MORRIS LLOYD MINE

ANNUAL REPORT

YEAR 1929

8. COST OF OPERATING

c. Detailed Cost Comparison

Screening and Crushing at Mine

	Amount	Per Ton
Year 1929	2,596.41	.006
Year 1928	3,274.95	.009
Decrease	678.54	.003

An increasing tonnage of ore is being crushed at the mine each Year.

In 1926	Tonnage	Crushed	was	58,976	Tons
In 1927	"	"	"	85,017	"
In 1928	"	"	"	90,316	"
In 1929	"	"	"	113,192	"

The total cost and unit cost for 1929 both show a decrease because of repairs to both the Morris and Lloyd shaft crushers were slight.

Dry House:

Year 1929	11,672.62	.027
Year 1928	10,831.25	.030
Increase	841.37	
Decrease		.003

Cost for fuel in 1929 and 1928 was $6,111.43 and $6,863.42 respectively. Cost for 1929 increased because the expense of laying new 4" water line from Lloyd Shaft to Concrete storage tank was charged to the Dry House and Compressors.

General Surface Expense

Year 1929	5,302.73	.012
Year 1928	4,809.07	.014
Increase	493.66	
Decrease		.002

Most of the increased cost was incurred by the building of a new launder to carry the surface drainage away from the area between the mine buildings and also provide adequate sewage facilities for the dry house.

Hoisting Equipment

Year 1929	4,667.38	.011
Year 1928	5,790.06	.016
Decrease	1,122.68	.005

Cost in 1929 below the normal for the past few years because only minor repairs were necessary on the hoists and equipment. We are also getting longer life for the hoisting ropes by using the discarded Morris shaft ropes in the Lloyd shaft. The Morris Mine ropes are 2100 feet long and by cutting off both ends and using the center 1350 feet we save the cost of new skip ropes for the Lloyd Shaft.

MORRIS LLOYD MINE

ANNUAL REPORT

YEAR 1929

8. COST OF OPERATING

c. Detailed Cost Comparison

Shaft

	Amount	Per Ton
Year 1929	2,217.41	.005
Year 1928	2,410.62	.007
Decrease	193.21	.002

Cost for 1929, just about normal. If the repair work necessary in the Morris shaft between the 6th and 7th levels had been started a little sooner, the year of 1929 would have shown but little change from 1928.

Top Tram Equipment

Year 1929	948.20	.002
Year 1928	2,014.53	.005
Decrease	1,066,33	.003

The maintenance cost of the top tram equipment for 1929 was unusually light being considerably below the normal for the past five years. We were fortunate in having no top tram cars run off the trestles.

Docks, Trestles and Pockets:

Year 1929	488.78	.001
Year 1928	1,516.39	.004
Decrease	1,027.61	.003

As in the case of the top tram equipment, the cost of maintaining the docks, rock trestles and pockets was unusually light in 1929, largely because they had been put in good shape during the years of 1926 and 1927.

Mine Buildings

Year 1929	4,564.87	.010
Year 1928	2,109.80	.006
Increase	2,455.07	.004

A new electricians building was built between the blacksmith shop and the tunnel underneath the engine House.

MORRIS LLOYD MINE

ANNUAL REPORT

YEAR 1929

8. COST OF OPERATING

c. Detailed Cost Comparison

A detail of the Costs Follow:
Cost of Maintaining Mine Buildings in 1928 and 1929.

	1928	1929
Office	622.03	221.17
Shops	241.76	1,433.23
Stables	58.43	6.00
Shaft House	175.12	174.91
Engine House	253.20	1,081.51
Dry House	677.12	1,509.26
Miscellaneous	11.95	85.28
Storage	70.19	0.00
Total	2,109.80	4,564.87

The heading shops includes the cost of providing new shop and Storehouse for mine electricians. The interiors of all three engine houses were painted and the machinery given two coats of enamel paint. The clothes racks in the drys were taken down and overhead chains and hooks provided.

Insurance

	Amount	Per Ton.
Year 1929	113.75	.001
Year 1928	117.63	.001
Decrease	3.88	

Small Decrease.

Engineering

Year 1929	3,440.96	.008
Year 1928	3,558.01	.010
Decrease	117.05	.002

Small decrease because of less engineering supervision.

Analysis

Year 1929	11,348.24	.026
Year 1928	11,552.63	.032
Decrease	204.39	.006

Cost of operating laboratory was less for 1929 because all the determinations were made locally. In 1928 considerable work was done for the Morris Lloyd Mine by the Negaunee Mine laboratory. The number of determinations for 1929 and 1929 was 41,858 and 38,479 and cost per determination was .2583 and .2914 respectivelly.

MORRIS LLOYD MINE

ANNUAL REPORT

YEAR 1929

8. COST OF OPERATING

c. Detailed Cost Comparison

Personal Injury Expense

	Amount	Per Ton.
Year 1929	7,377.87	.017
Year 1928	6,548.67	.018
Increase	829.20	
Decrease		.001

Increased because of larger pay roll footings in 1929. Two Per Cent of the pay roll is charged to this account each month.

Safety Department Expense

Year 1929	1,045.60	.003
Year 1928	220.43	.001
Increase	825.17	.002

Cost of gold buttons and knives given to the men for operating the mine without a lost time accident accounts for the increase.

Telephones and Safety Devices

Year 1929	1,858.71	.004
Year 1928	2,624.23	.008
Decreased	765.52	.004

Cost of supplying goggles, gloves, and hard hats was charged to this account in 1928. In 1929 these articles were paid for by the employees. In 1928 we also installed lamps and extention cords in all the working places underground.

Local General Welfare

Year 1929	3,202.05	.007
Year 1928	4,975.97	.013
Decreased	1,773.92	.006

Cost in 1928 above normal due to charging off old accounts against the North Lake Club House.

MORRIS LLOYD MINE

ANNUAL REPORT

YEAR 1929

8. COST OF OPERATING

c. Detailed Cost Comparison

Special Expenses

	Amount	Per Ton.
Year 1929	615.05	.001
Year 1928	416.38	.001
Increase	198.67	

This is a Central Office charge.

Mine Office

Year 1929	15,947.75	.037
Year 1928	16,847.15	.047
Decrease	899.40	.010

Decrease due to charging larger proportion of the supervisory expense to other properties.

Safety Expense

Year 1929	1,875.25	.004
Year 1928	0.00	.000
Increase	1,875.25	.004

A proportion of the Safety Picnic expense given on Labor day was charged to the Morris Lloyd Mine.

9. EXPLORATIONS AND FUTURE EXPLORATIONS:

No diamond drilling was done 1929, but we have planned to drill a number of holes 200 feet apart on the South side of the foot wall drift on the 8th level Morris Mine. A new foot wall drift will also be driven from the Morris to the Section 6 shaft at the 6th level, Morris Elevation.

MORRIS LLOYD MINE

ANNUAL REPORT

YEAR 1929

10. TAXES

The following tables show tax data for Ely and Ishpeming Townships and taxes paid by our company in these two townships.

	1929		1928	
Lloyd Mine & Sec. 6.	Valuation	Amount	Valuation	Amount
Realty	301,450	11,199.49	336,450	12,794.05
Personal	600,000	22,307.41	433,000	16,464.61
Total Lloyd & Sec. 6.	901,450	33,506.90	769,450	29,258.66
Morris Mine				
Realty	301,600	12,072.13	172,600	6,134.01
Personal	324,000	12,968.68	533,000	18,942.22
Total Morris	625,600	25,040.81	705,600	25,076.23
Grand Total	1,527,050	58,547.71	1,475,050	54,334.89
Product-Tons		435,430		356,164
Taxes Per Ton Produced		.1348		.1525
Shipments-Tons		629,388		393,184
Taxes Per Ton Shipped		.0922		.1382

Taxes Raised in Ely Township

Tax	1929	1928	1927
State	6,523.15	4,524.57	6,132.88
County	11,528.27	8,915.79	9,359.17
County Road	4,940.50	4,505.74	4,314.26
Highway Improvement	8,000.00	5,000.00	5,000.93
Road Repair	7,000.00	6,000.00	5,999.91
School	13,000.00	13,000.00	12,999.95
One Mill	1,711.77	1,638.22	1,816.60
Bridge	3,000.00	3,000.00	2,999.06
School Building	8,000.00	8,000.00	4,251.18
Township Contingent	4,000.00	3,000.00	3,500.35
Rejected Tax	39.95		
Total Tax	67,743.64	57,636.55	57,407.90
Tax Paid By C.C.I.Co.	27,086,32	26,818.13	34,222.89
Percentage of Tax Paid By C.C.I.Co.	39.62	46.53	59,80
Assessed Valuation	1,711,775	1,638,220.00	1,816,600.00
Tax Rate	3.957	3.519	3.160

MORRIS LLOYD MINE

ANNUAL REPORT

YEAR 1929

10. TAXES
(Continued)

Taxes Raised in Ishpeming Township

Tax	1929	1928	1927
State	4,999.05	3,259.46	4,141.88
County	8,834.75	6,422.87	6,315.58
County Road	3,786.18	3,245.90	2,914.20
Township Contingent	2,500.00	2,500.00	1,010.35
Highway Improvement	3,000.00	5,000.00	6,996.79
Road Repair	5,000.00	4,000.00	4,497.38
School Tax	18,687.62	18,820.00	18,486.98
One Mill Tax	1,312.38	1,180.16	1,227.00
Rejected	163.31	2.54	
Total Tax	48,283.29	44,430.93	45,590.16
Tax Paid by C. C. I. Co.	38,170.70	33,698.97	35,073.20
Percentage of Tax Paid by C.C.I.Co.	78.30	75.84	77.05
Assessed Valuation	1,312,380.00	1,180,160.00	1,227,000.00
Tax Rate	3.679	3.764	3.717

11. ACCIDENTS AND PERSONAL INJURY

The no lost time accident period which started at the Morris-Lloyd Mine on May 3, 1928, was continued for 445 days until it was broken by a trivial accident. Our record in December was marred by a fatality. Guido Boz was killed in the afternoon of December 10th, by a fall of ground. He was repairing a set of timber that had become dislodged by a blast when a large loose slab over the set broke through the lagging, catching him while he attempted to avoid it.

Our accident record for the past two years was as follows:

	1929	1928
No Loss Time Accidents	46	18
Compensible Accidents	2	6
Loss Time, But no Compensation Paid	1	3
Total	49	27

It will be noted that we had an increase in trivial accidents, while the accidents for which we paid compensation were reduced to two in number in 1929.

The Comparative severity rate for three years follow:

1927	17.1	days	lost	per	1000	days	worked.
1928	4.8	"	"	"	"	"	"
1929	6.7	"	"	"	"	"	"

MORRIS LLOYD MINE

ANNUAL REPORT

YEAR 1929

13. EQUIPMENT

a. Tugger Hoists and Scrapers:

Several new 15 H.P. Scraper Hoists were put into service increasing the total number on hand to 43. Near the close of the year a 25 H.P. unit was ordered, the intention being to use it where there is a considerable quantity of ore to be scraped over 200 feet. We are also trying out the large 48" Hoe Type Scrapers with these powerful units.

In order to speed up the main level drifting we also put into service a portable scraper slide and a second unit was ordered for delivery early in 1930. This is to supplement the Shovel loader that has given fine service for the past eighth or ten years.

b. Underground Motor Cars:

A 65 Cu. Ft. Rocker dump motor tram car was designed and put into operation in 1929. This car was so constructed that it is possible to lower it into the mine on our standard cage, by merely taking off the draw heads. Both the Easton Car Co. , and the Lake Shore Engine Works, prepared drawings and had cars in service in the Morris-Lloyd and Maas Mines before the year closed.

14. MAINTENANCE AND REPAIRS

a. A spare trolley locomotive was secured from the Crosby Mine and put into service on the new 8th level.

16. WATER SUPPLY

The old 4" wood water line between the Lloyd shaft and the Concrete water tank near the Section 6 dry, had been giving us trouble for years. A few spots in this line were replaced by steel pipe in 1928 and the rest of the line was rebuilt in 1929.

17. CONDITION OF PREMISES

The mine location houses were repaired and painted during the year. The porch roofs were renewed, sidings, window and door frames repaired or replaced as needed. All the houses were painted, except those on cottage street, which will be finished next season.

Nationality of Employees:

Finish	87
French	62
English	27
Italian	35
Scandanavians	29
Irish	2
Greek	1
Hollander	1
German	1
Total	245

Chas J Stokes Supt.

TILDEN MINE
ANNUAL REPORT
YEAR 1929.

1. GENERAL:

Construction work on the crushing plant was carried on throughout the winter and all the equipment was installed and ready to turn over by the middle of April. The building was not enclosed and all details completed until June.

The first blast of 85 churn drill holes was made on April 16th. These holes had been drilled during the summer and fall of 1928. The first ore was loaded on April 20th and the pit operated on a single shift for the balance of the month. The season's requirements of 441,769 tons were secured by November 6th. There were numerous delays in starting, on account of breaking in the new equipment and making adjustments in the crushing plant. Further, the transmission line to the Tilden Mine was not large enough for the amount of power consumed, which handicapped the operation of the shovel. All plans of operation for the Tilden Pit were based on a production of 250,000 tons. This tonnage was increased early in the season to 400,000 tons and then by small amounts to the tonnage shipped, 441,769 tons. With the increased sales it was necessary to purchase additional open pit equipment, which included a second 80-B Bucyrus-Erie Electric Shovel, two more cyclone churn drills and an additional locomotive and four cars.

We found the ore very hard and difficult to break, putting an unusual service on the pit and crusher equipment. The No.29 electric shovel transferred from the Ogden Mine, had been in use for three seasons without having any extensive repairs made and in the hard service at the Tilden was continually breaking down. In many instances it was necessary to wire the Manufacturer for repair parts, which tied up the shovel for several days at a time. The experience gained during the season's operations, while costly, will be of great value in the future.

2. PRODUCTION, SHIPMENTS & INVENTORIES:

a. Production of Grades.

Tilden Silica, 441,769 tons.

This production compares with 116,415 tons produced at the Ogden Mine during 1928, an increase of 325,354 tons.

b. Shipments.

The shipments from the Tilden Mine during 1929 was the same as the production figures, as all the ore mined was forwarded to Lake Erie ports.

c. Stockpile Inventories.

There is no ore in stock. We estimate approximately 33,000 tons of broken ore left in the pit from the last two blasts. In order to load out this tonnage, it will require some secondary blasting.

TILDEN MINE
ANNUAL REPORT
YEAR 1929.

PRODUCTION, SHIPMENTS & INVENTORIES (CONTINUED):

e. Product by Months.

Months.	Days Operated.	Average Daily Tonnage.	Total Tons.
April,	11	813	9,145
May,	28	1,970	55,182
June,	25	1,707	44,395
July,	26	1,997	55,931
August,	27	3,178	92,163
September,	24	3,120	78,005
October,	25	3,199	92,786
November,	5	2,832	14,162
Total,	171	2,583	441,769

The first ore for the season was loaded on April 20th and the mine operated day shift only.until May 1st when it went on a double shift. The second shovel wasput into service on July 14th, which made the loading of a large tonnage possible. On account of the many delays due to accidents to equipment, we worked each shift one quarter shift extra, or eleven hours, beginning August 19th to the end of the season.

f. Ore Statement.

	Year Tons.	Last Year Tons (Ogden).
On hand Jan.1, 1929,	None	None
Output for year,	441,769	116,415
Total,	441,769	116,415
Shipments,	441,769	116,415
Balance on hand,	None	None
Increase in output,	325,354	
Increase in shipments,	325,354	

1929. 1- 9 hour shift 6 days per week, April 20th to April 30, 1929.
2- 9 " shifts 6 " " " May 1st to Aug. 19, 1929.
2-11 " " 6 " " " Aug. 19th to Nov. 6, 1929.

1928. 1- 9 hour shift 6 days per week, Apr.26th to Aug. 20, 1928.
2- 9 " shifts 6 " " " Aug.20th to Sept. 2, 1928.
1- 9 " shift 6 " " " Sep. 2nd to Oct. 5, 1928.

g. Delays.

The mechanical and electrical delays during the season were numerous, to the drilling, loading and crushing equipment. Considering, however, the service that this machinery was put to, one wonders that it stood up as well as it did. As the drilling was a separate operation and the production was not affected by delays incident thereto, it is not listed.

TILDEN MINE
ANNUAL REPORT
YEAR 1929.

DELAYS
(CONTINUED):

DELAYS.

Month.	Duration.	Tons Lost.	Cause.
April,			Breaking in and making adjustments to crusher and loading equipment.
May,	4 1/4 hours,		Cars off track.
	20 "		Moving shovel in pit and trouble with trip cable.
	1 hour,		Adjustment of conveyor belt.
Total,	25 1/4 hours,	3,150	
June,	13 hours,		Repairs to crusher equipment.
	8 "		Repairs to electric shovel.
	9½ "		Cars off track and repairs to tracks.
Total,	30½ hours,	3,825	
July,	50 hours,		Repairs to No.29 electric shovel. Pedestal broke, stripped gears on main hoist.
	20 "		Crusher repairs, drive belt on 42" crusher broke.
	5 "		Car off track and repairs to track.
Total,	75 hours,	7,400	
August,	8 hours,		Hot bearing on generator set No.31 shovel.
	80 "		Saddle block on No.29 shovel broken on Aug.14th and had continual trouble throughout the month.
	7 "		Crusher blocked and repairs to conveyor belt.
	4 "		Car off track.
	5 "		Chain on door of D.S.S.& A.Ry. car broke dumping ore on track at loading pocket.
Total,	104 hours,	18,450	
Sept.,	30 hours,		Crushing Plant - broke spider car on 42" crusher and shaft on revolving grizzly.
	48 "		No.29 shovel - changed saddle block and dipper sticks.
	42 "		No.31 shovel burnt out coil on motor generator set.
	3 "		Cars off track.
Total,	123 hours,	14,600	
Oct.,	43 hours,		Snow storm and could not operate pit.
	49 "		Mechanical and electrical trouble on No.29 shovel.
	7½ "		Moving back and grading for loading track.
	5 "		Crushing plant.
	1 hour,		locomotives.
Total,	105½ hours,	13,300	
Nov.,	14 hours,		Repairs to No.29 shovel.
	4 "		Repairs to No.31 shovel, burnt out bearings.
	13 "		Rebabbitting concaves in 42" crusher.
Total,	31 hours,	4,300	

Total for season 494 1/4 hours - 65,025 tons.

TILDEN MINE
ANNUAL REPORT
YEAR 1929.

DELAYS (CONTINUED):

There were numerous delays in starting operations in April, on account of breaking in new equipment and making adjustments to the crushing machinery, the most important of these being an increase in the speed of the conveyor belt from 275' to 400' per minute.

The most serious delay in July was due to the stripping of the gears on the main hoist on the No.29 shovel. This laid up the shovel for 14 days before repair parts could be secured from the factory and the shovel was ready to load again. On August 14th, one of the saddle blocks broke and while temporary repairs were made, it gave continual trouble until September when a new dipper stick and saddle blocks were installed. One arm of the dipper stick developed a crack early in the month. It was reinforced by a metal patch, but the bolts continually sheared off. A new one was ordered by phone and was received the first of September.

The No.31 shovel was put into operation on July 14th and gave considerable trouble due to the bearings on the motor generator set running hot. A number of times they were burnt out. In September, some block holing was done near the No.31 shovel and a small piece of rock went through the back of the shovel and struck the motor generator set and caused a short circuit between two coils, burning out one. This tied the shovel up for 37 hours until it was ready to run again.

On July 12th, the belt connecting the motor with the 42" crusher broke and it took over a shift until repairs could be made. On September 5th, when dumping a car at the crusher, a large chunk struck the spider cap and broke it. It took 13 hours to make temporary repairs. The shaft of the revolving grizzly broke on September 12th, and a plate was put across the opening, all the material going through the reduction crushers. After we were forced to make this change and the dirt from the pit was very fine, it passed through the large crusher too fast and choked the small crusher. A bar grizzly was installed and worked more satisfactorily as it took out more of the fines than did the revolving one and as a result we are securing a better ribbon of ore on the conveyor belt, in that the fines form a cushion for the large pieces.

The numerous delays due to cars off the track early in the season was reduced somewhat by hiring an experienced track foreman who kept the pit tracks in good condition.

h. Delays From Lack Of Current.

Early in the season's operations, we were handicapped by a shortage of electric power. The line to the mine was not large enough to carry the load and as a result the shovels moved very slowly at times due to low voltage. This condition was corrected in part by the last week in May by the Cliffs-Power & Light Company erecting a synchronous motor and ran it as stabilizer on the line with a marked improvement in the power factor. After the second electric shovel was put into service in July, a new transmission line was installed and larger cables used for supplying the shovels.

TILDEN MINE
ANNUAL REPORT
YEAR 1929.

DELAYS (CONTINUED):

DELAYS.

Date.	Hours.	Tons Lost.	Cause.
May 1st,	3	400	No current.
11th,	1½	200	Low voltage. Crusher blocked.
15th,	2	250	Power off. Crusher blocked.
17th,	4	500	No current.
21st,	1½	200	No current.
Jun.10th,	2	250	No current.
10th,	1	125	Low voltage. Crusher blocked.
Sep.27th,	1	100	No current. Snow storm.
Total,	16	2025	

3. ANALYSIS:

a. Average Mine Analysis on Output.

Grade.	Iron.	Phos.	Sil.	Mang.	Alum.	Lime.	Mag.	Sul.	Loss by Ignition.
Tilden Silica,	39.90	.043	40.85	.06	.96	.30	.22	.010	.35

b. Average Analysis on Straight Cargoes.

	Mine.			Lake Erie.	
Grade.	Iron.	Phos.	Sil.	Iron.	Moist.
Tilden Silica,	40.01	.043	41.14	40.42	2.81

4. ESTIMATE OF ORE RESERVES:

a. Developed Ore.

Assumption: 14 cu. ft. equals one ton.
10% deduction for rock.
All ore is Tilden Silica Grade.

Ore in sight January 1, 1929, Upper Bench, - -	1,560,000 tons
Mined during 1929 from Upper Bench, - - - -	441,769 "
Ore in sight January 1, 1930, Upper Bench, - -	1,118,231 "
Ore in sight January 1, 1930, Lower Bench, - -	1,870,000 "
Total developed ore January 1, 1930, - - - -	2,988,231 tons

b. Prospective Ore.

In addition to the developed ore there is an indeterminate but probably a very large tonnage of ore adjoining the pit on the Northwest. This ore has not been proven by drilling, but is indicated by outcrops and old test pits.

TILDEN MINE
ANNUAL REPORT.
YEAR 1929.

