RECAPITULATION.

	Year 1919		Year 1918		Increase		Decrease	
	Total	Per Ton	Total	Per Ton	Total	Per Ton	Total	Per Ton
General Expense	8368.32	.199	3172.01	.055	5196.31	.144		
Maintenance	8166.36	.194	4964.80	.086	3201.56	.108		
Mining Expense	111033.71	2.638	79884.18	1.391	31149.53	1.247		
Cost of Production	127568.39	3.031	88020.99	1.532	39547.40	1.499		

ANGELINE MINE

AVERAGE MINE ANALYSIS ON OUTPUT FOR YEAR 1919.

GRADE	IRON	PHOS.	SILICA
East End Bessemer,	66.20	.028	3.05
Happy Hollow Bessemer,	67.03	.050	1.90
Happy Hollow,	66.55	.170	2.05
"D" Shaft Bessemer,	61.35	.042	8.50

AVERAGE ANALYSIS ON STRAIGHT CARGOES FOR YEAR - 1919.

GRADE	Mine		Lake Erie		
	IRON	PHOS.	IRON	PHOS.	MOIST.
Angeline Bessemer,	66.27	.026	65.88	.025	6.47

(Other grades all mixed.)
(No shipments of Hard Bess. - only few tons stocked.)

ANGELINE MINE

ORE STATEMENT - DECEMBER 31ST, 1919.

	E.END BESS.	"D"SHFT. BESS.	H.HOL. BESS.	"D"SHFT. ANG.	H.HOL. ANG.	ANG. SIL.	H.ORE BESS.	TOTAL	TOTAL LAST YEAR
On hand Jan.1st, '19,	4453	989	1050					6492	0
Output for Year,	14763	12114	1739	9573	1312	2335	27	42204	57439
Transferred,		570	211	1114	211	544			
Stockpile Overruns and shortages,	885	783	341			319		124	
Total,	18331	14456	2578	8459	1523	3198	27	48572	57439
Shipments,	18331	11918	2078	1398	211	2537		36473	50947
Balance on hand,	0	2538	500	7061	1312	661	27	12099	6492
Decrease in output-26%								15235	
Increase in ore on hand,								5607	

1919 - 2-8 Hour Shifts at "D" Shaft
East End - 1-10 Hour Shift - Jan. 1st to August 20th.
1918 - East End - Jan. 1st to March 1st, - 1-10 Hour Shift
Mar. 1st to Nov. 1st - 2-10 " "
Nov. 1st to Dec. 31st - 1-10 " "
Happy Hollow - June 7th to Nov. 1st-2-10 " "
Nov. 1st to Dec.31st 1- 8 " "
"D" Shaft - June 7th to Nov. 1st 1-8 " "
Nov. 1st to Dec.31st 2-8 " "

ANGELINE MINE.

ANGELINE MINE

SHIPMENTS FOR YEAR - 1919.

GRADE	POCKET	STOCKPILE	TOTAL	TOTAL LAST YEAR	
East End Bessemer,	5,014	13,317	18,331	45,346	
"D" Shaft Bessemer,	4,814	7,104	11,918	899	
Happy Hollow Bessemer,	2,078		2,078	4,566	
"D" Shaft Angeline,	1,398		1,398		
Happy Hollow Angeline,	211		211		
Angeline Silica,	544	1,993	2,537		
East End Bessemer,				136	
Total,	14,059	22,414	36,473	50,947	
Shipments last Year,			50,947		
Decrease -28%					

ANGELINE MINE.

ANGELINE MINE.

COMPARATIVE MINING COST FOR YEAR.

	1 9 1 9.	1 9 1 8.	INCREASE.	DECREASE.
PRODUCT	42,080	57,439		15,359
General Expense	.199	.055	.144	
Maintenance	.194	.086	.108	
Mining Expense	2.638	1.391	1.247	
Cost pf production	3.031	1.532	1.499	
Exploratory	.016	.020		.004
DEPRECIATION.				
Original Purchase	-	.132	.132	
Plant Account		.029		.029
Equipment	.008	.003	.005	
Construction	.119	.452		.333
Total Depreciation	.127	.352		.225
Taxes	.094	.040	.054	
Central Office	.094	.046	.048	
Miscellaneous	.035			.035
Supply Inventory		.030		.030
Idle Expense	-	.029		.029
Sundry Expense	.007	.038		.031
Cost on Stockpile	3.334	2.095	1.239	
Loading & Shipping	.175		.175	
Cost on Cars	3.509	2.095	1.414	
No.Days Operating	.298	161	137	
No.Shifts & Hours	1-10hr 1- 8hr	1-10hr		
Avg.Daily Product	141	357		216

Detail of Production				
From Mine	27463	1888	25575	
Happy Hollow	1739	5616		3 877
East End Deposit	13878	49935		36057
Total	42080	57439		15359

COST OF PRODUCTION.	
Labor	2.194
Supplies	.837
Total	3.031

ANGELINE MINE.

COMPARATIVE WAGES AND PRODUCT.