ESTIMATE OF ORE RESERVES (CONTINUED):

e. Estimated Analyses.

	Iron.	Phos.	Sil.	Alum.	Mang.	Lime.	Mag.	Sul.	Ign.	Moist.	
Dried 212°,	42.50	.046	35.10	.67	.120	.48	.31	.014	.90		
Natural,	40.93	.044	33.80	.65	.116	.46	.30	.013	.87	3.70	

5. LABOR & WAGES:

a. Comments:

1. Labor.

The labor conditions at the mine were very satisfactory; at no time was there a shortage of men. After completing our season's shipments on November 6th, we laid off all but the churn drill crews, shovel and locomotive engineers and a few shop men, a total of 43 men. The drill crews continued drilling for the 1930 ore and the other men were employed on repairs of the open pit and crusher equipment.

2. New Construction.

All new construction work was done by our regular mine labor and charged to the proper E. & A.

b. Comparative Statement of Wages and Product.

	1929.	
Product,	441,769	Mine not opened until 1929.
No. shifts and hours,	2 - 9	
Average No. of men working,	72	
Average wages per day,	4.68	
Tons per man per day,	33.71	
Labor cost per ton per Labor Statement,	.139	
Labor cost per ton per Cost Sheet,	.152	
Total No. days,	13102 1/4	
Amount paid for labor per Labor Statement,		$61,439.38
Amount paid for labor per Cost Sheet,		64,070.43

TILDEN MINE
ANNUAL REPORT
YEAR 1929.

7. OPEN PIT.

OPERATIONS:

a. Stripping.

Stripping operations were started early in April with the small Erie shovel. The loose dirt at the East end of the pit that was washed down last fall from the ore to be blasted at the beginning of the season was overcast down the bank. After the initial blast of the season on April 16th, it graded for the spotting track and then worked Westward, loading the sand and gravel that had accumulated from the hydraulic stripping at the foot of the hill. It continued this work until about the middle of July when it had reached the West end of the pit. The equipment used with the Erie shovel consisted of four 1 1/4 yard dump cars and a ton and half gasoline locomotive. The total yardage handled by the Erie shovel was 3360 yards.

Hydraulic stripping was started about the middle of May, as soon as there was electric power enough to operate the pump in addition to all other pit and crusher equipment. The washing was confined to the West end of the property until the early part of August when work was started on top of the bank North of the center of the pit. It was necessary to remove all dirt that would drain to the South before any blasting was done at the extreme West limit of the pit. A ditch was blasted in the rock which carried all the surface material and prevented it from spreading over the already cleared area to the South. This area was finished by the end of August, except a small yardage of coarse gravel and boulders which were removed during September by team and scraper. The washingduring the balance of the year was at the extreme Northwest end of the pit area. The stripping was slow in this area. The surface was deeper and covered with heavy roots of trees. There is also a layer of hardpan on top of the ore that requires blasting to loosen it up. Washing was discontinued about the middle of November on account of the cold weather. The total yardage removed by washing for the season amounted to 10,005 yards.

Some sand and gravel had accumulated on the top bench at West end of the pit from the washing above. Before blasting here early in September, it was necessary to clean this area. The No.31 shovel overcast 300 yards on Sunday, August 25th.

After loading operations were completed in November, the No.31 shovel moved several hundred yards of rock, taking off the corner at the East end of the pit. This was done so as to give us a better track alignment. We rented dump cars from the L. S. & I. Railroad Company and dumped the material along the track to the crushing plant. This track is on a fill and the shoulders were very narrow. This additional material built out this fill and has put this piece of track in good shape. The topping of rock will protect wash from heavy rains.

TILDEN MINE
ANNUAL REPORT
YEAR 1929.

OPEN PIT.

OPERATIONS:

Stripping (Continued).

The yardage stripped by months was as follows:

Month.	Yards Erie Shovel.	Yards Washing.	Yards Total.
May,	1,305	420	1,725
June,	1,575	960.	2,530
July,	480	3,055	3,535
August,		2,090	2,090
September,		1,490	1,490
October,		1,520	1,520
November,		470	470
Total,	3,360	9,705	13,365

Statement of Stripping Cost.

	1927.	1928.	1929.	Total.
Cubic yards stripped,		23,000	13,365	36,365
Holmes Mine,	53.53			53.53
General storehouse,	68.60			68.60
Cliffs Shaft Mine,	510.85			510.85
Ogden Mine,	1197.40			1197.40
Labor at mine,		7455.47	5600.20	13055.67
Supplies at mine,		6535.24	4222.15	10757.39
Total,	1830.38	13990.71	9822.35	25643.44
Cost per cubic yard	#	.688	.742	.705

1927 charges installation expense and added to 1928 in cost per yard.

e. Open Pit Operation.

Open pit operations were started on April 16th when 85 holes were blasted, breaking about 80,000 tons. The small Erie shovel graded for a loading track along the edge of the upper bench. The first ore was loaded on April 20th with the No.29 electric shovel. Loading was slow at first while working at the toe of the pile and due also to a shortage of electric power. The pit was worked on a single shift until May 1st when we went on a double shift. The night shift went on duty at ¥ 4:30 P. M. when the day shift had completed their nine hours and worked until 2:00 A. M. In this way we had the advantage of three and a half to four hours of day light on this shift. As we transported the men from Ishpeming to the mine, it was an additional advantage in that the truck brought out the night crew when they came for the day shift men.

The two locomotives, one from the Ogden Mine and the other from the Jackson Mine, with a train of four quarry type cars, transported the ore from the pit to the Crushing Plant.

TILDEN MINE
ANNUAL REPORT
YEAR 1929.

OPEN PIT.

OPERATIONS:

Open Pit Operations (Continued).

The open pit equipment was for a production of 250,000 tons. When this tonnage wqs increased to 400,000 tons, a second 80-B Bucyrus-Erie electric shovel, locomotive and train of four cars, and two cyclone churn drills were ordered. The new shovel was received at the end of June and went into service on the 14th of July. A 35-ton second hand saddle-back locomotive was purchased from the Mesaba Range and after being overhauled was put into service on the 22nd. Three trains were then operated. One train was being loaded by each shovel, while the third was being dumped at the crusher. Four more ore cars were received and put into service during August.

On July 2nd the gears of the main hoist on the No.29 shovel were stripped, laying it up for 14 days. As the new shovel was just being erected, a Marion 60 steam shovel was put into operation and loaded a fair tonnage along the edge of the working level.

After the two electric shovels were operating again, it was necessary to blast at about two week intervals in order to keep a sufficient tonnage of broken ore for the shovels to load. This frequent blasting had quite a disadvantage, in that before each blast the shovels had to be moved back out of the way and all tracks directly in front of the holes blasted had to be taken up. After the blast it was slow loading until a track grade was made and a full train of cars could be loaded by the shovels.

It was not until September that our drilling gained on the loading operation. Up to this time, the shovels cleaned up the broken ore almost before we were ready to make a blast. In many instances, we had to blast with a lost hole between two others, which left the toe solid in places and difficult to dig, necessitating a large amount of secondary drilling and blasting. Digging against these solid faces was very hard on the shovel equipment and responsible for the many breakdowns.

We have been operating our drills this winter and will drill two complete rows of holes across the full length of the pit. We estimate these holes will break between 225,000 and 250,000 tons of ore and with the 33,000 tons of broken ore left from last season, we will have a substantial tonnage to start next season.

f. Drilling, Blasting and Explosives.

The 85 holes drilled during the summer and fall of 1928 at the East end of the pit were blasted on April 16th. One cyclone drill was started on April 19th, a second on the 23rd and the third on the 25th. These drills were operated on one shift until May 1st when they were put on two shifts. It was soon realized with the increased tonnage desired that it would require more drills to break the ore. Two new ones were ordered and until they were received, one was rented from the Volunteer Mine, of the Pickands-Mather Company at Palmer. This drill was worked from June 4th to 22nd, when the new ones were set up and ready to run.

TILDEN MINE
ANNUAL REPORT
YEAR 1929.

OPEN PIT.

OPERATIONS:

Drilling, Blasting and Explosives (Continued).

The ore is very hard and tough and in places badly fractured, making drilling difficult. The holes go off of line and the tools stick, causing a great deal of trouble. We found by experience that drilling the holes 25' from the face of the cut was too much burden and caused considerable back break which made the drilling of the next row of holes very difficult. The distance was reduced to 20' with 15' between the holes along the face. We had a great deal of trouble with the drilling tools, such as bits, stems and jars. We have been experimenting with different makes of tools and are gradually improving conditions.

Statement of Holes Drilled.

	Holes.			Feet.		
Month.	No. Drilled.	No. Lost.	Total.	Drilled.	Lost.	Total.
April,	5½		5½	387		387
May,	32	3	29,	2055	185	1870
June,	50	0	50	2690		2690
July,	50	3	47	3302,	220	3082
August,	69	16	53	3970	380	3590
September,	36	1	35	2674	51	2623
October,	35	1	34	2302	49	2253
November,	33		33	3014		3014
December,	25	1	24	2349	101	2248
Total,	335½	25	310½	22743	986	21757

The above table shows the drilling done during the year 1929. On October 21st, we had sufficient holes drilled for our 1929 tonnage. The cost of drilling from October 21st to the end of the year is being carried in a deferred account and will be charged to the ore mined in 1930.

Division of Drilling Between 1929 and 1930 Ore.

	Holes.			Feet.		
	No. Drilled.	No. Lost.	Total.	Drilled.	Lost.	Total.
1929 ore,	266	24	242	16579	885	15694
1930 ore,	69½	1	68½	6164	101	6063
Total,	335½	25	310½	22743	986	21757

TILDEN MINE
ANNUAL REPORT
YEAR 1929.

OPEN PIT.

OPERATIONS:

Statement of Drilling for 1929 Tonnage.

	Holes.			Feet.		
	No. Drilled.	No. Lost.	Total.	Drilled.	Lost.	Total.
1928,	88	3	85	3782	91	3691
1929,	266	24	242	16579	885	15694
Total,	354	27	327	20361	976	19385

Statement of Blasts Made in 1929.

Blast No.	Date.	Section of Pit.	No. Holes.	Total Depth.	Pounds Powder.	Estimated Tons Broken.	Tons Per Ft. of Hole.	Tons Per Lb. of Powder.
1	Apr.16	East	85	3610	20000	80000	22	4.0
2	May 15	East	29	1960	18800	50000	25	2.6
3	Jun.18	Center	13	807	8400	25000	30	3.0
4	Jul.13	W.of Center	47	2333	20650	50000	22	2.4
5	Jul.24	East	21	1647	12150	38000	23	3.1
6	Aug.14	E.of Center	4	325	2300	7000	21	3.0
7	Aug.21	East	17	1425	13600	40000	28	3.0
8	Sep. 7	Center & West	57	3400	28300	95000	28	3.3
9	Oct. 4	Center	17	1610	12000	40000	25	3.3
10	Oct.14	West	12	470	3400	10000	21	3.0
11	Oct.26	West	21	1450	12500	40000	28	3.2
Total,			323	19037#	152100	475000	25	3.12

The footage of holes blasted does not check the footage of holes completed, namely, 19,385', by 348'. After a hole is completed, it sometimes caves and fills in the bottom few feet. The figure used in the above table is footage of hole actually blasted.

TILDEN MINE
ANNUAL REPORT
YEAR 1929.

OPEN PIT.

OPERATIONS:

Cost of Churn Drilling.

16580' of Holes Drilled.

Operating.	Labor.	Supplies.	Total.	Cost Per Ft.
Drilling at mine,	$13622.04	$ 5963.61	$19585.65	$1.181
Building roads,	2033.55	529.36	2562.91	.154
Sharpening bits,	1093.57	248.50	1342.07	.081
Pipe and fittings,	66.89	340.43	407.32	.024
Rope,		2001.65	2001.65	.121
New drill bits,		558.84	558.84	.034
Drilling tools,	43.58	4.86	48.44	.003
Electric cable,		54.52	54.52	.003
Electric power,		609.53	609.53	.037
Truck & Tractor,	636.71	177.16	813.87	.050
Total operating,	$17496.34	$10488.46	$27984.80	$1.688
Maintenance.				
Drills,	407.70	1555.41	1963.11	.119
Sharpener,	84.80	72.49	157.29	.009
Total maintenance,	$492.50	$1627.90	$2120.40	$ .128
Grand total for 1929,	$17988.84	$12116.36	$30105.20	$1.816
Grand total for 1928,	$3531.09	$1998.95	$5530.04	$1.462
Other labor and supplies,			3365.69	
Total cost for 20362' of holes for ore broken 1929,			$39000.93	$1.905

Cost of Drilling and Blasting.

	Primary Blasting.		Secondary Blasting.		Total.	
	Amount.	Per Ton.	Amount.	Per Ton.	Amount.	Per Ton.
Drilling,	$39000.94	$.088	$1853.85	$.005	$40854.79	$.093
Explosives,	25153.96	.058	1279.25	.003	26433.21	.060
Total,	$64154.90	$.146	$3133.10	$.008	$67288.00	$.153

TILDEN MINE
ANNUAL REPORT
YEAR 1929.

OPEN PIT.

OPERATIONS:

Distribution of Explosives Used.

PRIMARY BLASTING.

Kind.	Quantity.	Avg. Price.	Total.
#4 Hercomite, - - - - - - -	4350	$12.75	$556.91
40% Gelatine, - - - - - - -	34150	12.00	4098.00
60% Gelatine, - - - - - - -	36000	14.25	5130.00
80% Gelatine, - - - - - - -	74650	18.25	13623.38
Total powder,	149150	$15.69	$23408.29
Blasting Supplies.		Per M.	
Caps #6, - - - - - - - - -	4000	$11.70	$46.80
Electric blasting caps, - - -	100	6.80	6.80
Californian cap crimper, - - -	1		22.00
Crescent fuse, - - - - - - -	9000'	6.24	56.16
Eagle brand fuse, - - - - - -	6000'	5.77	34.65
Dbl: Countered Cordeau Bickford fuse,	24980'	48.87	1221.15
Single Countered Cordeau Bickford fuse,	8407'	42.50	358.11
Total fuse, caps, etc,			$ 1745.67
Total all explosives for Primary Blasting,			$25153.96

SECONDARY BLASTING.

60% Gelatine, - - - - - - -	8550	$14.25	$1218.37
Total powder,	8550	$14.25	$1218.37
Blasting Supplies.			
Caps #6, - - - - - - - - -	2000	$11.70	$23.44
Crescent fuse, - - - - - - -	6000	6.24	37.44
Total fuse, caps, etc,			$60.88
Total all explosives for Secondary Blasting,			$1279.25
Total all explosives as per cost sheet,			$26433.21

TILDEN MINE
ANNUAL REPORT
YEAR 1929.

OPEN PIT.

OPERATIONS:

Statement of Explosives Used.

Kind.	Quantity.	Avg. Price.	Total.
#4 Hercomite,	4350	$12.75	$ 556.91
40% Gelatine,	34150	12.00	4098.00
60% Gelatine,	44550	14.25	6348.37
80% Gelatine,	74650	18.25	13623.38
Total powder,	157700	$15.61	$24626.66
Blasting Supplies.		**Per M.**	
Caps #6,	6000	$11.70	$70.24
Crescent fuse,	15000'	6.24	93.60
Eagle brand fuse,	6000'	5.77	34.65
Dbl; Countered Cordeau Bickford fuse,	24980'	48.87	1221.15
Single Countered Cordeau Bickford fuse,	8407'	42.50	358.11
Electric blasting caps,	100	6.80	6.80
1 Cap crimper,			22.00
Total fuse, caps, etc,			$1806.55
Total all explosives as per cost sheet,			$26433.21
Product,			441,769
Pounds of powder per ton of ore,			.0035
Cost per ton for powder,			.055
Cost per ton for fuse, caps, etc,			.005
Cost per ton for all explosives,			.060
Average price per pound for powder,			.1561

Statement of Churn Drill Bits Sharpened.

Month.	No. Churn Drill Bits Sharpened.	Feet of Holes Drilled.	Feet of Hole Per Bit Used.
April,	41	387	9.4'
May,	201	2055	10.2
June,	203	2690	13.2
July,	296	3302	11.2
August,	439	3970	9.0
September,	406	2674	6.6
October,	406	2302	5.7
November,	407	3014	7.4
December,	416	2349	5.6
Total,	,2815	22743	8.08

TILDEN MINE
ANNUAL REPORT
YEAR 1929.

8. COST OF OPERATING:

a. Comparative Mining Costs.

Production.	1928.	1929.
Ore produced,		441,769
Average daily product,		2,482
Tons per man per day,		33.71
No. days operating,		178
No. shifts and hours,		2 - 9 & 1 - 9
Budget estimated production,		250,000
Budget estimated cost at mine,		.503
Costs.		
Pit operating accounts,		.328
Pit general accounts,		.019
Cost at mine per cost sheet,		.347
Depreciation.		
Plant and equipment,		.057
Movable equipment,		.010
Taxes,		.015
Central office,		.011
Welfare, safety, hospital, etc,		.007
Stripping,		.016
Supply inventory,		.000
Total cost at mine,		.483
Expenses Beyond Mines.		
Rail freight,		.640
Lake freight,		.760
Cargo, insurance and analysis,		.010
Shrinkage,		.011
Total cost lower lake ports,		1.904

TILDEN MINE
ANNUAL REPORT
YEAR 1929.

COST OF OPERATING:

b. Detail Cost Comparison.

The Tilden Mine was not opened up until 1929, and no detail cost comparison can be made. We feel the operating cost was very high during the past year, due to the many delays caused by failure to equipment. Many of the causes will be overcome by the experience gained during the past year, but on account of the extreme service this equipment is put to, there will always be some breakdowns.

9. EXPLORATIONS AND FUTURE EXPLORATIONS:

The depth of the overburden in the swamp North of the Tilden Pit was tested by putting down three standpipes. A churn drill was moved to the top of the hill about the middle of April and the first standpipe put down 100' Northwest of diamond drill hole No.8. No.2 and No.3 were put down 100' apart extending the line Northwest. Ledge was struck at depths of 13', 13' and 8', respectively.

Summit Mountain Exploration.

The Summit Mountain deposit is located in the $S\frac{1}{2}$ of the $NE\frac{1}{4}$ of Section 6, 47-27, about one half mile East of the New Tilden Pit. The test pits and outcrops of the Summit Mountain deposit indicate a siliceous ore of very low phosphorus content. As there is a demand for siliceous ore of this grade, diamond drilling to further test the grade of this deposit was started in November.

On account of weather conditions and the unusual depth of snow in the woods, work of getting started was very slow. We had difficulty in getting a water supply near the operation due to ledge being so close to surface. Finally a pipe line was laid to the dam used for the pump station at the Tilden Pit. This location increased the pumping head to over 300' and an electric pump from the Republic Mine had to be installed.

Two diamond drills started actual drilling on December 16th. Eight holes have been planned to be drilled, in four sections 300' apart. Two holes have been planned to cut the respective layers of the formation in each section. One hole on each section will be drilled from the top of the hill and the second at a point about 200' South. The most Westerly section on the edge of the deposit is being drilled first. The results as far as the phosphorus is concerned was not encouraging although averaging about half of what the Tilden ore runs. We feel sure that the sections to the East will check out the test pits, with a phosphorus of about .012%.

Hole No.13, drilled from the top of the hill was down 80' and No.12, which is located 200' South of No.13, was down 54' on January 1st.

TILDEN MINE
ANNUAL REPORT
YEAR 1929.

10. TAXES:

Tilden Township.
Tilden Mine.

	1929. Values.	1929. Taxes.	1928. Values.	1928. Taxes.
N½ of NW¼ Sec.26, 47-27, - -	$116,000	$4672.91	$25,000	$992.15
SE¼ of SW¼ Sec.23, 47-27, - -	4,000	161.14	4,000	158.74
Supplies and equipment, - -	40,000	1611.35		
Total Tilden,	$160,000	$6445.40	$29,000	$1150.89
Ogden Mine.				
Supplies and equipment, - -			36,000	1428.69
Lot 3, Section 13, 47-27, - -	150	6.04	150	5.95
Part of Lot 4, Sec.13, 47-27, -	100	4.03	100	3.97
Lot 5, Section 13, 47-27, - -	150	6.04	44,000	1746.18
SW¼ of SW¼, Sec.13, 47-27, - -	200	8.06	200	7.94
Total Ogden,	$160,600	$6469.57	$109,450	$4343.62
Collection fees,		64.70		43.44
Total Ogden-Tilden,	$	$6534.27		$4387.06

11. PERSONAL INJURIES:

There were four accidents at the Tilden Mine during the past year. Three of these were of a serious nature requiring compensation payment. A short description follows:

Report No.2.

Name: Helmer Solem, Date: August 24, 1929 - 10:00 A. M.
Cause: Solem was operating the nozzle for the hydraulic stripping. The pump which supplies the water was down for minor repairs. There is about 30' of 3" pipe leading off the 6" pipe to the nozzle. When the pump was started up the bushings connecting the 3" and 6" pipes broke out and the piece of 3" pipe swung around striking Solem on the right instep.

Nature of Injury: Fracture of second metatarsal bone right foot.

Time lost: 8 1/3 weeks. Compensation paid $126.66.

Report No.3.

Name: Edward Pietro, Date: September 10, 1929 - 2:00 P. M.
Cause: Pietro was drilling a vertical hole with a jack hammer machine. The drill steel wedged in the hole and the handle of the machine flew back striking Pietro in the left side.

Nature of Injury: Left inguinal hernia.

Time lost: 9 1/3 weeks. Compensation paid $168.00.

TILDEN MINE
ANNUAL REPORT
YEAR 1929.

PERSONAL INJURIES (CONTINUED:)

Report No.4.

Name: John F. Dawe, Date October 9, 1929 - 5:30 P. M.
Cause: Dawe, Crusher Engineer, was walking around inspecting the crusher when a piece of ore flew up from the crusher and struck him in the left eye.

Nature of Injury: Contusion of left eye.

Time lost: 3 days. Compensation paid None.

Report No.5.

Name: Clinton Doney, Date December 14, 1929 - 1:00 P. M.
Cause: Doney had assisted the tractor driver put in a new magneto and make other repairs to the tractor. After the repairs were made Doney cranked the engine. The spring did not throw the crank out and it continued to spin around. Doney did not notice this and in stepping away the crank struck him on the right arm.

Nature of Injury: Fracture of right radius.

Time lost: Has not yet returned to work. Compensation paid - case not closed.

12. NEW CONSTRUCTION AND PROPOSED NEW CONSTRUCTION:

E. & A. No.514, Opening and Equipping Tilden Mine.

The excavation for the crusher plant was completed on January 22nd and the forms for concrete erected. The concrete work was all poured early in February and the two small crushers and their motors were set up and grouted in. The steel members of the building from the Maas plant were erected and enclosed with corrugated iron by the end of May.

The 42" auxiliary gyratory crusher was received, erected and ready to turn over by the end of March. During the early partm of April the chutes and other details about the plant were completed so that everything was ready for operation by the 20thnof April when the first ore was loaded. The belt conveyor trestle and enclosure was completed in March. The rollers were put in place and belt put on in April. A shanty for the pocket men and sampler was built on the North side of the loading pocket. A small sample crusher and motor purchased from the Republic Mine was installed in this shanty.

The dry, shop and office building, while in use, was not finished until in the summer. The outside was gunited and also the interior of the change room. The old office building was moved down from the top of the hill to just West of the shop and is being used for an oil house.

TILDEN MINE
ANNUAL REPORT
YEAR 1929.

NEW CONSTRUCTION AND PROPOSED NEW CONSTRUCTION:

E. & A. No.514, Opening and Equipping Tilden Mine (Continued).

The old Salisbury barn was dismantled in September and all the material moved to the Tilden Mine. After loading operations were finished work on the round house or equipment storage building was started. It was erected on the flat area at the East end of the pit. It was all enclosed and roof covered with galvanized corrugated sheets by the end of the year. Both the exterior and interior will be gunited in the spring.

The road from the Cliffs Drive to the Mine was graded and surfaced with rock and was in good shape by the middle of the summer. This work was done by Tilden Township and the Company billed for the cost. From time to time when labor was available, the road extending South to the dam was improved.

13. EQUIPMENT AND PROPOSED EQUIPMENT:

a. Shovels.

The new 80-B Bucyrus-Erie electric shovel was received on June 27th, and erected in very fast time. It went into service on July 14th. This work was rushed as much as possible as the No.29 electric shovel had stripped the gears of the main hoist on July 2nd and was idle waiting for repairs. The purchase price and cost of erecting was covered by E. & A. No.550.

E. & A. No.550, Cost of and Erecting 80-B Bucyrus-Erie Electric Shovel.

Contract price of shovel,	$50,500.00
Freight, - - - -	964.07
Cost of erecting, - -	2,787.55
Total charge to E. & A. 550,	$54,251.62

b. Locomotives and Cars.

The transportation equipment includes the following:

1 Second hand Dixon locomotive from Ogden Mine,
1 Second hand Dixon locomotive from Jackson Mine,
1 35 ton second hand Saddle-back locomotive purchased from Nelson Machinery Co.
2 40 ton Pittsburg 17" x 24" - 4 driver locomotives, purchased from Oliver Iron Mining Company December 1929.
12 Easton duplex cars, fitted with 2-10 yard Phoenix bodies,
8 purchased on E. & A. 514 in 1928, cost $2250.00 each,
4 purchased on E. & A. 550 in 1929, cost $2675.00 each.

TILDEN MINE
ANNUAL REPORT
YEAR 1929.

EQUIPMENT AND PROPOSED EQUIPMENT:

Locomotives and Cars (Continued).

The two 40-ton locomotives were purchased to take the place of the two small ones in use during the past season. These machines would require a great deal of repairs to put them in condition for another season and then it is questionable if they would be heavy enough for the work on account of the track grade in the pit. Rather than spend any money on these machines, the two 40-ton locomotives were purchased at a very low price of $1000.00 each, F.O.B. Virginia, Minnesota, and had been completely overhauled in 1926 and have not been in service since. The total cost will be $3000.00, which is covered by E. & A. No.567.

The cars which were built by the Easton Car & Construction Company of Easton, Pennsylvania, are of very strong construction and have stood up well under the service. We find the body of the car allows an unusual amount of spill when being loaded by the shovels, which is a big handicap for shifting tracks in the pit. This is due to the shape of the Phoenix Body and steps are being taken to correct this before next season.

c. Crusher Plant.

The crusher equipment includes the following:

2 10" Allis Chalmers Superior McCully reduction crushers,
1 from Maas Mine plant,
1 new cost $6897.00.
1 42" Bulldog Type T gyratory crusher, bought from The Traylor Engineering & Mfg. Co., cost $23,450.00.
1 36" Belt Conveyor, Allis Chalmers Co. from Maas Mine plant.

d. Drilling Equipment.

2 14# Sanderson Cyclone electric traction drills, from Ogden Mine, purchased in 1925.
1 14# Sanderson Cyclone electric traction drill, from Ogden Mine, purchased in 1928.
2 14# Sanderson Cyclone electric traction drills, purchased 1929, cost $7156.11.
1 6# Armstrong bit dressing machine, cost $1286.00.
1 Sullivan drill sharpener from Republic Mine.

STATEMENT SHOWING EXPENDITURES TO E & A 514 OPENING AND EQUIPPING TILDEN MINE
TO DECEMBER 31, 1929.

ACCT. NO.		ESTIMATED.	EXPENDED TO DATE.	UNEXPENDED BALANCE.
1.	Diamond drilling, - - - - - - - -	11,000.00	10,795.81	204.19
2.	Undepreciated value of Ogden equipment, -	35,000.00	35,948.55	948.55
3.	Undepreciated value of Maas equipment, -	25,000.00	19,471.64	5,528.36
6.	Moving & Erecting Ogden Equipment.			
	a. Moving drills and equipment, - - -	100.00	102.80	2.80
	b. Moving & Erecting Air Compr:			
	1. Foundation, - - - - - - -	500.00	259.24	240.76
	2. Moving and erecting, - - - - -	500.00	377.12	122.88
	3. Elect. connections, - - - - -	200.00	226.77	26.77
	4. Laying pipe line to pit, - - - -	300.00	520.90	220.90
	Sub-total,	1,500.00	1,384.03	115.97
	c. Moving Steam Shovel.			
	1. Power line, - - - - - - - -	1,000.00	1,188.77	188.77
	2. Widening road, - - - - - - -	500.00	455.57	44.43
	3. Moving shovel, - - - - - - - - &	500.00	511.60	11.60
	Sub-total,	2,000.00	2,155.94	155.94
	d. Moving Pump, Pipes, Rail, Etc. - -	400.00	99.49	300.51
	Total,	4,000.00	3,742.26	257.74
7.	Railroad Tracks.			
	a. Crusher to pit.			
	1. Clearing and grading, including trestle, culverts, etc, - - -	6,000.00	4,108.41	1,891.59
	2. Track, inst. rail, ties, switches, etc, Laying track and ballast, - - -	13,000.00	6,758.87	6,241.13
	Sub-total,	19,000.00	10,867.28	8,132.72
	b. Connecting Track to Main Line.			
	1. Clearing & grading, as above, - -	2,000.00	4,973.50	2,973.50
	2. Tracks, as above, - - - - - -	2,000.00	32.40	1,967.60
	Sub-total,	4,000.00	5,005.90	1,005.90
	Total railroad,	23,000.00	15,873.18	7,126.82
8.	Railroad Cars.			
	a. 6-20 cu. yd. cars, - - - - -	19,000.00	18,000.00	1,000.00
	b. Freight, - - - - - - - - -	1,000.00		1,000.00
	Total,	20,000.00	18,000.00	2,000.00
	Forwarded,	118,000.00	103,831.44	14,168.56

STATEMENT SHOWING EXPENDITURES TO E & A 514 OPENING AND EQUIPPING TILDEN MINE TO DECEMBER 31, 1929 (CONTINUED).

ACCT. NO.		ESTIMATED.	EXPENDED TO DATE.	UNEXPENDED BALANCE.
	Brought Forward, - - - - - -	118,000.00	103,831.44	14,168.56
9.	Crushing Plant.			
	a. Foundations, - - - - - -	6,500.00		
	1. Excavation, - - - - - -		6,059.31	
	2. Forms, - - - - - -		1,363.69	
	3. Concrete, - - - - - -		2,122.39	
	4. Belts, steel wk. etc., - - -		1,280.79	
	Sub-total,	6,500.00	10,824.18	4,324.18
	b. Jaw Crushers.	*3,000.00		
	1. New crusher, - - - - - -		23,450.00	
	2. Erecting, - - - - - -		3,867.80	
	3. Motor and switchboard, - - -		1,639.08	
	4. Belt, - - - - - - -		52.69	
	Sub-total,	3,000.00	29,009.57	26,009.57
	c. Rotary Grizzly.			
	1. Grizzly, - - - - - -	700.00	964.15	264.15
	2. Motor switch and wiring, - -	200.00	223.09	23.09
	3. Belt and erecting, - - - -	150.00	15.15	134.85
	4. Chute, - - - - - -	450.00	1,073.48	623.48
	Sub-total,	1,500.00	2,275.87	775.87
	d. Gyratory Crushers.			
	a. 1 New crusher, - - - - -	7,000.00	7,055.90	55.90
	b. Moving 1 crusher from Maas Mine,	500.00	917.04	417.04
	c. Freight and erecting, - - -	500.00	678.71	178.71
	d. 1 Speed reducer, - - - -	700.00		700.00
	e. Motors and switchboard, - - -	1,800.00	1,448.43	351.57
	Sub-total,	10,500.00	10,100.08	399.92
	e. Belt Conveyor.			
	1. Chute and feeder, - - - -	300.00	257.17	42.83
	2. Belt - 125' $5.00, - - - -	625.00	9.72	615.28
	3. Erection, - - - - - -	525.00	373.38	151.62
	4. Enclosure and trestle, - - -	1,500.00	926.77	573.23
	5. Motor & speed reducer,etc & wiring,	1,550.00	337.33	1,212.67
	Sub-total,	4,500.00	1,904.37	2,595.63
	f. Railroad Pocket.			
	1. Foundations, - - - - -	500.00	365.51	134.49
	2. Pocket construction, - - -	2,000.00	2,336.00	336.00
	Sub-total,	2,500.00	2,701.51	201.51
	g. Dumping Machinery.			
	1. Air cylinder, - - - - -	500.00	108.21	391.79
	2. Steel work for crane, - - -	2,000.00	2,078.13	78.14
	3. 20-ton crane, - - - - -	1,500.00		1,500.00
	4. 20-ton chain block, - - - -	500.00	916.62	416.62
	5. Elec. crane, hoist, erected, -	500.00	639.31	139.31
	6. Chutes and platforms, - - -	300.00	534.87	234.87
	7. Housing - corrugated iron, - -	1,200.00	1,799.33	599.33
	8. Lighting,light arrestor,belts,etc,	500.00	408.20	91.80
	9. Floors, - - - - - - - -	500.00	491.76	8.24
	Sub-total,	7,500.00	6,976.44	523.56
	General Expense, - - - - -	1,000.00		1,000.00
	Total crushing plant, - - - -	37,000.00	63,792.02	26,792.02
	Forward, - - - - - - - .	155,000.00	167,623.46	12,623.46

*In addition to the 3,000 shown above, Mr. S.R.E.'s letter to Mr. W.G.M. of 7/19/28 mentions an additional expenditure of $6,156.00 to this account.

STATEMENT SHOWING EXPENDITURES TO E & A 514 OPENING AND EQUIPPING TILDEN MINE TO DECEMBER 31, 1929 (CONTINUED).

ACCT. NO.		ESTIMATED.	EXPENDED TO DATE.	UNEXPENDED BALANCE.
	Brought Forward,	155,000.00	167,623.46	12,623.46
10. A.	Main buildings.			
	1.Foundations,	500.00	1,161.71	661.71
	2.Buildings,	4,000.00	5,156.73	1,156.73
	3.Lighting, piping, etc,	500.00	131.86	368.14
	Sub-total,	5,000.00	6,450.30	1,450.30
	B. Storage Building,	3,000.00	2,357.19	642.61
	Total buildings,	8,000.00	8,807.49	807.49
11.	Miscellaneous Items.			
	c. 2-ton motor truck,			
	f. 2-ton tractor,			
	g. 50 H.P. scraper hoist,	1,300.00	367.78	932.22
	h. Clearing, grading and pltg.,	2,000.00	116.42	1,883.58
	i. Road construction,	2,000.00	2,262.80	262.80
	j. Water tank and pump,	1,000.00		1,000.00
	k. Car hoist and spotting eng.,	2,000.00	1,490.25	509.75
	l. 2 Cyclone drills,		7,060.62	7,060.62
	m. Drill sharpener,		141.18	141.18
	Total,	8,300.00	11,439.05	3,139.05
12.	Feeders.			
	1. First cost,	6,500.00		6,500.00
	2. Freight and erecting,	1,000.00		1,000.00
	3. Drive and connection,	500.00		500.00
	Total,	8,000.00		8,000.00
13.	General Expenses.			
	a. Engineering,		1,154.59	1,154.59
	b. Analysis,		443.15	443.15
	c. Mine office,		801.45	801.45
	d. Personal injury expense,		686.90	686.90
	e. Superintendence,		218.40	218.40
	f. Captain,		1,387.50	1,387.50
	g. Watchman,		707.00	707.00
	h. Insurance,		27.00	27.00
	i. Contingent expense,		438.45	438.45
	j. Dry house,		6.70	6.70
	Total,		5,871.14	5,871.14
	Grand total,	179,300.00	193,741.14	14,441.14
	Contingencies,	11,000.00		11,000.00
	Grand Total (1),	190,300.00		3,441.14
	SUMMARY;			
	E & A 514 A,	190,300.00	193,741.14	3,441.14
	E & A 514 B,	56,000.00	26,093.44	29,906.56
	Total,	246,300.00	219,834.58	26,465.42

(1). Estimate as shown above, - 190,300.00
2-ton motor truck, - - 3,000.00
2-ton tractor, - - 2,700.00
Total per E & A statement, 196,000.00

TILDEN MINE
ANNUAL REPORT
YEAR 1929.

14. MAINTENANCE & REPAIRS:

A crew of mine men consisting of three shovel engineers, three locomotive engineers, two crusher engineers and the mechanic were employed from November 6th when the pit was closed for the season, on repairs to equipment. No.29 electric shovel is being given a complete overhauling, the first time since it was purchased in 1926. It was in very bad condition of repair and caused the majority of the delays to pit equipment during the past season. The No.31 shovel will also be gone over after the repairs are completed on the No.29. The work on this machine will only be in the nature of cleaning and adjustments as practically no renewal of parts will have to be made.

The crushers are being gone over and new mantles and concaves installed. We are changing the slide into the main xxxx crush as it was not strong enough and need continual repairs during the season. A new bar grizzly is being installed with manganese steel fingers, now that we know it works successfully.

The repair work is progressing nicely and all the equipment will be in first class condition for the 1930 operation.

18. NATIONALITY REPORT:

American,	2
English,	21
Irish,	7
Finnish,	20
Norwegian,	1
Swedish,	7
French,	11
Austrian,	1
Total,	70

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1929

1. GENERAL:

The mine operated the entire year on a schedule of six days per week as compared with a total of practically six months, six days per week, and six months, five days per week, in 1928.

Additional miners were taken on in August and September in order to obtain the increased production authorized in July, from 500,000 to 600,000 tons per year.

Two transfer systems operated successfully the entire year and two others, opened in 1928, had to be abandoned on account of water. If the water can be diverted from the territory tributary to the two abandoned systems, they will be operated again. A transfer system was under development at the end of the year in an area on the footwall that could not be reached from existing raises from the 12th level except by an extremely long scraper haul. The area to be mined tributary to the two raises here was also entirely too large for economical mining. It would have required an excessive amount of raising in rock from the 12th level to develop this area in the regular way.

For the first time this year all of the ore mined has been handled by scraper hoists. A large amount of scraper equipment was purchased during the year; the results obtained amply justified the expenditures. After several years experience with scraper equipment it was evident that the 15 h.p. electric scraper hoist was best suited for the work and, accordingly, this hoist has been adopted as standard equipment.

Due to the increase in the amount of ore hoisted from the 12th level it developed that the Ilgner hoisting set in the engine house was overloaded and that the risk of burning out motors with serious shutdowns justified the purchase of a new and larger set. An addition has been built to the engine house and the new set will arrive and be installed in February 1930.

Stoping was continued during the year above the 10th level near the Maas Mine boundary. The footwall, dipping to the West, and lean ore materially decreased the area of the sub levels as they approached the 10th level. Mining was also continued in the South footwall area on the 10th level and the first sub above the 10th.

Stoping was continued on several sub levels between the 10th and 11th levels, on both the North and South footwalls. Mining on the hanging wall side of this area has been decreased in order that faster progress can be made on the footwall areas where mining had been delayed due to crushing of the 11th level haulage drifts in 1928.

Mining of an area on the hanging wall side of the ore body on the 11th level, North of No. 1 dike, was completed in 1929, and mining of the first sub below the 11th was underway at the end of the year. Practically all the Bessemer ore produced in 1929 came from this area.

Development work was continued on the 12th level, the drift parallel with the Maas boundary was completed, and also a connection was made to the Maas Mine 4th level for ventilation and a second outlet. Excavation of the sump was completed, also the raise connecting the 12th and 11th level pumphouses. One of the 11th level pumps will be moved to the 12th level in a few months.

The grade of ore produced in 1929 was very close to the guarantee. There was a small decrease in the output of Bessemer ore and no increase is anticipated in 1930.

The mine finished the year in good condition. On account of the increase in production a fairly heavy raising program was underway the latter part of the year and will be continued in 1930..

I regret to report that a fatal accident occurred in March, the second one within a period of four months - after a record of ten years operation with no fatal accidents. It was classified as a trade risk as all ordinary precautions had been taken.

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1929

1. GENERAL: (Cont)

Standardization of nearly all of the various mining operations have been adopted by the Company and have been put into effect at this mine. The number of accidents decreased from 17 in 1928 to 9 in 1929, due to strict discipline and adherence to safety standards.

2. PRODUCTION, SHIPMENTS & INVENTORIES:

a. Production by Grades:

	1929	1928	Increase	Decrease
Negaunee Bessemer Ore	22,708	28,329		5,621
Negaunee Ore	529,709	426,234	103,475	
Total Ore	552,417	454,563	97,854	
Rock	17,092	17,944		852
Total Hoist	569,509	472,507	97,002	

The product for the year increased 97,854 tons due to operating six days per week for the entire year and to an increased production schedule in the latter months of the year.

b. Shipments:

Grade of Ore	Pocket Tons	Stockpile Tons	Total Tons	Total Last Year
Negaunee Bessemer	3,724	18,710	22,434	28,950
Negaunee Ore	366,372	249,154	615,526	443,783
Total	370,096	267,864	637,960	472,733
Total Last Year	214,464	258,269	472,733	
Increase	155,632	9,595	165,227	

Shipments increased 165,227 tons and all ore in stockpiles was shipped, the first time in over 15 years. Shipments were 85,543 tons more than was mined during the year. The overrun from stockpile averaged 5.3%.

c. Stockpile Inventories:

Grade of Ore	Dec.31,1929	Dec.31,1928	Increase	Decrease
Negaunee Bessemer	9,560	5,784	3,776	
Negaunee Ore	48,476	41,624	6,852	
Total	58,036	47,408	10,628	

There was more ore in stock at the end of the year due to a larger product in November and December. Actually there was a large decrease due to shipping the overrun in stock which was on hand at the end of the previous year.

d. Division of Product by Levels:

The ore hoisted from the various levels was as follows:

	1929		1928	
10th Level	63,253	11.4%	117,618	26.0%
11th Level	246,264	44.3%	116,930	36.6%
12th Level	246,402	44.3%	170,220	37.4%
Total	555,919	100 %	454,768	100 %

At the end of the year very little ore was being handled on the 10th level due to the subs above being mined out. The increase on the 12th level is due to the additional territory developed in 1929.

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1929

2. PRODUCTION, SHIPMENTS & INVENTORIES:

e. Production by Months:

The production by months is as follows:

Month	Bessemer	Negaunee	Total	Rock
January	2,336	39,417	41,753	1,896
February	2,032	35,202	37,234	2,272
March	1,896	38,452	40,348	2,248
April	3,312	40,041	43,353	1,660
May	3,827	43,419	47,246	1,352
June	767	35,859	36,626	1,012
July	1,395	43,501	44,896	652
August	0	53,367	53,367	536
September	2,760	47,037	49,797	1,616
October	2,950	56,101	59,051	1,124
November	3,898	47,944	51,842	1,048
December	3,592	43,312	46,904	1,676
Total	28,765	523,652	552,417	17,092
Transferred from	6,057 to	6,057		
Stockpile Overrun	3,502		3,502	
Total	26,210	529,709	555,919	
Total 1928	28,329	439,210	467,539	17,946
Increase		90,499	88,380	
Decrease	2,119			844

The product was distributed as follows:

	1929	1928	Increase
Negaunee Mine	538,241	441,867	96,374
American Mining Co.	14,176	12,696	1,480
Total	552,417	454,563	97,854

f. Ore Statement:

	Negaunee Bessemer	Negaunee	Total	Total Last Year
On Hand Jan. 1, 1929	5,784	33,895	39,679	52,397
Output for Year	28,765	523,652	552,417	454,563
Overrun	3,502	100,398	103,900	12,976
Transferred from	6,057	6,057		
Total	31,994	664,002	695,996	519,936
Shipments	22,434	615,526	637,960	472,733
Balance on Hand	9,560	48,476	58,036	47,203
Increase in Output			188,778	
Increase in ore on hand			10,833	

1929 - 1-8 hour shift, 6 days per week, January 1st to December 31st, 1929

1928 - 1-8 hour shift, 6 days per week, January 1st to April 9th, 1928
1-8 hour shift, 5 days per week, April 9th to October 1st, 1928
1-8 hour shift, 6 days per week, October 1st to December 31st, 1928

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1929

2. PRODUCTION, SHIPMENTS & INVENTORIES:

g. Delays:

The delays during the year were as follows:
January 14th - 1½ hours delay due to broken underground haulage cable in shaft.
June 6th & 7th-2 shifts delay due to skip tearing out several shaft sets.
August 2nd - 9½ hours delay due to burnout on cage hoist generator.
December 3rd - 6 hours delay due to burnout on cage hoist generator.

h. Delays from Lack of Current:

The following delays occurred on account of lack of current:
June 10th - 3/4 hour delay due to low voltage.

3. ANALYSIS:

a. Average Mine Analysis on Output:

Grade	Iron	Phos.	Silica
Negaunee Bessemer	61.74	.050	6.43
Negaunee Ore	59.94	.093	7.40

The average mine analysis on output was slightly lower in 1929 but shipments averaged slightly higher than in the previous year.

b. Average Analysis on Straight Cargoes:

	Mine		Lake Erie		
Grade	Iron	Phos.	Iron	Phos.	Moist
Negaunee Bessemer	62.20	.048	None		
Negaunee Ore	59.88	.095	60.56	-	11.30

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	106,312 tons
Between 10th and 11th Levels	1,290,701 "
Between 11th and 12th Levels	2,042,591 "
Total Developed ore - all available	4,702,191 "
Total Developed ore last year	5,046,197 "
Decrease 1929	344,006 "

This estimate and Analysis under Section "c" will be given to the State Tax Commission. This year's estimate is 344,006 tons less than the estimate of a year ago. The product was 555,919 tons so that 211,913 tons were developed during the year, mainly between the 11th and 12th levels.

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1929

4. ESTIMATE OF ORE RESERVES:

b. Prospective Ore:

No prospective ore is shown in this report. All the ore below the 12th level is prospective ore. The total estimated tonnage in the mine on Dec. 31st, 1929, was 6,393,441 tons, of which 1,691,250 tons is prospective ore. The tax commission figures for 1929 were 6,585,359 tons; deducting the product of 555,919 tons in 1929 gives 6,029,440 tons as the probable tonnage to be used by 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	.088	6.78	.232	2.75	.910	.360	.009	2.10	12.00

Ore in Stock: Average Natural Analysis:

	Iron	Phos.	Silica	Mang.	Alum	Lime	Mag.	Sul.	Igni.	Moist
Bessemer	54.20	.044	6.08	.208	2.21	.880	.271	.007	1.41	12.00
Negaunee	52.28	.079	7.60	.222	2.55	1.06	.383	.010	1.94	11.75

5. LABOR AND WAGES:

a. Comments:

(1) Labor:

There was no shortage of unskilled labor at any time during the past year. Experienced miners were scarce and it required nearly two months to build up the force when an increased schedule of production was authorized in July. Due to the decreased demand for labor in the winter both at the mines and outside there are now many men out of work, and the situation for this group promises to be quite serious before Spring.

(2) New Construction:

The following is a list of the E & A's on which work was done in 1929:

E & A #531 - Vacation of Maas, Lonstorf & Mitchell Addition (moving 21 houses) and Extension of Healy Ave. - Negaunee Mine Company 37½% - The C. C. I. Co. 62½% - uncompleted.

E & A #534 - Painting Houses and Sheds - completed.

E & A #557 - New Ilgner Hoisting Set - uncompleted at end of 1929.

E & A #558 - New Electric Haulage Generator Set - uncompleted at end of 1929.

These E & A's will be taken up in detail under the heading #12 "New Construction and Proposed New Construction".

b. Comparative Statement of Wages and Product:

	1929	1928	Increase	Decrease
PRODUCT	555,919	454,563	101,356	
No. Shifts and Hours	1-8 hr	1-8 hr		
AVERAGE NO. MEN WORKING:				
Surface	48	42	6	
Underground	207	201	6	
Total	255	243	12	
AVERAGE WAGES PER DAY:				
Surface	4.32	4.37		.05
Underground	5.11	5.13		.02
Total	5.03	4.99		.04

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1929

5. LABOR AND WAGES:

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

	1929	1928	Increase	Decrease
WAGES PER MONTH OF 25 DAYS:				
Surface	108.00	109.25		1.25
Underground	127.75	128.25		.50
Total	125.75	124.75		1.00
PRODUCT PER MAN PER DAY:				
Surface	36.43	35.34	1.09	
Underground	8.87	7.90	.97	
Total	7.13	6.46	.67	
LABOR COST PER TON:				
Surface	.119	.124		.005
Underground	.577	.648		.071
Total	.696	.772		.076
AVERAGE PRODUCT MINING:				
Stoping	20.77	18.67	2.10	
Ore Development	9.41	9.71		.30
Total	20.00	17.80	2.20	
AVERAGE WAGES CONT. LABOR	5.53	5.47	.06	
TOTAL NUMBER OF DAYS:				
Surface	15,259 3/4	12,867	2,392 3/4	
Underground	62,711 1/4	57,541 3/4	5,169 1/2	
Total	77,971	70,408 3/4	7,562 1/4	
AMOUNT FOR LABOR:				
Surface	65,949.32	56,196.85	9,752.47	
Underground	320,745.25	294,928.95	25,816.30	
Total	386,694.57	351,125.80	35,568.77	

Proportion of Surface to Underground Men:

1929 - 1 to 4.31	1-8 hr. shift 6 days per week
1928 - 1 to 4.79	1-8 hr. shift 6 days per week, Jan. 1st to April 9th
	1-8 hr. shift 5 days per week, April 9th to Oct. 1st
	1-8 hr. shift 6 days per week, Oct. 1st to Dec. 31st
1927 - 1 to 4.81	1-8 hr. shift 5 days per week, Jan. 1st to March 12th
	1-8 hr. shift 6 days per week, March 12th to Dec. 31st
1926 - 1 to 4.89	1-8 hr. shift 5 days per week
1925 - 1 to 5.18	1-8 hr. shift 5 days per week

6. SURFACE:

a. Buildings, Repairs:

Only minor repairs were made to the mine buildings during the year.

The interior of the dry was remodeled by taking out the pipe clothes drying racks and installing chains and hooks for hoisting the clothes up to the roof. New benches were also built and the entire interior painted.

A new wing was built on the East side of the engine house to house the new Ilgner flywheel set.

The frame two-stall garage was moved from near the Maas barn and placed near the heating plant so that it could be heated. The interior was gunited to make it fire proof and a concrete floor installed, also steam line from heating plant.

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1929

6. SURFACE:

a. Buildings, Repairs: (Cont)

Some of the old barns, fences, etc. that were left after the houses near the mine were moved were torn down and removed.

A storage shed for plate, car wheels, and other supplies was erected in November near the shops. The exterior of the sheet iron covering the tunnel to timber yards was painted.

b. Stockpiles:

Nine bents were added to the rock trestle during the year.

New creosoted ties were laid on about one-half of the steel trestle tracks as replacements.

The wooden trestle at the East end of the steel trestle was torn down to permit shipment of the Bessemer ore in stock, and was not rebuilt.

c. Tracks, Roads, etc.:

A wire fence was built from the office yard to Main Street, enclosing ground that will eventually cave.

The office lawn was extended on the Northwest corner to improve the general appearance. Part of this area was formerly occupied by a location house. A new fence was built and shrubbery moved to screen it.

The timber track for unloading lagging located North of the West stockpile grounds was moved by the railroad section crews about 15 ft. to the South to the edge of the stockpile grounds. It will now be used for loading the first cut through the Stockpile, and on the North side there is now room for an extra pile of lagging the full length of the timber yard, approximately 1,000 ft. This change in location of track materially increased the capacity of the yard for storage of lagging and poles, thereby decreasing unloading and handling expense as it will no longer be necessary to make piles 20 ft. high.

d. Timber Yard:

When No. 3 shaft was sunk the rock was stocked Northwest of the shaft in an area that prevented the use of the East end of the timber yard. This rock pile was loaded by steam shovel in October and used by the L. S. & I. R. R. for rip-rapping several of their large fills. A total of 2,355 yards of rock was loaded in cleaning up the pile. The ground was then leveled so that timber could be stocked here; the timber yard was lengthened 125 ft.

7. UNDERGROUND:

a. Shaft Sinking:

There was no shaft sinking at the mine in 1929.

b. Development:

Development work on the main levels decreased in 1929 as compared with the previous years; there was also a small decrease in the amount of raising in ore and rock. There was an average of 5 contracts on development work throughout the year as compared with 6 in each of the two previous years. In 1928 the development of four transfer systems on sub levels increased the amount of ore and rock raising; these raises were, however, single compartment. In 1929 all raises were double compartment.

Eleventh Level:

A new crosscut was driven West from #10 crosscut on the North footwall side of the 11th level until it reached the American Mining Co. strip when it was turned to the Southwest, paralleling the Maas boundary. It was driven so that

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1929

7. UNDERGROUND:

b. Development: (Cont)

Eleventh Level: (Cont)

raises might be put up to the first sub level above the 10th level for mining the footwall pillar down to the 11th level. The total length of the crosscut was 330 ft. Six raises have been completed to the first sub above the 10th level and one was being put up at the end of the year.

On the South side of the ore body, a short distance North of No. 1 dike, No. 2 crosscut was started late in the year from the hanging wall side of the deposit. It is being driven due East and at the end of the year had advanced 340' in ore. A number of raises will be put up from this new crosscut to mine the ore across the deposit in this area.

During the year five raises were put up from the footwall drift to the operating sub levels above the 11th.

A number of drifts were driven on the main level in ore connecting to the open crosscuts to provide timber roads and improve ventilation.

Twelfth Level:

The drift parallel with the Maas boundary advanced 100 ft. in rock and holed to #8 crosscut, completing this drift. During the year five raises, averaging 120 ft. in height, were put up from this drift to the 440' sub, a short distance above the 11th level. One raise, the last one in this area, was being put up at the end of the year.

No. 7 crosscut was driven 160' to the West of the footwall drift and three raises completed and one going up at the end of the year in this crosscut.

During the year three raises were put up on the hanging side of the deposit, two from No. 4 crosscut, and one from No. 3, a distance of 100' to the elevation of the 11th level.

Three raises were put up from the footwall drift between No. 7 and No. 8 crosscuts, two of which were 140' in height and one 70 ft.

No. 3 crosscut was extended 20' in rock early in the year. Several months later a raise from the Maas Mine holed to the end of this drift, providing a second outlet for safety and ventilation.

The West sump drift was completed in 1929. The central part of this drift was stripped to a width of 18 ft. to increase the capacity of the sump. There was a total of 250' of rock drifting here.

The raise connecting the pumphouses on the 12th level and the 11th level was completed after advancing 25' in January. The discharge line has been installed in this raise.

The drifting and raising footage in connection with the pumphouse and sump does not appear on the cost sheet under "Development in Rock"; the expense of this work is charged to "Pumping Machinery".

The summary of the development work for the year is as follows:

	Drifting		Raising		
	Ore	Rock	Ore	Rock	Total
11th Level	460'	120'	851'	120'	1,551'
12th Level		510'	1,270'	417'	2,197'
Total	460'	630'	2,121'	537'	3,748'

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1929

7. UNDERGROUND:

c. Stoping:

(1) General Remarks:

In 1929 mining extended from an area just above the 10th level to the first sub below the 11th level. Mining was continued on the North footwall above the 10th level near the Maas boundary on the 545', the 530', and the 520' sub levels, and near the South footwall South of No. 2 dike on the 520' sub level. Mining on the South footwall was started on the 10th level after the 520' sub was finished.

Between the 10th and 11th levels mining was done on the 500' sub level near the South footwall, the 450', 440', and 425' sub levels, chiefly on the North footwall and in the main deposit.

An area was mined on the 11th level in the Southwest part of the deposit under the hanging above No. 4 and 5 crosscuts on the 12th level. In December the work of opening the 11th level area above No. 6 crosscut on the 12th level was started by seven contracts and was well advanced at the end of the year.

Below the 11th level mining was under way during the last half of the year on the 395' sub level in an area under the hanging at the Southwest end of the deposit.

(2) Detail of Stoping:

Subs between 9th and 10th levels:

545' Sub Level: North footwall:

This sub level, located near the Maas boundary, was opened in May 1928 and mining was completed in May 1929. A considerable area on this sub level was too low grade to be mined.

530' Sub Level: North footwall:

This sub level was opened in February and finished in November. The area mined here was considerably smaller than on the 545' sub, due to lean ore areas and to the flattening of the footwall.

520' Sub Level: North footwall:

Mining was started on this sub level in September and all ore mined here is handled through raises that have been put up during the year from the new footwall drift on the 11th level. The ore that came from the subs above was handled through 10th level raises. The area on this sub level is much smaller than on the subs above due to the footwall flattening and cutting out a large area on the Northeast side of the sub level. In December there were five contracts working here.

520' Sub Level: South footwall:

This section of the sub level was opened in December 1927 and mining was completed in August 1929. The area mined here was South of No. 1 dike on the South footwall and an area immediately North of the dike at the West end under new hanging. The area North of the dike was so wet that mining was temporarily abandoned until mining in adjacent areas drained the water.

Tenth Level:

Mining was started on the North side of No. 1 dike on the South footwall at the elevation of the 10th level in May 1928 and is not yet completed. An area at the West end has not been mined due to water on the sub above. Mining of the area on the South side of No. 1 dike was started in the summer and in December there were three contracts mining here.

500' Sub Level - South footwall:

Mining was started in the area between No. 1 and No. 2 dikes in May and there were seven contracts mining here at the end of the year. The ore in the area being mined between No. 1 and 2 dikes during 1928 and 1929 on the 520 ft. sub, 10th level, and the 500 ft. sub, has been removed through transfer raises put up from two transfer drifts on the 450' sub level, where the ore is handled by 25 h.p. scraper hoists direct to raises from the 11th level.

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1929

7. UNDERGROUND:

c. Stoping: (Cont)

450' Sub Level:

The only area mined on this sub level during the past year was located on the North footwall adjacent to No. 2 dike. There has only been a few contracts working on this sub level during the year and mining has been delayed several times due to crushing of travelling road and raises. In December two contracts were completing the mining of the three small pillars remaining in this area.

440' Sub Level:

Mining was started on this sub level in 1926 and was still in progress at the end of the year. Mining during 1929 was confined to the North and Northeast areas of the sub level. In December there were six contracts stoping in these two areas.

425' Sub Level:

This sub level was opened in January 1928 and mining has been continued during the past two years. An area near the Maas boundary was opened from a new system of raises from the 12th level in July and in December six contracts were mining here. Another area on this sub level was mined in the early part of the year through transfer raises to the 370' transfer sub level until water conditions made it necessary to temporarily abandon the use of this transfer system. No. 7 crosscut on the 12th level was then advanced 160 ft. and several raises put up to this sub level and mining resumed in this area. In December three contracts were mining here. The area on this sub level above No. 6 crosscut on the 12th level was all mined out in November. In December a contract started drifting on this sub from #175 raise, a new one recently put up from the East footwall drift on the 11th level, and will connect to the other raises in this area near the footwall.

Eleventh Level:

During the early part of the year a footwall drift was driven on the Northwest side of the ore body near the Maas boundary in order that raises could be put up to mine the pillar left many years ago to support the railroad right of way. Mining has been under way for the past few years in this pillar and has now reached the first sub above the 10th level. At the end of the year seven raises, of which six have been completed, were put up from this drift to the first sub above the 10th level. After completing this drift No. 2 crosscut was started from the hanging wall side of the ore body towards the foot, this crosscut being located between No. 1 and No. 2 dikes. It is planned to try out a new system of spacing raises at 24 ft. centers in this crosscut. At the end of the year the crosscut had advanced 360' in ore. A steel scraper slide is in use here for loading ore directly into motor cars.

Three raises were put up during the year from the East footwall drift and two from No. 9 crosscut to the 450' sub. One raise was put up in the new footwall drift near the winze from the 11th to the 10th level.

Several connecting drifts were driven for timber roads and ventilation in various parts of the 11th level where mining was in progress either on the main level or on subs above.

An area in the Southwest part of the ore body on the 11th level was mined above No. 4 and 5 crosscuts on the 12th level, the ore being handled through raises to the 12th level. In December there were seven contracts drifting prepatory to slicing above the 1260 system of raises from No. 6 crosscut on the 12th level. The area being mined here is under the hanging and furnishes a large part of the Bessemer ore being hoisted.

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1929

7. UNDERGROUND:

c. Stoping: (Cont)

395' Sub Level:

This sub level was opened in June under the hanging at the Southwest end of the deposit and eight contracts worked here for the balance of the year. One additional raise was put up to this sub level from No. 3 crosscut on the 12th level. The area adjacent to this raise was mined out under new hanging in November and December.

385' Sub Level:

This sub level was opened in April and a drift driven connecting the two raises above No. 8 crosscut on the 12th level. Branch raises were put up to the Southwest from this drift to replace two of the old raises that had crushed beyond repair; they were extended up to the 440' sub.

370' Sub Level:

The two transfer systems that were developed here last year had to be temporarily abandoned early in 1929 on account of water conditions. The ore being mined in the areas served by these two transfer systems is now being handled through raises from the 12th level. The last of the year a drift was being driven on this sub level for another transfer system that will be opened near No. 2 dike. It is planned to mine the ore above the footwall up to the 425' sub in this transfer system and thus avoid putting up a number of raises in rock from the 12th level.

Twelfth Level:

This level was opened the latter part of 1925; it has been developed gradually since that time and was practically completed in 1929. The drift parallel with the Maas boundary was completed after advancing 100' in rock when it holed to No. 8 crosscut.

No. 7 crosscut was started late in 1928 from the East footwall drift and advanced 160' in jasper in 1929.

During the year eighteen raises were started and fourteen had been completed at the end of the year.

No. 3 crosscut was extended a short distance to the Southwest and holed to the top of a ventilation and second outlet raise put up from the Maas Mine.

The West sump drift, 200' in length, was completed in 1929. The central portion of this drift was stripped to a width of 18 ft. in order to increase the capacity of the sump.

The raise from the 12th to the 11th level pumphouse, started in 1928, was completed in January 1929.

At the end of the year there were four contracts putting up raises from the 12th level.

d. Timbering:

The total cost for timber in 1929 increased due to more timber used on account of larger production. The amount of 6" to 8" cribbing timber used decreased due to less raising. The increase in 8" to 10" stull timber was due to more rapid mining on sub levels with scrapers which made it safe to use smaller timber in areas where the pressure was not heavy. There was less treated timber used due to less main level drifting in ore.

The cost per foot for timber decreased slightly in 1929. The feet of timber used per ton of ore decreased due to more 8" to 10" timber used on sub levels. There was a small increase in cost per ton for 9½ ft. poles due to more poles used in covering down floors, and a corresponding decrease in cost per ton for 7 ft. lagging. Poles are now used entirely for floor covering instead of 7 ft. lagging for two reasons, 1st, on account of use of scrapers, and, 2nd, increases safety in mining due to greater strength.

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1929

7. UNDERGROUND:

d. Timbering: (Cont)

Statement of Timber Used:

	LINEAR FEET	AVG. PRICE PER FOOT	AMOUNT 1929	AMOUNT 1928
6" to 8" Cribbing Timber	179,927	.0404	7,270.24	7,898.42
8" to 10" Stull Timber	111,436	.0609	6,796.72	5,394.94
10" to 12" " "	58,036	.0829	4,811.80	4,393.22
12" to 14" " "	20,460	.1142	2,337.04	2,425.40
Athens Treated Timber	3,864	.4066	1,571.31	1,975.02
Total Timber - 1929	373,723	.0610	22,787.11	
Total Timber - 1928	351,201	.0629		22,087.00
		Per 100'		
7' Lagging	1,437,065	.738	10,599.29	9,378.39
Poles, 9½'	757,702	1.566	11,867.84	9,075.27
Cover Boards, 1"	14,989	17.25	258.51	341.40
Total 1929			22,725.64	
Total 1928				18,795.06
Grand Total 1929			45,512.75	
Grand Total 1928				40,882.06
Product			555,919	454,563
Feet of timber per ton of ore			.6723	.7726
Feet of lagging per ton of ore			2.5850	2.9584
Feet of lagging per foot of timber			3.8455	3.8291
Cost per ton for timber			.0410	.0485
" " " " Lagging			.0190	.0206
" " " " Poles			.0214	.0200
" " " " Covering Boards			.0005	.0008
" " " " All timber			.0819	.0899
Equivalent of stull timber to board measure			623,169	597,944
Feet of board measure per ton of ore			1.121	1.315

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

1929	$45,512.75	$.0819
1928	40,882.06	.0899
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

e. Drifting and Raising:

There was less drifting on main levels in 1929, also less raising in ore. The small increase in raising in rock was due to putting up raises on the footwall side of the 12th level. Raising and drifting in 1929 decreased 34% as compared with the previous year.

The following is a statement of drifting and raising for the years 1929 and 1928:

YEAR	ORE DRIFTING	ORE RAISING	ROCK DRIFTING	ROCK RAISING	TOTAL
1929	460'	2,121'	630'	537'	3,748'
1928	644'	2,882'	1,012'	495'	5,033'
Increase				42'	
Decrease	184'	761'	382'		1,285'

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1929

7. UNDERGROUND:

f. Explosives, Drilling and Blasting:

The cost per pound for powder decreased $.0116, the cost per ton of ore for powder decreased $.010, while the pounds of powder per ton of ore decreased .0403 pounds. 50% powder is used except in very hard, tight, ground where 60% is used in the cut holes and in the bottom of the other holes. All of the powder used in hard, tight, ground is 1½ inches in diameter, in other ground 1¼ inches. The larger sized sticks have been proven more economical. The decrease in amount of powder per ton of ore is due mainly to less drifting and raising in ore.

Statement of Explosives Used: (Ore Development and Stoping)

	Quantity	Average Price	1929 Amount	1928 Amount
50% Am. Gel.	180,250	13.00	23,431.51	17,851.11
60% " "	26,300	14.24	3,746.35	8,962.35
Total Powder - 1929	206,550	13.16	27,177.86	
Total Powder - 1928	187,200	14.32		26,813.46
Fuse	591,209	.5803	3,430.59	2,985.00
Caps	91,313	1.1722	1,070.40	861.96
Cap Crimpers	7	.668	4.68	34.70
Connecting Wire	16	.455	6.68	-
Tamping Bags	13,900	2.13	29.69	48.22
Total Fuse, etc. 1929			4,542.04	
Total Fuse, etc. 1928				3,929.88
Total All Explosives - 1929			31,719.90	
Total All Explosives - 1928				30,743.34
Product			555,919	454,563
Pounds of powder per ton of ore			.3715	.4118
Cost per ton for powder			.0489	.0590
" " " " fuse, caps, etc.			.0082	.0086
" " " " all explosives			.0571	.0676

Rock Development, etc.

	Quantity	Average Price	1929 Amount	1928 Amount
50% Am. Gel.	6,950	13.00	903.50	601.09
60% " "	12,900	14.18	1,829.93	2,793.50
Total Powder 1929	19,850	13.78	2,733.43	
Total Powder 1928				3,394.59
Fuse	52,661	.5868	309.02	294.32
Caps	8,418	11.55	97.27	125.54
Connecting Wire				4.74
Cap Crimpers				4.67
Tamping Bags				5.96
Total Fuse, etc. 1929			406.29	
Total Fuse, etc. 1928				435.23
Total 1929			3,139.72	
Total 1928				3,829.82

Most of the powder used in rock development was in the West sump drift on the 12th level.

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1929

7. UNDERGROUND:

f. Explosives, Drilling and Blasting: (Cont)
Statement of Explosives Used: (Cont)

	1929 Amount	1928 Amount
Total explosives used in mine	34,859.62	34,573.16
Average price per pound for powder	.1321	.1438

17.3% of all the powder used in 1929 was 60% strength.
37% of all the powder used in 1928 was 60% strength.

Decrease in 60% powder used in 1929 due to less drifting, raising, and mining in hard, tough, ground.

g. Mining and Loading:

There was no change in mining methods in 1929. On account of water it was necessary to temporarily abandon two of the transfer systems developed in 1928; the other two systems were used throughout the year and worked very satisfactorily. Owing to the encroachment of the footwall, one of these systems was nearly worked out at the end of the year.

All ore mined on sub levels was handled with scrapers in 1929 for the first full year since scrapers were introduced.

The following statement gives the amount of ore loaded by hand shoveling and scrapers in 1929 and 1928. The ore that was hand shoveled in 1929 came from the main levels.

	1929 Tons	1928 Tons	1929 % of Product	1928 % of Product
Hand Shoveling	13,494	73,309	2.5%	16%
Mayne Loader	0	3,967	0%	1%
Scrapers	538,923	377,287	97.5%	83%
Total	552,417	454,563	100 %	100%

i. Ventilation:

The joint ventilation plant located at #2 shaft has worked satisfactorily during the year.

The rock drift on the 3rd level, Maas Mine, holed to the 12th, Negaunee, early in the year and provided another second outlet and opening for ventilation. No. 3 crosscut, 12th level, was connected to the raise from the 4th level, Maas Mine, early in the year, and this connection also provided another opening for ventilation and a second outlet.

At the end of the year the old footwall rock drift connecting the 10th level, Negaunee Mine, and the 2nd level, Maas Mine, was being reopened and retimbered. It provides a permanent connection in rock for the upper levels of both mines, since the Maas recently completed a rock drift several hundred feet long to eliminate a similar section in ore. The drift from the Maas shaft to the Negaunee shaft is now entirely in rock.

j. Pumping:

The number of gallons pumped per minute during 1929, 1928, and 1927, are shown below:

Month	1929	1928	1927
January	1,285	1,120	962
February	1,226	1,076	999
March	1,153	1,023	1,034
April	1,155	1,038	1,034

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1929

7. UNDERGROUND:

j. Pumping: (Cont)

Month	1929	1928	1927
May	1,179	1,107	1,073
June	1,303	1,156	1,179
July	1,223	1,223	1,222
August	1,274	1,280	1,273
September	1,279	1,319	1,294
October	1,231	1,354	1,282
November	1,202	1,342	1,233
December	1,250	1,333	1,147
Total Average	1,230	1,198	1,144

The increase in mine water continued during 1929 but it was not as large as in the previous year - 32 gallons per minute in 1929 as compared with 54 gallons in 1928. It is interesting to note that the average water pumped per minute in 1926 was only 819 gallons; the increase in three years has been 50%. The caves are growing larger and deeper each year, thereby increasing the drainage area, and also the yearly rainfall has been heavier the past three years. The monthly record shows a decrease in the last five months of the year as compared with the same months of 1928; sufficient time has not elapsed, however, to draw any definite conclusions as to whether this decrease will continue.

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

Year	Gals. per minute
1929	1,230
1928	1,198
1927	1,144
1926	819
1925	705
1924	796

k. Underground in General:

Further progress was made in 1929 in respect to mechanization of the mine. More powerful scraper hoists were purchased and it is only a question of time until the smaller units will be discarded and replaced with units of greater horse power. The operations of scraper hoists have been pretty well standardized, with a resulting decrease in personal injuries and an increase in output.

Standardization of practically all underground operations have been adopted by the Company resulting in increased efficiency and safety.

The use of poles for covering down has made it possible to increase the sub level interval from 11 or 11½ feet to 12 or 12½ feet. This change was not made until late in the year and as yet has had little or no effect on output. It will require nearly a year to realize the full benefit, due to the large size of the sub levels.

The area showing heavy weight - the North footwall area above the 11th level - did not effect operations to the same extent as in 1928 when the haulage drifts on the 11th level crushed and were replaced by a new rock footwall drift. Additional raises were put up in this territory, and more are required. A reduction in the area to be mined from a raise decreases the time required for mining and in areas under heavy pressure reduces the retimbering cost appreciably.

A change in method of poling down sub levels was made early in 1929. Three or more cross poles are laid on the floor, then poles lengthwise which are

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1929

7. UNDERGROUND:

k. Underground in General: (Cont)

spiked to the cross poles. In some areas the entire floor covering is bound together by lapping and spiking the poles. The advantages of this method are closer covering, thereby reducing dilution from runs of rock, and added strength, thereby decreasing danger of breaks in covering, thus increasing safety and per cent of recovery. The scrapers are pulled over the poles which prevents digging holes in the floor and decreases the h.p. required to pull the scraper.

Development work was continued during 1929 but was reduced as compared with the previous year. It will be continued on about the same scale in 1930.

8. COST OF OPERATING:

a. Comparative Mining Costs:

	1929	1928	Increase	Decrease
PRODUCT	555,919	454,563	101,356	
Underground Costs	1.012	1.139		.127
Surface Costs	.125	.131		.006
General Mine Accounts	.080	.094		.014
Cost of Production	1.217	1.364		.147
Loading and Shipping	.023	.025		.002
Total Cost on Cars	1.241	1.389		.148
Depreciation - Original Cost	.092	.090	.002	
Plant and Equipment	.031	.031		
Movable Equipment	.001	.004		.003
Taxes	.357	.424		.067
Depletion of Appreciated Value	.315	.308	.007	
Central Office	.063	.089		.026
Welfare, Safety, Hosp.	.026	.035		.009
Misc. Debits & Credits	.007	.006	.013	
Administrative Expense	.009	.011		.002
Total Cost at Mine	2.142	2.375		.233
No. of Days Operated	299	280½	19½	
No. Shifts & Hours	1-8 hr	1-8 hr		
Average Daily Product	1,859	1,640	219	
COST OF PRODUCTION:				
Labor	.704	.785		.081
Supplies	.513	.578		.065
Total	1.217	1.363		.146

b. Detailed Cost Comparison:

(1) Days and Shifts:

Year	Days Worked	Shifts & Hours	Men Employed	Total Days Worked
1929	299	1-8 hr	255	77,971
1928	280½	1-8 hr	243	70,409
Increase	19½		12	7,562

(2) Wages:

The mine operated on the same wage schedule in both 1929 and 1928.

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1929

8. COST OF OPERATING:

b. Detailed Cost Comparison: (Cont)

(3) Comparison of Production:

Production - 1929	552,417 tons
Production - 1928	454,563 "
Increase	97,854 "

(4) Comparison of Number of Men and Wages:

	No. Men	No. Days	Amount	Rate per day
1929	255	77,971	$386,694.57	$ 5.03
1928	243	70,409	351,125.80	4.99
Increase	12	7,562	35,568.77	.04

(5) Tons per man per day:

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

	1929	1928	Increase	Decrease
Surface	36.43	35.34	1.09	
Underground	8.87	7.90	.97	
Total	7.13	6.46	.67	

(6) Cost of Production:

1929 -	$676,415.53	Cost per ton	$1.217
1928 -	620,043.57	" " "	1.364
Incr.-	56,371.96	Decrease	.147

	Total Cost				Cost per ton		
	Labor	%	Supplies	%	Labor	Supplies	Total
1929 -	$391,581.35	57.9%	$284,834.28	42.1%	$.704	$.513	$1.217
1928 -	357,189.46	57.6%	262,748.48	42.4%	.785	.578	1.363
	34,391.89	.3%	22,085.80	.3%	.081	.065	.146
	Increase	Incr.	Increase	Decr.	Decr.	Decr.	Decr.

The ratio of labor and supplies changed slightly in 1929, with a further small increase in percentage of supplies. The ratio in both 1929 and 1928 show the change brought about by mechanization of the mine. No further change in ratio is expected as the initial outlay has been completed and future expenditures will cover replacements.

The decrease in cost per ton is due to operating six days per week, throughout 1929, and to the increased schedule of production effective the latter part of the year.

(7) Detail of Accounts:

UNDERGROUND COSTS:

Development in Rock

1929 Amount	$9,413.24	Cost per ton	$.017
1928 Amount	9,256.35	" " "	.020
Increase	156.89	Decrease	.003

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1929

8. COST OF OPERATING:

Development in Rock (Cont)

	Sub Division			
	Drifting	Raising	Total Ft.	Cost per Ft.
1929	630'	537'	1,167'	$ 8.06
1928	1,012'	495'	1,507'	6.14
Decrease	382'		340'	
Increase		42'		1.92

The expenditures were practically equal but the amount of rock drifting decreased 37%, while rock raising increased 8½%. The cost per foot increased due to more drifting on main levels. In 1928 a portion of drifts were driven in developing the transfer systems on sub levels.

Development in Ore

1929 Amount	$13,142.74	Cost per ton	$.023
1928 Amount	16,894.31	" " "	.037
Decrease	3,751.57		.014

	Drifting	Raising	Total Ft.	Cost per Ft.
1929	460'	2,121'	2,581'	$ 5.09
1928	644'	2,882'	3,526'	4.79
Increase				.30
Decrease	184'	761'	945'	

The decrease is due to less ore drifting and raising. The cost per foot increased due to more ore drifting on main level. The cost per ton decreased due to larger product.

Stoping

1929 Amount	$223,939.89	Cost per ton	$.403
1928 Amount	197,943.05	" " "	.435
Increase	25,996.84	Decrease	.032

Detail

	Labor		Supplies	
1929 -	$157,876.34	70.5%	$66,063.55	29.5%
1928 -	137,962.68	69.7%	59,980.37	30.3%

Cost per ton

	Labor	Supplies	Total
1929	$.284	$.119	$.403
1928	.304	.131	.435
Decrease	.020	.012	.032

The decrease in cost per ton is due to larger production and the use of additional scrapers.

The cost for explosives also shows a decrease of .0101 per ton.

Expenditures for new scraper hoists were about equal in the two years.

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1929

8. COST OF OPERATING:

Stoping (Cont)

Explosives

	1929	1928
Total pounds of powder	206,550	187,200
Average price per pound	.1316	.1432
Cost of powder	$27,177.86	$26,613.46
Cost of fuse, caps, etc.	4,542.04	3,929.88
Cost of all explosives	31,719.90	30,743.34
Lbs. of powder per ton of ore	.3715	.4118
Cost per ton for powder	.0489	.0590
Cost per ton for fuse, caps, etc.	.0082	.0086
Cost per ton for all explosives	.0571	.0676

Cost for powder decreased due to lower price per pound, to the use of less 60% powder, and to less drifting and raising in ore.

Timbering

1929 Amount	$124,485.62	Cost per ton	$.223
1928 Amount	119,495.53	" " "	.263
Increase	4,990.09	Decrease	.040

	1929	1928
Timber Cost	$22,787.11	$22,087.00
Lagging, poles, & cover boards	22,725.64	18,795.00
Total	45,512.75	40,882.00

This account shows a decrease of .040 in cost per ton. This was due to the smaller amount of raising done in 1929 (2,181 ft), as compared with 2,882 ft. in 1928, a difference of 761 ft. There was also more 8" to 10" timber used made possible by rapid mining with scraper hoists.

Detailed Cost of Timber

	1929	1928
Feet of timber per ton of ore	.6723	.7726
Feet of lagging per ton of ore	2.5850	2.9584
Cost per foot for timber	3.8455	3.8291
Cost per ton for timber	.0410	.0485
" " " " lagging	.0190	.0206
" " " " poles	.0214	.0200
" " " " cover boards	.0005	.0008
" " " " timber, lagging, poles, and cover boards	.0819	.0899
Equivalent of stull timber to board measure	623,169	597,944
Feet of board measure per ton of ore	1.121	1.315

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1929

8. COST OF OPERATING:

Tramming

1929 Amount	$56,003.59	Cost per ton	$.101
1928 Amount	44,659.37	" " "	.098
Increase	11,344.22		.003

The increase in cost per ton is due to more expense for cleaning tracks. There was more wet ore trammed in 1929, which spilled from the saddleback tram cars.

Ventilation

1929 Amount	$4,084.02	Cost per ton	$.007
1928 Amount	4,548.91	" " "	.010
Decrease	464.89		.003

A Siroco fan used as a booster to force air into a sub level was charged in 1928, together with the necessary ventube. This expense in 1928, with the additional product in 1929, reduced the cost per ton this year.

Pumping

1929 Amount	$42,211.00	Cost per ton	$.076
1928 Amount	41,792.77	" " "	.092
Increase	418.23	Decrease	.016

	1929	1928
Total gallons of water pumped	648,316,346	629,675,383
Gallons pumped per minute	1,166	1,198

Increase in cost is due to increased power charge - $756.19 more than in 1928, due to more water pumped. The cost per ton was reduced on account of larger product.

Compressors & Air Pipes

1929 Amount	$46,422.67	Cost per ton	$.084
1928 Amount	43,036.85	" " "	.095
Increase	3,385.82	Decrease	.011

	Compressors	Air Pipes
1929	$40,035.26	$6,387.41
1928	37,401.94	5,634.91
Increase	2,633.32	752.50

Total cu. ft. of air used in 1929 - 1,123,840,000
" " " " " " " 1928 - 1,048,240,000
Cubic feet per ton of ore - 1929 - 2,022
" " " " " " - 1928 - 2,306

The cost for current in 1929 was $37,428.00 as compared with $34,908.00 for 1928, an increase of $2,520.00. The cost for air pipes was greater due to extension of air lines.

The cost per ton, however, shows a decrease of .011 due to the larger product.

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1929

8. COST OF OPERATING:

Back Filling

1929 Amount	$4,959.80	Cost per ton	$.009
1928 Amount	3,673.95	" " "	.008
Increase	1,285.85		.001

Expense for back filling increased in 1929, due to more extension of mining under new ground where the capping was broken for filling.

Underground Superintendence

1929 Amount	$14,172.30	Cost per ton	$.026
1928 Amount	14,245.10	" " "	.032
Decrease	72.80		.006

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

Cave-In

1929 Amount	$57.60	Cost per ton	$.000
1928 Amount	14.52	" " "	.000
Increase	43.08		.000

The increased cost this year was for fencing caved areas on surface.

MAINTENANCE ACCOUNTS:

Compressors & Power Drills

1929 Amount	$1,682.18	Cost per ton	$.003
1928 Amount	1,083.55	" " "	.002
Increase	598.63		.001

	Compressors		Power Drills
1929	$319.27		$1,362.91
1928	396.86		686.69
	Decrease 77.59	Incr.	676.22

In 1929, 8 R. B. 12 Jackhammer Drills, costing $1,362.91, were purchased, compared with 2 N-72 Ingersoll Drifters in 1928, costing $686.69.

Hand Tramming Equipment

1929 Amount	$81.19	Cost per ton	$.000
1928 Amount	69.62	" " "	.000
Increase	11.57		.000

The use of scrapers has practically eliminated the use of hand tramming equipment.

Electric Tram Equipment

1929 Amount	$15,599.06	Cost per ton	$.028
1928 Amount	15,760.73	" " "	.035
Decrease	161.67		.007

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1929

8. COST OF OPERATING:

Electric Tram Equipment (Cont)

	Sub Division		
	Gen. & Motors	Locomotives	Wiring
1929	325.57	4,216.64	1,758.73
1928	316.23	4,164.69	1,672.26
Increase	9.34	51.95	86.47

	M. L. Tracks	M. L. Cars
1929	5,672.14	3,625.98
1928	5,837.48	3,725.07
Decrease	165.34	99.09

Increase in Generator & Motors is due to repairs
" " Locomotives " " " "
" " Wiring is due to extensions of trolley wire
Decrease in M. L. Tracks is due to smaller cost for upkeep.
Decrease in M. L. Cars is due to less repairs on cars.

Pumping Machinery

1929 Amount	$6,518.35	Cost per ton	$.012
1928 Amount	5,048.48	" " "	.011
Increase	1,469.87		.001

Increase in this account is due to more expense for excavating sump on 12th level. Increase is also due to repairs to electric pumps - amounting to $709.83 more than in 1928.

Total Underground Costs

1929 Amount	$562,773.25	Cost per ton	$1.012
1928 Amount	517,520.09	" " "	1.138
Increase	45,253.16	Decrease	.126

SURFACE COSTS:

Hoisting

1929 Amount	$30,608.67	Cost per ton	$.055
1928 Amount	26,727.98	" " "	.059
Increase	3,880.69	Decrease	.004

Electric Power 1929 -	$22,698.00	Cost per ton	$.0408
Electric Power 1928 -	19,258.50	" " "	.0425
Increase	3,439.50	Decrease	.0017

Increase in expenditures is due to larger tonnage hoisted. The cost per ton shows a decrease due to the labor cost for the two years being practically the same with a much larger product in 1929.

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1929

8. COST OF OPERATING:

Stocking Ore

1929 Amount	$5,029.58	Cost per ton	$.009
1928 Amount	5,984.90	" " "	.013
Decrease	955.32		.004

Decrease is due to less ore stocked in 1929, 181,321 tons, as compared with 240,304 tons in 1928.

Dry House

1929 Amount	$8,625.97	Cost per ton	$.015
1928 Amount	7,680.76	" " "	.017
Increase	945.21	Decrease	.002

Coal to Boiler House:	Tons	Cost
1929	1,410	$7,556.54
1928	1,278	6,985.01
Increase	132	571.53

Increase in cost is due to more coal used in heating plant and more expense for cleaning dry house.

General Surface Expense

1929 Amount	$6,066.86	Cost per ton	$.011
1928 Amount	5,457.62	" " "	.012
Increase	609.24	Decrease	.001

Expenditures increased due to enlarging office grounds near entrance. This account shows a decrease of .001 in cost per ton. This is due to the larger product in 1929.

MAINTENANCE ACCOUNTS:

Hoisting Equipment

1929 Amount	$9,283.16	Cost per ton	$.017
1928 Amount	7,607.97	" " "	.017
Increase	1,675.19		.000

	Sub Division			
	Sheaves	Wire Rope	Mach. Parts	Skips & Skip Roads
1929		$1,045.84	$5,185.31	$3,013.28
1928	$230.28	1,483.63	2,516.29	3,377.77
	230.28	437.79	2,669.02	364.49
	Decr.	Decr.	Incr.	Decr.

Sheaves: No renewal of sheaves occurred this year. A cast iron head sheave was placed on the cage hoist in 1928.
Wire Rope: New 1¼" ropes were installed on both North and South skip hoists in 1929, whereas a new cage rope and two skip ropes were put on in 1928.
Machinery Parts: A new armature, costing $3,117.18, was purchased for the skip hoist this year.
Skips & Skip Roads: The cost for repairs to this equipment is less this year.
The cost per ton does not show any change due to increased production.

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1929

8. COST OF OPERATING:

Shaft

1929 Amount	$3,886.76	Cost per ton	$.007
1928 Amount	1,778.21	" " "	.004
Increase	2,108.55		.003

Increase is due to concreting the loading pocket on the 12th level and repairing damage to shaft in accident of June 6th when skip jumped the guides and damaged 200' of shaft.

Top Tram Equipment

1929 Amount	$1,783.67	Cost per ton	$.003
1928 Amount	2,880.53	" " "	.006
Decrease	1,096.86		.003

	Sub Division	
	General Repairs	Wire Rope
1929	$1,406.54	$377.15
1928	2,312.16	568.37
Decrease	915.64	191.22

Decrease is due to less repairs and less new wire rope required.

Docks, Trestles & Pockets

1929 Amount	$ 890.82	Cost per ton	$.002
1928 Amount	1,168.65	" " "	.002
Decrease	277.83		

There was less expense for extending the rock trestle in 1929.

Mine Buildings

1929 Amount	$3,275.86	Cost per ton	$.006
1928 Amount	473.02	" " "	.001
Increase	2,802.84		.005

Increase in this account is due to taking out the pipe racks that were used for drying clothes and replacing same with chains and hooks. The interior of the dry was also painted and other changes made. A shed for storage of plate was built and the garage was moved 600 ft. and placed near the heating plant. The garage is used for the mine and sample truck.

Total Surface Costs

1929 Amount	$69,451.35	Cost per ton	$.125
1928 Amount	59,759.46	" " "	.131
Increase	9,690.89	Decrease	.006

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1929

8. COST OF OPERATING:

GENERAL MINE ACCOUNTS:

Insurance

1929 Amount	$66.73	Cost per ton	$.000
1928 Amount	93.60	" " "	.000
Decrease	26.87		.000

Engineering

1929 Amount	$2,134.03	Cost per ton	$.004
1928 Amount	2,238.56	" " "	.005
Decrease	104.53		.001

Decrease in cost per ton of .001 is due to larger production.

Analysis

1929 Amount	$11,946.02	Cost per ton	$.022
1928 Amount	13,165.18	" " "	.029
Decrease	1,219.16		.007

Cost per determination in 1929 - $.1339
Cost per determination in 1928 - .1485
Decrease .0146

This account includes proportion of district laboratory expense and sampling.

	Cost of Operating Laboratory	No. Determinations
1929	$18,788.39	140,351
1928	17,172.95	115,609
Increase	1,615.44	24,742

The increase in the number of determinations is due to more samples from the Maas and Athens Mines.

The number of determinations for the Negaunee Mine in 1929 was 49,392 as compared with 53,138 in 1928, a decrease of 3,746 determinations. This decrease, with the additional determinations made in the district laboratory for other mines, accounts for the lower cost this year. The number of determinations at Negaunee Mine decreased due to sampling breasts three times each week instead of daily.

Personal Injury Expense

1929 Amount	$7,952.99	Cost per ton	$.014
1928 Amount	7,212.16	" " "	.016
Increase	740.83	Decrease	.002

Increase in expenditures is due to larger payroll though the cost per ton shows a decrease due to larger production. 2% of payroll is set up as a reserve for personal injury expense.

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1929

8. COST OF OPERATING:

Safety Department Expense

1929 Amount	$158.53	Cost per ton $.000
1928 Amount	283.34	" " " .001
Decrease	124.71	.001

Decrease is due to less expense for inspection committees.

Telephones & Safety Devices

1929 Amount	$2,617.30	Cost per ton $.005
1928 Amount	3,118.42	" " " .007
Decrease	501.12	.002

Decrease due to less expense for extension of lighting system and less safety gates, etc.

Local General Welfare

1929 Amount	$1,183.13	Cost per ton $.002
1928 Amount	1,479.47	" " " .003
Decrease	296.34	.001

Decrease due to less expense for car for visiting nurse.

Special Expense

1929 Amount	$281.73	Cost per ton $.001
1928 Amount	328.99	" " " .001
Decrease	47.26	

Less expense for assessment, Lake Superior Iron Ore Association.

Mine Office

1929 Amount	$15,808.80	Cost per ton $.028
1928 Amount	14,738.49	" " " .032
Increase	1,070.31	Decrease .004

	Direct Charges	Mine Office
1929	$7,698.50	$8,110.30
1928	6,891.36	7,847.13

Increase is due to choreboy for Assistant Superintendent and to Central Warehouse overhead charges.

9. EXPLORATIONS AND FUTURE EXPLORATIONS:

There were no explorations at the mine in 1929.

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1929

10. TAXES:

A comparison of the total taxes for the Negaunee Mine Company for the years 1929 and 1928 are as follows:

DESCRIPTION	1929		1928	
CITY OF NEGAUNEE	VALUATION	TAXES	VALUATION	TAXES
Realty - 213.19 acres	4,360,000	181,332.04	4,962,000	167,680.67
Personal-stockpile,equip't	390,000	14,391.46	632,000	23,046.83
Total by Tax Commission	5,250,000	196,423.50	5,644,000	190,727.50
Maas, Lonstorf, & Mitchell Addition Lots	Vacated 1929		6,200	209.52
Collection Fees		1,964.24		1,909.37
TOTAL OPERATING NEGAUNEE MINE		198,387.74		192,846.39
Rented Buildings:				
Maas, Lonstorf, & Mitchell	Add.		20,500	692.71
C. C. I. Co. 1st Addition	34,600	1,294.64		
Collection Fees		12.95		6.92
TOTAL NEGAUNEE MINE CO.	5,284,600	199,695.33	5,670,700	193,546.02
Tax Rate		3.742		3.379
Total City of Negaunee Tax		600,686.18		571,121.55
Negaunee Mine % of City Tax		33¼%		34%

Taxes increased in spite of a lower valuation, due to a higher tax rate. Total valuation of all City property decreased but amount of money raised for City purposes was the same in 1929 and 1928.

11. ACCIDENTS AND PERSONAL INJURY:

There was one fatal and eight minor accidents during 1929, a total of nine, as compared with seventeen, one fatal and sixteen minor accidents, in 1928.

The following table shows the classification for the two years:

	1929	1928
Fatal	1	1
Time lost - less than one month	2	12
" " - one to four months	4	3
" " - over four months	2	1
Total Accidents	9	17
Number of cases paid compensation for accidents prior to January 1st, 1929	7	2
Number of cases being paid difference in wages	3	2

The accidents causing loss of time of from one to four months consisted of one case each of hernia, severe contusion, an infection, and a slight fracture.

The accidents involving more than four months lost time were a broken back and an infection. The man whose back was broken will be a total disability case - payments will be made for 900 weeks.

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1929

11. ACCIDENTS AND PERSONAL INJURY: (Cont)

A fatal accident occurred at the Negaunee Mine on April 2nd, Matt Siik, a miner being killed by a run of loose ore while installing timber at the top of a raise. This raise, No. 1282, was put up two years ago from the 12th to the sub levels above the 11th. This territory was under heavy pressure in 1928, and No. 8 crosscut on the 11th level crushed, which stopped mining on the sub levels above. A new footwall drift was driven on the 11th level, No. 8 crosscut reopened and mining resumed in this area. Several of the raises from the 12th had crushed and it was necessary to repair them. Siik and his partner had repaired No. 1282 raise from the 12th to the 11th level, driven an outlet to the 11th level, and had repaired the raise up to the 440' sub level. They were installing timber over the raise at the elevation of the 440' sub level preparatory to mining when the accident occurred. They put in two low sets over the ladder road, while they opened up over the chute compartment for the full sized 8' sets. The end set had been placed in position and the back caught up with fore poles and breast boards. Siik was cutting some lagging on the foot side of the raise to make room for the middle set at the time of the accident; his partner had gone down to the level to get the timber and fill his carbide lamp. As far as is known, there was no warning of the run of loose ore. It filled the opening they had made on the 440' sub level, catching Siik before he had time to reach the ladder road. Considerable ore ran down the ladder road and it was some time before Siik's body was recovered. This accident was considered a trade risk as the men were experienced miners and had taken unusual precautions to prevent an accident of this character. The excessive weight in this area undoubtedly caused the accident. This was the second fatal accident in four months, as one occurred in December 1928, following a ten-year period without a fatal accident.

12. NEW CONSTRUCTION AND PROPOSED NEW CONSTRUCTION:

(a) E. & A. #531 - Vacation of Maas, Lonstorf, and Mitchell Addition, and Healy Avenue Extension:

Estimate for moving houses, etc.		$118,555.00
" " Healy Ave. Extension	$14,000.00	
Less C. C. I. Co. proportion (62½%)	8,750.00	
Negaunee Mine proportion (37½%)		5,250.00
Total Estimate		$123,805.00
Total Expenditures to Jan. 1, 1929		94,254.00
" " in 1929		42,959.88
Unexpended balance Jan. 1, 1930		13,408.88 (red)

(1) Purchase price for 5 houses

Total Estimate	49,500.00
Total Expenditures to Jan. 1, 1929	49,500.00
" " in 1929	0.00
Unexpended balance Jan. 1, 1930	0.00
Completed	

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1929

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

E. & A. #531 - Cont.

(2) Moving 21 houses, foundations, etc.

Total estimate		$ 42,300.00
Total expenditures to Jan. 1, 1929		44,732.48
Estimated expenditures in 1929		5,806.79
Unexpended balance Jan. 1, 1930		8,239.27 (red)

The 1929 expense consisted of fencing, grading, seeding, planting, and repairs and construction of sheds and garages. It was not quite completed at the end of the year.

(3) Lots in The C. C. I. Co. 1st Addition

Total estimate		$ 22,000.00
Total expenditures to Jan. 1, 1929		23,000.00
Total expenditures in 1929		0.00
Unexpended balance Jan. 1, 1930		1,000.00 (red)
Completed		

(4) Healy Avenue Extension	$ 8,000.00	
(5) Condemnation of small parcel	2,000.00	
(6) Moving 2 houses, etc.	4,000.00	
Total estimate	14,000.00	
Negaunee Mine Co. proportion (37½%) estimate		$ 5,250.00
Estimated expenditures in 1929		5,250.00
Unexpended balance Jan. 1, 1930		0.00
Completed		

Interest, Legal, Miscellaneous

Total estimate		$ 0.00
Estimated expenditures in 1929		3,047.06
Unexpended balance Jan. 1, 1930		3,047.06 (red)
Completed		

(7) General Expense

Total estimate		$ 0.00
Estimated expenditures in 1929		5,261.65
Unexpended balance Jan. 1, 1930		5,261.65 (red)
Completed		

(8) Street Lighting

Total estimate		$ 0.00
Estimated expenditures in 1929		265.65
Unexpended balance Jan. 1, 1930		265.65 (red)
Completed		

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1929

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

E. & A. #534 - Painting 5 houses and sheds:

Total estimate	$ 787.00
Total expended in 1929	1,252.15
Unexpended balance Jan. 1, 1930	465.15 (red)

The overrun was due to painting more houses than were covered by the original estimate.
Completed.

E. & A. #538 - Electric Haulage Generator Set:

Total estimate	$7,785.00
Total expended in 1929	5,961.29
Unexpended balance Jan. 1, 1930	1,823.71

(1) Motor Generator Set

Total estimate	$3,085.00
Total expenditures in 1929	1,774.00
Unexpended balance Jan. 1, 1930	1,311.00

A set in stock at the General Storehouse was purchased and installed; it went in service at once as it was of greater capacity than the old set. The old set has been sold to the Maas Mine and a new and larger set purchased under E. & A. #558 to supplement the set purchased under E. & A. #538.

(2) Trolley Wire
(3) Feeder Hangers
(4) Trolley Feeder Hangers
(5) Trolley Hanger

Total estimate	$ 440.00
Total expenditures in 1929	170.30
Unexpended balance Jan. 1, 1930	269.70

The trolley wire on the 10th level had become so worn that it was not large enough to carry the increased load required for the electric scrapers and haulage. A new trolley wire was installed to act as a feeder, which could be utilized later elsewhere in the mine, after the 10th level load was reduced due to decreased mining above the level.
A feeder cable was transferred from the old 9th level to the 11th level to carry the increased load that has developed on this level during the last two years.

(6) Shaft Cable
(7) Circuit and Main Feeder panel
(8) Cable Hangers

Total estimate	$3,260.00
Total expenditures in 1929	3,066.54
Unexpended balance Jan. 1, 1930	193.46

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1929

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

E. & A. #538 (Cont)

The underground haulage cable in the shaft was fabric covered, and had given considerable trouble in the past in wet areas in the shaft. Two new armored cables were installed between the engine house and underground, one serving the 10th and 12th levels, and the other the 11th level. A new panel, necessary for the two circuits, was installed in the engine house. The new arrangement of cables has greatly improved haulage conditions underground and assures sufficient power for years to come.

(9) Installation

Total estimate	$1,000.00
Total expenditures in 1929	950.45
Unexpended balance Jan. 1, 1930	49.55

This E. & A. was completed in 1929.

E. & A. #557 - New Ilgner Hoisting Generator Set:

Total estimate	$36,300.00
Total expended in 1929	5,354.78
Unexpended balance Jan. 1, 1930	30,945.22

The addition to the engine house has been completed except concrete floor. No other work has been done as delivery of the new set is not expected until in February 1930. It is planned to install the foundations in January so that the new set can be installed immediately on its arrival.

E. & A. #558 - Electric Haulage Generator Set:

Total estimate	$ 7,467.00
Total expenditures in 1929	5,899.14
Unexpended balance Jan. 1, 1929	1,567.86
Sale of old set to Maas Mine	1,500.00

This new generator set will take the place of the set sold to the Maas Mine. The set purchased on E. & A. #538 will be kept as a spare. The new set will take care of the underground haulage and scraper load for a much larger output than the mine is now producing; the other set will be available in case of a breakdown

(1) Motor Generator Set

Total estimate	$ 4,475.00
Expenditures in 1929	5,899.14
Unexpended balance Jan. 1, 1930	1,424.14
Future credit for old set	1,500.00

The new set was received in December but as the electric equipment had not arrived very little work on installation had been done at the end of the year. It will be installed in January 1930.

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1929

13. EQUIPMENT AND PROPOSED EQUIPMENT:

a. Steam Shovels:

The three Negaunee District shovels were repaired during the winter of 1928-1929 and are again undergoing repairs this winter.

b. Stockpile Trestles:

(2) Wooden Trestle:

Six additional bents were erected on the end of the rock trestle as compared with nine in the previous year. The wooden stocking trestle at the East end of the steel trestle used for stocking Bessemer Ore in 1928 and prior years was dismantled last summer and was not re-erected in the Fall. The shipping of all ore in stock in 1929 provided ample stocking ground under the steel trestles for both grades of ore.

d. Scraper Hoists:

The mine is now supplied with the following scraper equipment.

Company	On Hand 1/1/1929	Purchased 1929	On Hand 1/1/1930
Ingersoll Rand Co., air	10	2	12
Gardner-Denver, air	7		7
" " 7½ h.p. Electric	9		9
" " 10 " "	2		2
Sullivan, 6½ h. p. Electric	10		10
" 7½ " "	2		2
" 25 " "	3		3
" 10 " "		1	1
" 15 " "		8	8
Gardner-Denver, 15 h. p. Electric		2	2
Total	43	13	56

13 new scraper hoists were purchased in 1929, as compared with 8 in the previous year. Ten of the new hoists were 15 h.p. electrics and one a 10 h.p. The 15 h.p. electric has proven so satisfactory that it has been adopted as the standard hoist and as the old hoists wear out they will be replaced with 15 h.p. machines.

14. MAINTENANCE AND REPAIRS:

The only unusual maintenance and repair work done in 1929 was in the dry house, where extensive alterations were made. The iron pipe clothes dryers were removed and chains and hooks substituted. All interior walls were painted. New benches with backs were installed and the old benches removed. The clothes lockers were raised one foot from the floor and set on brackets. The dry is now lighter, roomier, and much easier to keep clean.

15. POWER:

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

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1929

17. CONDITION OF PREMISES:

The lawn and planted areas around the office, engine house, and dry house, have been kept in good condition throughout the year. The new addition to the engine house, and extension of the lawn, necessitated considerable moving of shrubbery. The planted areas were thinned during the Fall and the excess shrubbery was planted around the Negaunee Mine houses in the New Location.

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 classified 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 separates the nationalities into "Foreign born" and "American born", the latter being shown as Americans.

As to parentage	1929	%	1928	%
English	65	24	54	23
Finnish	96	36	100	42
Italian	34	13	29	12
Swedish	36	13	22	9
French Canadian	24	9	15	6
Americans (Mixed)	-	-	10	4
Germans	3	1	5	2
Austrians	3	1	2	-
Argentines	1	½	1	-
Norwegians	1	½	1	1
Irish	3	1		
Danish	4	1		
	270	100%	239	100%

As to birth	Total	American born	Foreign born
English	65	33	32
Finnish	96	32	64
Italian	34	4	30
Swedish	36	15	21
French Canadians	24	18	6
German	3	2	1
Austrian	3	-	3
Irish	3	3	-
Danish	4	4	-
Norwegian	1	1	-
Argentines	1	-	1
Total	270	112	158
Percentage	100%	41.5%	58.5%

MAAS MINE
ANNUAL REPORT
YEAR 1929

1. GENERAL:

During the past year a number of improvements have been made at this property that have improved operating conditions. Among these were the moving of head sheaves in shaft house to bring them in line with the center of the skip and cage roads, the building of concrete loading pockets on the 3rd level, building of new measuring pockets on 3rd and 4th levels, new haulage tracks on 3rd level, widening and deepening of ditches on 3rd and 4th levels, installation of pump on 4th level, installation of counter-balance for cage hoist, etc.

Mining operations have been concentrated in two general areas, the foot-wall pillar between 3rd and 2nd levels, and an area under the hanging above the 4th level.

The development of the ore body on the Race Course property was continued but very little ore was found. It is now evident that only a small amount of ore can be mined on this property above the 4th level.

There was a large increase in the output of Bessemer Ore and considerable ore of this grade was in stock at the end of the year. A large output of this grade is assured as long as mining is continued in the hanging wall areas above the 4th level.

There was practically no decrease in the cost of production due to the heavy program of development work and to the many improvements made during the year. Production increased and under normal operating conditions the cost would have shown an appreciable decrease. The greater part of the development work will be completed on the 3rd and 4th levels in 1930.

Shipments increased nearly 152,000 tons and the stockpile reserve was reduced from 250,000 tons to 103,000 tons. If shipments of 500,000 tons are made in 1930, most of the ore in stock will be removed.

The mine operated five days per week to April 15th, and six days per week for the balance of the year. An increased schedule of production was authorized in July but underground conditions made it impossible to increase production to the new schedule. Additional working places are gradually being opened up and it is expected that the mine will soon be up to the scheduled product of 1,333 tons per day.

2. PRODUCTION, SHIPMENTS & INVENTORIES:

a. Production by Grades:

	1929	1928	Increase	Decrease
Maas Bessemer	107,005	36,778	70,227	
Race Course Bessemer	22,590	161	22,429	
Maas	185,260	224,121		38,861
Race Course	17,067	394	16,673	
Total	331,922	261,454	70,468	
Rock	15,028	12,408	2,620	
Total Hoist	346,950	273,862	73,088	

MAAS MINE
ANNUAL REPORT
YEAR 1929

2. PRODUCTION, SHIPMENTS & INVENTORIES:

b. Shipments:

Grade of Ore	Pocket Tons	Stockpile Tons	Total Tons	Total Last Year
Maas Bessemer	64,237	26,566	90,803	32,554
Maas	113,400	252,696	366,096	294,988
Race Course Bessemer	14,034	-	14,034	161
Race Course	8,879	-	8,879	322
Total	200,550	279,262	479,812	328,025
Total Last Year	126,156	201,869	328,025	
Increase	74,394	77,393	151,787	

There were 170 tons of lump steel ore picked from the rim of the stockpile and loaded by hand included in the above shipments.

c. Stockpile Inventories:

The ore by grades in stock December 31st, 1929, was as follows:

	1929	1928	Increase	Decrease
Maas Bessemer	22,454	6,252	16,202	
Maas Ore	63,674	244,510		180,836
Race Course Bessemer	8,556	0	8,556	
Race Course	8,260	72	8,188	
Total	102,944	250,834		147,890

The ore in stock decreased to the lowest figure in many years. There is a large reserve stocking capacity available.

d. Division of Product by Levels:

The ore hoisted from the various levels was as follows:

	1929 Tons	%	1928 Tons	%
Second Level	74,434	22.4	72,812	27.8
Third Level	27,484	8.3	5,908	2.3
Fourth Level	230,004	69.3	182,734	69.9
Total	331,922	100 %	261,454	100 %

By the end of the year all hoisting of ore from the Second Level had stopped due to the completion of mining of the subs above. All the ore in the footwall pillar is now going to the Third Level. The increase of production on the Fourth Level is due to additional territory opened up.

e. Production by Months:

The production by months by grades was as follows:

Month	Maas Bess.	Maas	R.C. Bess	Race Course	Total	Rock
January	4,352	15,756	0	1,336	21,444	1,188
February	4,776	13,128	1,736	588	20,228	1,824
March	7,732	10,740	1,592	1,332	21,396	1,092
April	8,153	12,981	2,819	2,264	26,217	1,212
May	11,310	13,423	4,513	1,385	30,631	772
June	12,067	12,433	2,403	674	27,577	804
July	14,222	14,808	1,858	1,281	32,169	656
August	12,096	17,216	1,982	2,364	33,658	1,036
September	9,836	16,785	1,474	1,811	29,906	1,360

MAAS MINE
ANNUAL REPORT
YEAR 1929

2. PRODUCTION, SHIPMENTS & INVENTORIES:

e. Production by Months: (Cont)

Month	Maas Bess.	Maas	R.C. Bess	Race Course	Total	Rock
October	9,673	20,037	1,810	1,668	33,188	1,884
November	8,479	16,746	2,531	508	28,264	1,524
December	9,528	15,988	856	872	27,244	1,676
Total	112,224	180,041	23,574	16,083	331,922	15,028
Transferred from	5,219 to	5,219 from	984 to	984		
Total	107,005	185,260	22,590	17,067	331,922	15,028
Total 1928	36,778	224,121	161	394	261,454	12,408
Increase	70,227		22,429	16,673	70,468	2,620
Decrease		38,861				

Production from the various leases was as follows:

	1929	1928
George Maas Lease	214,053	203,901
Catholic Cemetery	49,620	38,355
C. C. I. Co. (Right of way)	9,332	10,031
American Mining Company (Right of way)	4,568	4,208
Race Course	39,657	555
City of Negaunee (Baldwin Kiln Road)	14,692	4,404
Total	331,922	261,454

f. Ore Statement:

	Maas Bessemer	Maas	R. C. Bess.	Race Course	Total	Total Last Year
On Hand Jan. 1st, 1929	6,252	244,510	0	72	250,834	317,405
Output for year	112,224	180,041	23,574	16,083	331,922	260,332
Transferred	5,219	to 5,219	984	to 984		
Overrun	-	-	-	-		1,122
Total	113,257	429,770	22,590	17,139	582,756	578,859
Shipments	90,803	366,096	14,034	8,879	479,812	328,025
Balance on Hand	22,454	63,674	8,556	8,260	102,944	250,834
Increase in Output					71,590	
Decrease in ore on hand					147,890	

1929 - 1-8 hr. shift, 5 days per week, January 1st to April 15th, 1929
1-8 hr. shift, 6 days per week, April 15th to December 31st, 1929
1928 - 1-8 hr. shift, 5 days per week, January 1st to December 31st, 1928
1927 - 1-8 hr. shift, 5 days per week, January 1st to December 31st, 1927

g. Delays:

The delays during the year were as follows:

February 19th - 1½ hours delay due to ice in shaft.
" 20th - 2 " " " " " " " "
" 23rd - 4 " " " " " " " "
June 25th - 2½ hours delay due to burn-out on underground haulage generator set.
October 29th - 1 " " " " blow-out of gasket on air line in shaft.
December 6th - 1 " " " " skip striking shaft sets.

MAAS MINE
ANNUAL REPORT
YEAR 1929

2. PRODUCTION, SHIPMENTS & INVENTORIES:

h. Delays from Lack of Current:
There were no delays from lack of current.

3. ANALYSIS:

a. Average Mine Analysis on Output:

Grade	Iron	Phos.	Silica
Maas Bessemer	61.31	.042	7.95
Maas	59.72	.080	8.42
Race Course Bessemer	61.52	.045	8.32
Race Course	58.67	.062	9.60

The grade of ore produced in 1929 was slightly better than in 1928. There are still some areas being mined near the hanging where the enrichment is not complete and the grade drops.

b. Average Analysis on Straight Cargoes:

	Mine			Lake Erie	
Grade	Iron	Phos.	Silica	Iron	Moist
Maas Bessemer	-	-	-	-	-
Maas Ore	59.19	.117	-	59.65	11.08
Race Course Bessemer	-	-	-	-	-
Race Course	-	-	-	-	-

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 10.

Between 2nd and 3rd levels	1,189,250 tons
" 3rd " 4th " (excl. Race Course)	3,285,800 "
Total above 4th Level	4,475,050 "
Race Course	1,500,000 "
Total developed ore, all available	5,975,050 "
Total developed ore last year	4,787,424 "
Increase - 1929	1,187,526 "

The large increase in available ore is due to the inclusion of 1,500,000 tons on the Race Course.

b. Prospective Ore:
No prospective ore is shown in this report. All the ore below the 4th level is prospective ore and some will have to be shown when the 5th level is developed to the ore body.

MAAS MINE
ANNUAL REPORT
YEAR 1929

4. ESTIMATE OF ORE RESERVES:

c. Estimated Natural Analysis:

Ore Reserves: Approximate Expected Natural Analysis.

	Iron	Phos.	Silica	Mang.	Alum.	Lime	Mag.	Sul.	Igni.	Moist
Maas & R. C. Bessemer	53.39	.040	6.56	.195	1.80	.612	.225	.008	1.15	12.50
Maas & Race Course	52.25	.100	6.63	.208	2.20	.850	.380	.010	1.80	12.75

Ore in Stock: Average Natural Analysis.

	Iron	Phos.	Silica	Mang.	Alum.	Lime	Mag.	Sul.	Igni.	Moist
Maas Bess.	54.86	.038	6.74	.197	1.86	.710	.226	.007	.98	11.00
Maas	52.74	.089	7.55	.196	2.10	1.24	.367	.011	1.77	11.50
R.C.Bessemer	54.65	.042	6.35	.157	1.89	.64	.182	.007	1.00	11.25
Race Course	53.05	.058	7.85	.183	2.06	1.06	.319	.010	1.50	11.75

5. LABOR AND WAGES:

a. Comments:

(1) Labor:

There was no shortage of labor during the year. Good miners have been scarce but forces have been increased when necessary without appreciable delay. There is a large excess of surface labor in the district.

(2) New Construction:

The following is a list of the E. & A's on which work was done during 1929:

E. & A. #504 - Moving 21 Race Course Houses. Uncompleted.
E. & A. #513 - Moving 44 Additional Race Course Houses. Uncompleted.
E. & A. #527 - (a) Construction of 2 shipping pockets. Completed
(b) Erection of Steel Stocking Trestle. Completed
(c) Installation of New Pumping Station on Fourth Level. Completed.
E. & A. #533 - Painting 30 Houses in New Location.Uncompleted.
E. & A. #531 - Healy Avenue Extension. The C. C. I. Co. 62½%, Negaunee Mine Co. 37½%. Uncompleted.
E. & A. #548 - Sinking Maas Shaft and Developing 5th Level.Uncompleted.
E. & A. #559 - Electric Haulage Generator Set. Uncompleted.

All E. & A's will be taken up in detail under the heading #12 - "New Construction and Proposed New Construction".

b. Comparative Statement of Wages and Product:

	1929	1928	Increase	Decrease
PRODUCT	331,922	261,454	70,468	
No. Shifts and Hours	1-8 hr	1-8 hr		
AVERAGE NO. MEN WORKING:				
Surface	43	37	6	
Underground	165	152	13	
Total	208	189	19	

MAAS MINE
ANNUAL REPORT
YEAR 1929

5. LABOR AND WAGES:

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

	1929	1928	Increase	Decrease
AVERAGE WAGES PER DAY:				
Surface	4.37	4.40		.03
Underground	5.07	5.02	.05	
Total	4.92	4.90	.02	
WAGES PER MONTH OF 25 DAYS:				
Surface	109.25	110.00		.75
Underground	126.75	125.50	1.25	
Total	123.00	122.50	.50	
PRODUCT PER MAN PER DAY:				
Surface	25.26	25.51		.25
Underground	6.77	6.40	.37	
Total	5.34	5.12	.22	
LABOR COST PER TON:				
Surface	.173	.173		
Underground	.748	.784		.036
Total	.921	.957		.036
TONS PER MAN PER DAY:				
Stoping	16.85	15.18	1.67	
Ore Development	7.62	6.88	.74	
Total	15.23	14.37	.86	
AVG. WAGES CONTRACT MINERS	5.42	5.35	.07	
TOTAL NUMBER OF DAYS:				
Surface	13,140	10,248	2,892	
Underground	49,006	40,826 1/4	8,179 3/4	
Total	62,146	51,074 1/4	11,071 3/4	
AMOUNT FOR LABOR:				
Surface	57,401.76	45,116.25	12,285.51	
Underground	248,243.64	205,040.91	43,202.73	
Total	305,645.40	250,157.16	55,488.24	

Proportion of Surface to Underground Men:

1929 - 1 to 3.84	One	8-hr	shift,	5	days	per week,	and 6 days per week
1928 - 1 to 4.11	"	"	"	5	"	"	"
1927 - 1 to 4.32	"	"	"	5	"	"	"
1926 - 1 to 3.87	"	"	"	5	"	"	"
1925 - 1 to 3.76	"	"	"	5	"	"	"
1924 - 1 to 4.16	"	"	"	5	"	"	"

6. SURFACE:

a. Buildings, Repairs:

The two new shipping pockets for Race Course Ore were completed early in the Spring and were put into service when pocket shipments began.

An 8 ft. bicycle sheave was installed on the shaft house for the cage counterweight. The girders in the shaft house holding the two skip and cage sheaves were moved to line up the ropes in the center of the skip and cage roads.

MAAS MINE
ANNUAL REPORT
YEAR 1929

6. SURFACE:

a. Buildings, Repairs: (Cont)

The timbered portion of the entrance to the timber tunnel, South of the shaft, was failing due to dry rot, and was replaced by concrete. The open part of this tunnel was enclosed with sheet iron over a frame construction. The open spur from the tunnel, North of the shaft, was enclosed with concrete walls and sheet iron top. These enclosures have reduced the amount of snow removal and improved conditions in the tunnels. The main tunnel immediately North of the shaft was widened 12" to permit the handling of underground motor cars through the tunnel to the cage.

The old rock tram engine building and the old frame dry house South of the shaft were torn down during the summer.

The interior of the dry house was painted. Work was commenced on remodeling the clothes drying arrangements. Overhead pulleys (chains & hooks) will be installed in place of the pipe racks, and new benches with backs will be built. This change is in line with similar alterations that have been made at all of the other Company drys.

b. Stockpiles:

The old rock trestles to the South of the shaft were removed and several cuts taken in the rock pile to supply material for the roads in the New Location and for the street work. The area South of the shaft was raised about a foot and leveled off. This had always been low and was a bad mud hole in wet weather. The removal of this rock pile has made it possible to install a continuous loading track on the South side of both the East and West trestles. Some of this rock was used for leveling depressions on the new stockpile grounds under the steel trestle East of the shaft.

Eleven bents were erected at the East end of the steel trestle to provide dumping room for rock from sinking the shaft and 5th level development. Eight of the eleven bents had two legs for an extension of the North track, while the remaining three bents were of three-leg construction to accomodate both tracks.

c. Tracks, Roads, etc.:

A new timber track was laid by the L. S. & I. R. R. in the West end of the timber yard for lagging and poles, and the mine tracks from the tunnel extended to this area. The new siding will provide more room for lagging, etc. and makes it more accessible for transfer to the mine.

7. UNDERGROUND:

a. Shaft Sinking:

Authority to sink the shaft and develop the 5th level was received in the latter part of May. It was decided to sink the shaft full size, using a sinking cage under the main cage. The last previous section of the shaft had been sunk by means of a winze in the ore body from the 3rd to the 4th level, a drift to the shaft, and raising of the shaft. Before sinking could be started it was necessary to install a counterweight pipe in the shaft for a counterweight for the cage hoist which had to be installed in order that the hoist would be able to handle both cages. The counterbalance will also reduce the amount of current required to handle the regular cage after sinking is completed.

Shaft sinking was started on September 6th on the night shift from 11 p.m. to 7 a.m. Progress has been slow due to sinking on single shift and to very

MAAS MINE
ANNUAL REPORT
YEAR 1929

7. UNDERGROUND:

a. Shaft Sinking: (Cont)
hard ground. Late in November sinking was stopped 7 ft. below the elevation of the 5th level and during the rest of the year the 5th level plat was excavated. The progress of sinking was as follows:

September	23 ft.
October	20 "
November	13 "
Total	56 ft.

By the end of the year excavation for the plat was well advanced and sinking will be resumed in January.

b. Development:
Development work during 1929 has been confined to drifting on the 2nd, 3rd, and 4th levels, and to raising on both the 3rd and 4th levels.

Second Level:
A new drainage and ventilation drift in the footwall was started in September near the Western boundary of the Roman Catholic Cemetery and was about three-fourths completed at the end of the year. It advanced a total of 200 ft. in jasper and slate. A portion of the old footwall drift to the Negaunee Mine will be reopened early in 1930 to complete the connection between the mines. An old rock drift will be reopened 50 ft. to the South to make a connection to a drift in the footwall that carries a considerable amount of water. The elevation of the new footwall drift is about 2 ft. lower than the old drift which will make it easy to divert the water into the new drift and keep it out of the ore body between the 2nd and 3rd levels.

Third Level:
There has been two contracts raising continuously during the year in the footwall pillar. Three raises have been completed to the 465 ft. sub and one to the 525 ft. sub above the 2nd level; three others have been started, making the total raising here during the year 581 ft. in ore and 308 ft. in rock.

Early in the year the footwall drift in rock was advanced 120 ft. until it holed in the 12th level, Negaunee Mine. This provided ventilation and a second outlet. All the raises have been put up in this footwall drift. Owing to the tendency of the ground to slab in the footwall drift it was necessary to install timber the entire length.

Fourth Level:
During the year 1,125 ft. of ore drift and 305 ft. of rock drift have been driven. No. 1 crosscut was completed after advancing 395 ft. in mixed ore and jasper. It was expected that this drift would be in ore but considerable jasper was encountered indicating that the hanging wall was much lower than anticipated in this territory.

No. 1 hanging wall drift, South of the Race Course, advanced 120 ft. in ore and No. 2 crosscut was started to the North and advanced 50 ft. in ore.

No. 2 hanging wall drift, parallel to the Negaunee boundary, was driven 220 ft. West to the dike from the main crosscut from the shaft. This hanging wall drift was also driven East 190 ft. where it connected to No. 500 drift.

MAAS MINE
ANNUAL REPORT
YEAR 1929

7. UNDERGROUND:

b. Development: (Cont)

Fourth Level: (Cont)

It was decided to drive a second main crosscut parallel to and 150 ft. East of the main haulage crosscut from the shaft. The present haulage crosscut runs along the East boundary of the Race Course under the City of Negaunee strip. The new crosscut will be in a pillar that will be left for many years and will permit mining to continue down near the main level in the Race Course. No. 2 hanging wall drift was continued to the North as a crosscut from No. 500 drift and the 200 ft. section between No. 500 and No. 400 drifts was completed. At the end of the year a contract was drifting South in another section of this new crosscut from the North footwall drift. At the end of the year they had advanced 60 ft. in ore. This second crosscut will soon be needed as a haulage road for mining operations over the present main crosscut are rapidly approaching the level.

The North footwall drift in the Race Course was driven 140 ft. to the West in ore and No. 2 crosscut turned off and advanced 50 ft. to the South in ore. Both these drifts were stopped temporarily until the height of the ore on the footwall above the level was determined.

The raising program on the 4th level has been quite extensive as four contracts have been engaged in this work the entire year. There has been 22 raises put up, of which 18 have been completed, for a total of 1,725 ft. of raising in ore and 200 ft. in rock. Twenty of these raises are to be used at once for mining on the Race Course and adjacent territory to the South and East, and two were for exploratory purposes to prove up the ore on the North footwall of the Race Course. These two raises in the footwall area have proven that the ore body extends at least to the elevation of the 3rd level. Further exploratory work in this footwall ore body will be done on the 3rd level and will be started early in 1930.

The following table shows the amount of raising and drifting on the various levels:

	Drifting		Raising		Total
	Ore	Rock	Ore	Rock	
2nd Level	-	260'	-	-	260'
3rd Level	-	120'	581'	308'	1,009'
4th Level	1,125'	240'	1,725'	200'	3,290'
Total	1,125'	620'	2,306'	508'	4,559'

c. Stoping:

Mining operations during the past year have been confined to the footwall pillar above the 3rd level near the Negaunee boundary and to opening and mining on the Race Course and adjacent territory to the East and South. There was some mining of pillars early in the year above the 245' transfer sub level in the footwall area between the 3rd and 4th levels. After mining these pillars, work was temporarily abandoned in this territory and will probably not be resumed for many years.

Mining of the footwall pillar above the 3rd level has been seriously handicapped by water and the crushing of raises and drifts. The only hand shoveling gangs in the mine are working here in areas where there is too much water to use scrapers. The development and mining of the Eastern half of the pillar was held up by the crushing of the raises from the 3rd level old haulage drift. Owing to the length of time required to put up raises

MAAS MINE
ANNUAL REPORT
YEAR 1929

7. UNDERGROUND:

c. Stoping: (Cont)

from the new 3rd level rock drift a transfer drift on the 465' sub was driven 225 ft. East to the Negaunee boundary from No. 116 raise. Single compartment raises 40 ft. apart were put up to the 525 ft. sub, a short distance above the 2nd level. Mining was then started and has been continued since in this area. The 525 ft. sub was mined out and at the end of the year mining was nearly completed on the 2nd level. Raises are now being put up from the 3rd level rock drift and are being advanced as rapidly as possible and as soon as completed the transfer system will be abandoned.

Mining during the year in the 4th level territory has been practically all under new hanging and very little water or heavy ground has been encountered. The extensive operations under new hanging made it necessary to use an unusual amount of lagging and poles in order to make a timber mat.

During the year ore has been mined on all of the leases - Maas Lease, Roman Catholic Cemetery Lease, City of Negaunee Lease, Baldwin Kiln Road, American Mining Co. right of way, C. C. I. Co. right of way, and the Race Course.

The detail of mining on the various levels and sub levels is as follows:

Subs above the 3rd Level:

565' Sub Level:

In May one contract completed mining on this sub level after taking out a small pillar between the footwall and dike. The ore mined here came from the railroad pillar.

550' Sub Level:

Mining was started on this sub level in 1928 and was completed in October. The ore mined here came from the Roman Catholic Cemetery and railroad pillar.

535' Sub Level:

Mining was started on this sub level in 1928 and completed last August. This was the last sub level on which ore was found between the dikes along the footwall. Below this elevation all the ore lies South of the dikes and if it were not for rolls in the hanging the ore body could be divided into regular mining areas. The sub levels are very irregular in outline due to the rolls in the hanging. Most of the ore mined during the year on this sub level came from the cemetery and railroad pillars.

525' Sub Level:

Mining on this sub level in the cemetery and railroad pillar was started in January 1929 and at the end of the year one gang remained to mine the last small pillar.

Second Level:

In the summer it was decided to drive a new rock drift in the footwall for drainage and ventilation. This drift was 200 ft. in length and was completed late in the year. At the end of the year this work was completed except for reopening of a rock drift 50 ft. to the South to connect with an old footwall drift and reopening 200 ft. of the old rock footwall drift connecting with the Negaunee Mine. Work will be continued here until completed.

60 ft. of rock drift was driven to the top of a raise from the 465 ft. sub to provide a timber road to the sub levels below the main level.

MAAS MINE
ANNUAL REPORT
YEAR 1929

7. UNDERGROUND:

c. Stoping: (Cont)

Second Level: (Cont)

Mining on the level was continued through the year. One contract was mining in the Western part of the footwall pillar at the end of the year. Mining has been completed along the Eastern boundary in the railroad pillar, leaving most of the cemetery area to be mined. There were five contracts working here at the end of the year. All the ore mined in the Eastern end of the level has been handled on the 465 ft. transfer sub level.

495' Sub Level:

This sub level was opened in January 1929 and an area mined in the center of the footwall pillar. At the end of the year there were two contracts working here.

485' Sub Level:

In July a contract started to stope a small area on the footwall at the West end of the pillar near the old workings in an endeavor to cut off the water that was interfering with mining operations on the sub levels above. Thus far the work done here has not been successful in diverting the water. Further to the East a contract was drifting at the end of the year preliminary to mining along the footwall.

465' Sub Level:

This sub level was opened many years ago and then abandoned. All the original drifts had crushed and when it was reopened new drifts were driven in order to provide a means for handling timber for the sub levels between the 465' sub and Second Level. A 45^{0} rock raise was put up in the footwall to the Second Level where an air hoist had been installed for lowering timber trucks from the main level down to the 465' sub level. All the raises from the Third Level were then connected by drifts and preparations were about completed for tramming timber to all of the contracts working above this sub level, when excessive pressure developed and it soon became impossible to utilize most of the sub level for transferring timber and other supplies. At one time four contracts were required to keep the drifts open but towards the end of the year the pressure eased and conditions were somewhat better. This excessive crushing was confined to drifts driven along the strike of the formation and is largely due to slabbing off of large pieces of ore. It is probable that there is some lime in the seams which swells on exposure to the air. The crosscuts in this area show little or no evidence of pressure.

A drift was driven East from 116 raise, 220 ft. to the Negaunee boundary, for a transfer sub level, and a 25 h.p. Sullivan electric scraper hoist installed. Five single compartment and one double compartment raises were put up to the 525 ft. sub and Second Level and mining started. Water and heavy ground have interfered with the operation of this transfer system. Recently a raise was completed from the 3rd Level which cut the long transfer into two shorter ones and improved operating conditions. When the other raises now being put up from the 3rd Level are completed, the transfer system will be abandoned.

Near the end of the year work was started preliminary to driving a rock drift in the footwall for handling timber. Crosscuts will be driven from the new footwall drift to the raises and it is expected that no further trouble will be experienced from crushing.

MAAS MINE
ANNUAL REPORT
YEAR 1929

7. UNDERGROUND:

c. Stoping: (Cont)

Third Level:

The new footwall drift was finished early in the year when it holed to the 12th level, Negaunee Mine, after advancing 120 ft. in rock. During the year three raises were completed from the 3rd level to the 465' sub level and one from the 3rd level to the first sub above the Second, or 525' sub level. During the year there was a total of 581 ft. of raising in ore and 308 ft. in rock. At the end of the year three raises were being put up as follows:

115 raise, height 50 ft., advance in December 40 ft., material jasper
120 raise, height 50 ft., advance in December 40 ft., material jasper
122 raise, height 80 ft., advance in December 50 ft., material 10 ft. jasper, 40 ft. ore.

Subs Between the 3rd and 4th Levels:

280' Sub Level:

A small area South of the dike at 219 raise was mined out on this sub level in the early part of the year. The ore here was found in an upturn of the hanging on the South side of the dike. It was discovered in 1927 and mining was started under the hanging at a point some distance above the other operating sub levels in this area.

270' Sub Level:

Work was in progress in various parts of this sub level until in July when the area to be mined at this time was finished and the contracts were all moved to the 4th level territory.

260' Sub Level:

A small pillar near the Negaunee boundary directly above the footwall was mined on this sub level early in the year. It was decided to stop mining in this territory until the footwall pillar between the 2nd and 3rd levels was mined.

245' Sub Level:

The first part of the year this sub level was still in use for transferring ore from mining on the 260, 270, and 280 ft. sub levels. After work was completed on the subs above, a contract started to explore the area West of the winze and drifted 100 ft. in ore. The drift was then stopped as it was decided that this territory could later be explored to better advantage by raises from the 4th level.

230' Sub Level:

Late in the year a small roll in the hanging was found above the 195 ft. sub level South of the Race Course. In December a contract started to connect two raises that had been extended to the elevation of this sub level.

200' Sub Level:

Mining was resumed in 1928 on this sub level which had been idle for several years and during the year considerable ore was mined here.

Some exploratory work was done on the City of Negaunee strip just East of the Race Course at the elevation of this sub level but only lean ore was found.

MAAS MINE
ANNUAL REPORT
YEAR 1929

7. UNDERGROUND:

c. Stoping: (Cont)

200' Sub Level: (Cont)

In December three contracts were mining from new raises that had just been completed to this elevation from No. 2 hanging wall drift on the 4th level. The area where mining is now being started lies South of the Race Course and is only a short distance North of the Negaunee boundary. This area was mined many years ago on a number of sub levels above. Work has been resumed here in order to provide ore until the 5th level has been opened.

195' Sub Level:

This sub level was opened for the first time in 1929. It is located about half way between the old 200 ft. sub and the old 185 ft. sub. When mining was in progress several years ago in this territory the sub level interval was about 20 ft. Part of the ore area was mined on the 185 ft. sub level. The balance of the area is being mined on the new sub level about 11 ft. above the old 185 ft. sub. Under the system of mining now followed in the soft ore mines, sub levels are opened at 11 to 12 ft. intervals which made it necessary to open the 195 ft. sub instead of mining the balance of the pillar on the 185 ft. sub. The greater part of the ore mined above the 4th level territory in 1929 came from this sub level.

No ore was found at this elevation in the area immediately East of the Race Course. An exploratory drift was driven at this elevation from the top of 306 raise near the footwall on the Race Course but no ore was found; the drift was in hanging wall jasper.

In December four contracts were mining on the sub level, all working on the Maas Lease East of the Southeast corner of the Race Course.

185' Sub Level:

This sub level was partly mined several years ago and then abandoned. It was reopened early this year in the area immediately East of the Race Course where some ore was found, but the area was quite small. When mining was completed on the 195 ft. sub in the area South and East of the Race Course, this sub level was opened and mining started. In December eight contracts were working in this area.

170' Sub Level:

Mining was started on this sub level late in 1928 and was completed in a small area under the hanging on the Race Course and the territory immediately to the East in October of this year. The area of ore developed on this sub level near the Southeast corner of the Race Course showed a considerable increase in area as compared with the sub level above.

An exploratory drift was driven from 306 raise on the North footwall of the Race Course in ore to the footwall and evidence of faulting was found. A test raise was put up from this drift at a point near the footwall to the 270 ft. elevation and stopped in ore. The top of this raise was about 35 ft. below the third level. It was then decided to put up a raise from the 4th level which would explore this territory at a point further to the East.

160' Sub Level:

Mining on the East side of the Race Course was started at the elevation of this sub level in January and has been continued throughout the year. In December five contracts were mining in the Maas, City of Negaunee, and Race Course property.

MAAS MINE
ANNUAL REPORT
YEAR 1929

7. UNDERGROUND:

c. Stoping: (Cont)

150' Sub Level:

This sub level was opened in the territory immediately East of the Race Course in August and mining was still in progress here at the end of the year.

Fourth Level:

Development work was continued through 1929 on the main 4th level. There was an average of four contracts employed here raising and drifting. The development work necessary at this time is now well advanced and will be completed in 1930. It was necessary to develop a large area for mining above the 4th level due to the small amount of ore found on the Race Course. At the end of the year there were four contracts raising and one drifting in ore. During the year there was 1,125 ft. of ore drift and 305 ft. of rock drift on the level, and 1,725 ft. of ore raising and 200 ft. of rock raising above the 4th Level.

The following is a record of raises being put up at the end of the year:

618 raise, height 65 ft., advance 55 ft., material 10 ft. jasper, 45 ft. ore; 35 ft. to complete.
617 raise, height 107 ft., advance 32 ft., material ore; completed.
609 raise started.
285 raise, height 80 ft., advance 60 ft., material ore, 10 ft. to complete.
303 raise, height 160 ft., advance 35 ft., material 10 ft. dike, 25 ft. ore; not completed.

d. Timbering:

The cost for timber increased 62.8% in 1929, while the product increased only 26.9%. The main increase was in 6" to 8" cribbing timber, which increased 113% in 1929, due to 73% more raising, and more repairing of raises. The amount of 8" to 10" stull timber used increased 69%. The amount of 10" to 12" timber used increased over 50%, while there was a decrease of nearly 50% in the amount of 12" to 14" timber used. The amount of treated timber used was about the same in each year. The large increase in amount of timber used was due, first, to an increase of 73% in raising, to an increase of 26.9% in product, and to more repair work.

The increase in amount of poles and lagging used was due to larger product, to opening an unusual amount of new ground under the hanging, and to change in method of poling down the floors of sub levels. This change was first tried out at this mine and later adopted at all of the Company soft ore mines. It is described in detail under 7-k.

Statement of Timber Used:

	LINEAR FEET	AVG. PRICE PER FOOT	AMOUNT 1929	AMOUNT 1928
6" to 8" timber	216,045	.042	9,072.09	4,422.80
8" to 10" "	92,748	.065	6,077.24	3,522.53
10" to 12" "	46,924	.096	4,504.99	2,851.95
12" to 14" "	9,793	.120	1,175.16	1,656.17
12" to 14" Treated Timber	5,146	.375	1,929.75	1,525.44
Total Timber - 1929	370,656	.0614	22,759.23	
Total Timber - 1928	208,175	.0671		13,978.89

MAAS MINE
ANNUAL REPORT
YEAR 1929

7. UNDERGROUND:

d. Timbering: (Cont)

Statement of Timber Used: (Cont)

	LINEAR FEET	AVG. PRICE PER FOOT Per 100'	AMOUNT 1929	AMOUNT 1928
7' Lagging	1,485,258	.74	10,991.09	8,021.84
9½' Tamarack Poles	612,503	1.506	9,224.06	5,601.60
Total - 1929	2,097,761	.964	20,215.95	
Total - 1928	1,412,334	.965		13,623.44
1" Covering Boards - 1929	20,148	1.77	357.52	
1" Covering Boards - 1928	25,584	1.88		481.29
Total Timber - 1929			43,320.70	
Total Timber - 1928				28,083.62
Product, Tons			331,922	261,454
Feet of timber per ton of ore			1.1167	.7962
Feet of lagging per ton of ore			4.474	4.053
Feet of poles per ton of ore			1.849	1.349
Feet of lagging per foot of timber			4.007	5.09
Cost per ton for timber			.0671	.0535
" " " " lagging			.0331	.0307
" " " " covering boards			.00107	.0018
" " " " poles			.0278	.0214
" " " " all timber			.1305	.1074
Equivalent of stull timber to board measure			574,369	369,564
Feet of board measure per ton of ore			1.73	1.41

Total Cost for timber, lagging, poles, etc., and cost per ton:

1929	$ 43,332.70	$ .1305
1928	28,083.62	.1074
1927	23,097.31	.0855
1926	22,163.56	.0906
1925	11,011.51	.0736
1924	17,199.67	.0760

The cost per ton for timber, lagging and poles, increased 21.5% as compared with 1928, and is higher than at the Negaunee or Athens Mines. It was due to more raising and drifting, more repairing of drifts and raises, and to opening more ground under new hanging. In order to make a mat quickly under new hanging, poles are laid close together and covered with cross lagging on one or more sub levels.

e. Drifting and Raising:

The following is a statement of drifting and raising on the main levels for the years 1929 and 1928:

Year	Ore Drifting	Ore Raising	Rock Drifting	Rock Raising
1929	1,125'	2,306'	620'	508'
1928	465'	1,281'	810'	345'
Increase	660'	1,025'		163'
Decrease			190'	

MAAS MINE
ANNUAL REPORT
YEAR 1929

7. UNDERGROUND:

e. Drifting and Raising: (Cont)

Most of the ore drifting and raising in 1929 was confined to the 4th level. Rock Raising and Drifting was done on the 4th, 3rd, and 2nd Levels.

Good progress was made in development work and aside from the development of the 5th level in 1930 and 1931, should be practically completed in 1930.

f. Explosives, Drilling and Blasting:

Statement of Explosives Used:

Ore Development and Stoping.

	Quantity	Average Price	1929 Amount	1928 Amount
50% Am. Gel. Powder	90,650	.1299	11,774.00	11,225.52
60% " " "	44,600	.1422	6,342.88	2,067.75
Total Powder - 1929	135,250	.1340	18,116.88	
Total Powder - 1928	94,450	.1407		13,293.27
Fuse	458,876	.585	2,687.77	1,859.01
#6 Blasting Caps	73,868	1.072	803.97	649.96
Cap Crimpers	3	.67	2.01	14.03
Powder Bags	37	2.40	88.80	43.80
Total Fuse, etc.			3,582.55	2,566.80
Total All Explosives			21,699.43	15,860.07
Product, tons			331,922	261,454
Pounds of powder per ton of ore			.4075	.3612
Cost per ton for powder			.0546	.0509
" " " " fuse, caps, etc.			.0108	.0098
" " " " all explosives			.0654	.0607
Average price per pound for powder			.13442	.14186

Rock Development

	Quantity	Average Price	1929 Amount	1928 Amount
50% Am. Gel. Powder	3,250	.1305	424.00	348.76
60% " " "	8,100	.1438	1,165.00	1,537.00
Total Powder - 1929	11,350	.1400	1,589.11	
Total Powder - 1928	12,550	.1502		1,885.76
Fuse	33,180	.585	195.13	193.62
Caps	5,550	1.072	123.72	48.58
Total Fuse, etc. 1929			319.52	
Total Fuse, etc. 1928				242.20
Total All Explosives - 1929			1,908.63	
Total All Explosives - 1928				2,127.96
Grand Total All Explosives Used - 1929			23,608.06	
Grand Total All Explosives Used - 1928				17,988.03
Average price for powder			.13442	.14186

MAAS MINE
ANNUAL REPORT
YEAR 1929

7. UNDERGROUND:

f. Explosives, Drilling and Blasting: (Cont)

Early in the year the fuse cutting and capping house in the tunnel was put into service, and all fuse was delivered to the miners when going to the shaft, in round metal containers, ready for use, and only in such quantities as needed for the day.

The amount of powder used in 1929 increased 43%, while the product increased 26.9%. More powder was used per ton of ore due to more main level drifting in ore, more raising, and more mining in new ground under the hanging where the ore was hard and tight. The cost per pound for powder decreased 5% in 1929.

g. Mining and Loading:

There was no change in the mining methods in 1929. The sub level interval has been kept between 10½ and 11½ ft. The interval will now be increased to 12½ ft. in areas where there is a good timber mat.

The number of scrapers in use has increased and if water did not interfere the mine would now be 100% scraper operated. The abandonment of mining in the footwall pillar between the 3rd and 4th levels and transfer of these gangs to the hanging wall territory above the 4th level has improved operating conditions and scrapers are now used by all contracts in this area. The only hand shoveling gangs are in the 2nd level footwall pillar where water renders it impossible to use scrapers. About 90% of the ore produced in 1929 was handled by scrapers, as compared with 75% in 1928.

A scraper slide was purchased early in the year for main level drifting and has been used in driving the 4th level drifts.

i. Ventilation:

The ventilation and second outlet raise between the 4th level Maas and 12th level Negaunee in the South part of the mine was holed early in the year, and materially benefitted the mining areas adjacent to the Race Course above the 4th level. The new 4th level main crosscut diverts the air currents to the working places in a very satisfactory manner.

The large fan located at No. 2 shaft Negaunee Mine and jointly owned by the Maas and Negaunee Mines, worked satisfactorily during the year. Some trouble with ice developed during the severe cold weather and it was necessary to reverse the fan and make the Maas Shaft downcast. Ice formed in the Maas Shaft and interfered somewhat with the operation of the skips and cage. Fortunately, there was no delay in hoisting but some expense was incurred in chopping ice between shifts and ventilation was not good due to shutting down the fan for short periods.

j. Pumping:

The number of gallons pumped per minute in 1929 as compared with 1928 is shown in the following table:

Month	1929	1928
January	1,076	1,055
February	1,089	1,043
March	1,075	1,100
April	1,009	1,123
May	1,023	1,095
June	1,014	1,067
July	1,018	993

MAAS MINE
ANNUAL REPORT
YEAR 1929

7. UNDERGROUND:

j. Pumping: (Cont)

Month:	1929	1928
August	1,030	973
September	1,062	986
October	1,102	1,014
November	1,064	1,109
December	1,058	1,071
Average	1,052	1,052

The average number of gallons pumped per minute in 1929 was exactly the same as in the previous year. No decided change is anticipated until a new cave breaks through to surface.

The amount of water pumped at the Negaunee Mine increased in 1929, due to extension of the caved areas, but at the Maas there was no change in the caved area.

The erection of the Aldrich triplex pump on the 4th level was completed early in the year and it has handled all the water from the level.

The 4th Level sump was also cleaned out for the first time in several years. It will be necessary to enlarge this sump in the near future to provide adequate storage capacity

The average number of gallons pumped per minute in the past six years is shown below.

Year	Gals. per minute
1929	1,052
1928	1,052
1927	1,013
1926	970
1925	915
1924	990

k. Underground in General:

During 1929 a large amount of work was done that added to the underground costs, but which has greatly benefitted the general operations. The pockets at the shaft on the 3rd level were entirely rebuilt with concrete and two measuring pockets were added. The old pockets were constructed of timber and were in bad condition due to rotting of the timber and the ore did not run out freely. The new installation is permanent and has increased the number of skip trips from this level at least 25%.

The track on the 3rd level from the shaft to the ore body has been relaid with 40 lb. rail and new ties, and the water ditch enlarged. This has increased the speed of the motor trains and reduced track maintenance.

Twelve new rocker dump cars have replaced the old saddleback cars which were in bad condition and unsuitable for handling wet, sloppy ore. A large amount of wet ore is handled on this level and the new cars will reduce track cleaning to a minimum.

On the 4th Level the plat was widened to make room for a second timber track from the cage to facilitate the handling of timber trucks.

The water ditch was enlarged the entire length of the rock drift, and the main tracks are being relaid on new ties and with new rails and tie plates where needed.

A trolley wire and a feeder cable was installed on this level to take care of the increased scraper and haulage load.

MAAS MINE
ANNUAL REPORT
YEAR 1929

7. UNDERGROUND:

k. Underground in General: (Cont)

The measuring pockets on the 4th level had not been used since the shaft was enlarged in 1925, the skips being loaded direct from the storage pockets. This method of loading was slow and caused a lot of spillage. The measuring pockets were rebuilt and equipped with doors in front operated by air. This installation has proven very satisfactory and has increased the hoisting capacity of the shaft due to quicker loading of skips.

All the main level plats were whitewashed, also the back of rock drifts over lights, with the result that the levels are much better lighted and safety and general efficiency has increased. This extensive program of improvements underway during 1929 is now nearly completed. Operating costs in subsequent years will benefit from the work done this year.

8. COST OF OPERATING:

a. Comparative Mining Costs:

	1929	1928	Increase	Decrease
PRODUCT	331,922	261,454	70,468	
Underground Costs	1.391	1.427		.036
Surface Costs	.148	.146	.002	
General Mine Accounts	.116	.116		
Cost of Production	1.655	1.689		.034
Loading and Shipping	.037	.039		.002
Total Cost on Cars	1.695	1.728		.033
Depreciation - Original Cost	.073	.073		
Plant Account	.046	.046		
Development	.039	.039		
Movable Equipment	.003	.010		.007
Taxes	.344	.287	.057	
Central Office	.084	.105		.021
Welfare, Safety, Hosp.	.040	.046		.006
Total Cost at Mine	2.324	2.334		.010
No. of Days Operated	292	261½		
No. Shifts & Hours	1-8 hr	1-8 hr		
Average Daily Product	1,137	1,000	137	
COST OF PRODUCTION:				
Labor	.939	.982		.043
Supplies	.716	.707	.009	
Total	1.655	1.689		.034

b. Detailed Cost Comparison:

(1) Days and Shifts:

The mine worked one eight-hour shift during 1929.

	1929	1928	Increase
No. Days Worked	292	261½	30½
Average No. Men employed	208	189	19
Total No. of Days	62,146	51,074¼	11,071 3/4

(2) Wages:

The Mine operated on the same wage schedule in both 1929 and 1928.

MAAS MINE
ANNUAL REPORT
YEAR 1929

8. COST OF OPERATING:

b. Detailed Cost Comparison: (Cont)

(3) Comparison of Production:

Production - 1929	331,922 tons
Production - 1928	261,454 "
Increase	70,468 "

(4) Comparison of Number of Men and Wages:

	No. Men	No. Days	Amount	Rate per day
1929	208	62,146	305,645.40	$ 4.92
1928	189	51,074 1/4	250,157.16	4.90
Increase	19	11,071 3/4	55,488.24	.02

(5) Tons per man per day:

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

	1929	1928	Increase	Decrease
Surface	25.26	25.51		.25
Underground	6.77	6.40	.37	
Total	5.34	5.12	.22	

(6) Cost of Production:

1929	$549,465.74	Cost per ton	$1.655
1928	441,671.58	" " "	1.689
Increase	107,794.16	Decrease	.034

	Total Cost				Cost per ton		
	Labor	%	Supplies	%	Labor	Supplies	Total
1929 -	$311,831.15	56.8%	$237,634.59	43.2%	$.939	$.716	$1.655
1928 -	256,847.96	58.2%	184,823.62	41.8%	.982	.707	1.689
Incr.-	54,983.19		52,810.97	1.4%		.009	
Decr.-		1.4%			.043		.034

The ratio of labor to supplies decreased again in 1929 due to the unusually heavy expenditures for supplies. On account of mechanization of the mines it is probable that the ratio will remain fairly constant in future years in the proportion of 58% labor, 42% supplies.

(7) Detail of Accounts:

UNDERGROUND COSTS:

Development in Rock

1929 Amount	$10,714.53	Cost per ton	$.032
1928 Amount	10,503.47	" " "	.040
Increase	211.06	Decrease	.008

	Sub Division			
	Drifting	Raising	Total	Cost per foot
1929	1,076'	508'	1,584'	$ 6.76
1928	1,101'	209'	1,310'	8.02
Increase		299'	274'	
Decrease	25'			1.26

MAAS MINE
ANNUAL REPORT
YEAR 1929

8. COST OF OPERATING:

Development in Rock (Cont)

The amount of raising in rock increased in 1929 but the cost per foot decreased due to more drifting in rock on sub levels and more raising. The figures used in this statement do not agree with those in statement under 7-e which only show drifting on the main levels.

Development in Ore

1929 Amount	$24,636.18	Cost per ton	$.074
1928 Amount	11,488.38	" " "	.044
Increase	13,147.80		.030

Sub Division

	Drifting	Raising	Total	Cost per foot
1929	1,125'	2,306'	3,431'	$ 7.18
1928	465'	1,281'	1,746'	6.58
Increase	660'	1,025'	1,685'	.60

The increase in cost was due to an increase of 95% in the amount of ore drifting and raising. The cost per foot increased due to 142% more ore drifting on main levels; ore raising increased only 80%.

Stoping

1929 Amount	$146,437.67	Cost per ton	$.442
1928 Amount	122,982.97	" " "	.471
Increase	23,454.70	Decrease	.029

Detail

	Labor		Supplies	
1929 -	$102,807.54	70%	$43,630.13	30%
1928 -	92,282.87	75%	30,700.10	25%
Increase	10,524.67		12,930.03	5%
Decrease		5%		

Cost per ton:

	Labor	Supplies	Total
1929	$.310	$.132	$.442
1928	.353	.118	.471
Decrease	.043		.029
Increase		.014	

The following scraper hoists were charged in 1929:

1 - 6½ h.p. Ingersoll Rand air hoists	$ 636.45
9 - 15 " Sullivan Electric Hoists - $1,165.00	10,485.00
1 - Lake Shore Engine Works slide	1,000.00
	$12,121.45

As compared with the following in 1928:

7 - 6½ h.p. Sullivan & Denver - second hand	2,832.02
2 - 300 Waugh air hoists	671.15
1 - Sullivan air hoist, second hand	312.50
2 - 6½ h.p. Ingersoll Rand air hoist - new	1,290.00
	$ 5,105.67

MAAS MINE
ANNUAL REPORT
YEAR 1929

8. COST OF OPERATING:

Stoping (Cont)

Labor cost per ton decreased due to the use of more scraper hoists, while the supply cost increased due to purchase of more scraper hoists and accessories, also to more powder used.

Explosives

	1929	1928
Production	331,922	261,454
Total pounds of powder	135,250	94,450
Average price per pound	.1340	.14074
Total amount for powder	$18,116.88	$13,293.27
Fuse, caps, etc.	3,582.55	2,566.80
Cost of all explosives	21,699.43	15,860.07
Pounds of powder per ton of ore	.4075	.3612
Cost per ton for powder	.0546	.0509
Cost per ton for all explosives	.0654	.0607

Timbering

1929 Amount	$114,826.85	Cost per ton	$.347
1928 Amount	84,970.72	" " "	.325
Increase	29,856.13		.022

Detailed Cost of Timber

	1929	1928
Timber Cost	$22,759.23	$13,978.89
Lagging, poles, etc.	20,573.67	14,104.73
Total	43,332.90	28,083.62
Feet of timber per ton of ore	1.1167	.7962
Cost per ton for all timber	.1305	.1074
Average price per foot	.0614	.0671

Timbering cost increased due to more timber used on account of more raising and more repairing on subs and main levels. Due to larger product the increase in cost per ton did not increase in proportion to the increased cost for timber.

Tramming

1929 Amount	$34,664.30	Cost per ton	$.104
1928 Amount	31,530.97	" " "	.121
Increase	3,133.33	Decrease	.017

Increase due to 30½ more working days in 1929. Cost per ton decreased due to larger product and to elimination, early in the year, of tramming on the 245' transfer sub level.

MAAS MINE
ANNUAL REPORT
YEAR 1929

8. COST OF OPERATING:

Ventilation

1929 Amount	$3,091.22	Cost per ton	$.009
1928 Amount	3,520.19	" " "	.013
Decrease	428.97		.004

The expense in both years represents Maas Mine proportion of expense of operating a joint ventilation fan at the Negaunee Mine. There was one #2½ Anaconda fan charged in 1928 - cost $344.00.

Pumping

1929 Amount	$48,354.36	Cost per ton	$.147
1928 Amount	47,059.41	" " "	.180
Increase	1,294.95	Decrease	.033

	1929	1928
Total gallons of water pumped	554,452,221	553,419,346
Gallons pumped per minute	1,052	1,052
Cost for power	$37,848.24	$38,196.15
Decrease	347.91	

The increased cost is due to more days worked by pumpmen in 1929. Due to increase in water on the 4th level it was necessary to operate the pump on this level three 8-hour shifts during all of 1929, as compared with only part of 1928. The decreased cost per ton is due to greater product.

Compressors & Air Pipes

1929 Amount	$42,605.83	Cost per ton	$.128
1928 Amount	31,155.95	" " "	.119
Increase	11,449.88		.009

Cubic feet of air used in 1929 -	1,067,265,000
" " " " " " 1928 -	679,005,000
Increase	388,260,000

The detail of this account for the two years is as follows:

	1929	1928
Compressors	$36,617.90	$25,457.14
Air Pipes	5,987.93	5,698.81
	42,605.83	31,155.95

Cost for power - 1929 -	$35,653.23
Cost for power - 1928 -	22,633.50
Increase	13,019.73

The increased cost is due to the mine operating 30½ more days and running the compressors on day and night shift on account of hoisting ore on both shifts.

MAAS MINE
ANNUAL REPORT
YEAR 1929

8. COST OF OPERATING:

Back Filling

1929 Amount	$477.61	Cost per ton	$.001
1928 Amount	126.48	" " "	.000
Increase	351.13		.001

Increase due to more filling broken in 1929 on account of mining under new hanging above the 4th level.

Underground Superintendence

1929 Amount	$13,748.63	Cost per ton	$.043
1928 Amount	11,754.42	" " "	.045
Increase	1,994.21	Decrease	.002

Increase due to the mine operating 30½ more days in 1929 and to employing an Assistant Captain in 1929 - Fred Prudom, formerly Captain at the Boeing Mine

MAINTENANCE ACCOUNTS:

Compressors & Power Drills

1929 Amount	$1,299.45	Cost per ton	$.004
1928 Amount	2,384.83	" " "	.009
Decrease	1,185.38		.005

The detail of this account for the two years is as follows:

	1929	1928
Compressors	287.70	91.41
Air Lines	155.57	491.63
Power Drills	856.18	1,801.79
Total	1,299.45	2,384.83

Decrease due to less repairs to air lines and less power drills purchased. There were more repairs to compressors in 1929.

The following power drills were charged in 1929:
5 AlAD Cleveland Rock Drills, cost $ 856.18
As compared with
3 N-72 Ingersoll Rand Drifters
1 91-A Cleveland Auger Drill
1 Sullivan 8 Auger Drill
6 Second-hand Ingersoll Rand Auger Drills
costing $1,801.79 in 1928.

Hand Tramming Equipment

1929 Amount	$22.95	Cost per ton	$.000
1928 Amount	92.11	" " "	.000
Decrease	69.16		.000

Decrease due to less use of this equipment which has been replaced by scraper hoists.

MAAS MINE
ANNUAL REPORT
YEAR 1929

8. COST OF OPERATING:

Electric Tram Equipment

1929 Amount	$15,716.32	Cost per ton	$.047
1928 Amount	11,902.86	" " "	.046
Increase	3,813.46		.001

Sub Division	1929	1928	Increase	Decrease
Generator & Motor	171.81	33.46	138.35	
Locomotives	2,984.48	2,955.95	28.53	
Wiring	1,656.46	1,632.27	24.19	
Main Line Tracks	8,294.67	3,219.78	5,074.89	
Main Line Cars	2,608.90	4,061.40		1,452.50
Total	15,716.32	11,902.86	3,813.46	

Increase due to more repairs to Generator & Motor, more Locomotive repairs, more Wiring, and to relaying the 3rd level tracks with new ties and 40 lb. rail. There were less repairs to cars during the year.

Pumping Machinery

1929 Amount	$5,070.44	Cost per ton	$.015
1928 Amount	3,584.27	" " "	.014
Increase	1,486.17		.001

Increase due to expense for widening and deepening the water ditch on third and fourth levels.

Total Underground Costs

1929 Amount	$416,666.34	Cost per ton	$1.391
1928 Amount	373,057.03	" " "	1.427
Increase	43,609.31	Decrease	.036

SURFACE COSTS:

Hoisting

1929 Amount	$21,177.34	Cost per ton	$.063
1928 Amount	16,322.90	" " "	.063
Increase	4,854.44		.000

Cost of electric power - 1929	$14,416.80
Cost of electric power - 1928	10,922.55
Increase	3,494.25

Increase due to mine operating 30½ days more and hoisting two shifts.