	1 9 1 9.	1 9 1 8.	INCREASE.	DECREASE.
PRODUCT	42,080	57,439		15,359
No.Shifts and Hours	1-10hr 1-8hr	1-10hr		
AVERAGE NUMBER MEN WORKING				
Surface	24	17	7	
Underground	39	15	24	
Total	63	32	31	
AVERAGE WAGES PER DAY				
Surface	4.97	4.62	.35-8%	
Underground	5.38	4.99	.39-7.8	
Total	5.23	4.79	.44-9%	
WAGES PER MONTH OF 25 DAYS				
Surface	124.25	115.50	8.75	
Underground	134.50	124.75	9.75	
Total	140.75	119.75	21.00	
PRODUCT PER MAN PER DAY				
Surface	6.43	10.78		4.35
Underground	3.71	13.10		9.39
Total	2.35	5.91		3.56
LABOR COST PER TON				
Surface	.773	.429	.344	
Underground	1.451	.381	1.070	
Total	2.224	.810	1.414	
AVG.PRODUCT BRK'G & TRM'G	15.20	-		
" WAGES CONTRACT MINERS)				
" " " TRAMMERS)Co.				
" " " LABOR)Acct.				
TOTAL NUMBER OF DAYS				
Surface	6,545 ¾	5,328½	1,217¼	
Underground	11,354	4,385¾	6,968¼	
Total	17,899 ¾	9,714¼	8,185½	
AMOUNT FOR LABOR				
Surface	32,534.28	24,615.89	7,918.39	
Underground	61,066.72	21,872.65	39,194.07	
Total	93,601.00	46,488.54	47,112.46	

Proportion Surface to Underground Men:
1919 - 1 to 1.62
1918 - 1 to ,88

ANGELINE MINE.

TIMBER STATEMENT FOR YEAR ENDING DECEMBER 31, 1920.

KIND.	LINEAL FEET.	AVG.PRICE PER FOOT.	AMOUNT 1 9 1 9.	AMOUNT 1 9 1 8.
6" to 8" Timber	13,562	.0226	306.65	262.21
8" to 10" "	2,506	.04	100.24	173.69
10" to 12" "	12,797	.06	767.82	109.35
12" to 14" "	3,125	.08	250.00	-
Total - 1919	31,990	.045	1434.71	
Total - 1918	17,934	.0306		545.25
	LINEAL FEET.	PER 100'.		
5' Lagging	125,800	.59	736.50	
7' "	27,045	.55	148.96	
8' "	29,467	.55	162.06	
Total Lagging	182,312	.56	1047.52	
Poles	3,256	1.00	32.30	10.78
Total - 1919	185,568		1079.82	

Product	42,080	57,439
Ft. timber per ton of ore	1.31	.031
Ft. Lagging "	4.31	
Ft. Lagging per ft. of timber	5.73	
Cost per ton for Timber	.034	.009
" Lagging	.025	
" Poles	.008	
" Timber, Lagging & Poles	.067	.009
Equivalent of stull timber to Bd.measure	63,116	
Ft. Bd.Measure per ton of ore	1.50	

Total cost for Timber, Lagging & Poles -	1919	2514.53
"	1918	556.03

ANGELINE MINE.

ANGELINE MINE.

STATEMENT OF EXPLOSIVES USED FOR BREAKING ORE.

KIND.	QUANTITY.	AVERAGE PRICES.	AMOUNT 1 9 1 9.	AMOUNT 1 9 1 8.
40% Powder	50	.179	8.95	
50% "	18,800	.175	3286.32	3778.05
Total Powder	18,850	.175	3295.27	3778.05
Fuse	35,000	7.32	261.42	66.98
Caps	7,600	12.71	96.57	10.32
Crimpers	8	.29	2.35	6.75
Exploders	850	9.01	76.59	117.32
Total Fuse, Etc.			436.93	212.07
Total Explosives,			3732.20	3990.12
Product			42,080	57,439
Pounds Powder per ton of Ore			.448	.316
Cost per ton for Powder			.0783	.066
" Fuse, Etc.			.0102	.004
" All Explosives			.0885	.070
Avg. Price per Lb. for Powder			.175	.208

ANNUAL REPORT

OF THE

HOLMES MINE (1919)

Production and Shipments.

The Holmes Mine worked 299 days in 1919, and produced 133,131 tons of ore, an average of 445 tons per day. Hoisting was done on day-shift only until December 27th, at which time hoisting of all grades was started on night-shift also. An unusually large amount of rock was hoisted during the year, on account of sinking the shaft and opening the third and fourth levels. 41,708 tons of rock were hoisted, an average of 139 tons per day.

The Holmes Bessemer Lump in stock was loaded and crushed, and sold as Holmes Bessemer Crushed.

Three grades of ore were being stocked at the end of the year, Holmes Bessemer, Holmes and Junction.

There was little labor shortage during the year.

Table I.

Production by Grades.

Grade	1918 Tons	1919 Tons
Holmes Bessemer Lump	27,045	420
Holmes Bessemer Crushed	53,407	60,319
Holmes Crushed	17,989	35,944
Junction Bessemer	1,878	889
Junction	21,017	35,979
Total Ore	121,336	133,131
Rock	11,040	41,708
Total Ore and Rock	132,376	174,839

Table II.

Comparison of Product for 1918 and 1919.

	1918	1919
Days Worked	298	299
Ore, Tons	121,336	133,131
Rock, Tons	11,040	41,708
Ore and Rock, Tons	132,376	174,839
Ore per Day, Tons	407	445
Rock per Day, Tons	37	139
Ore and Rock per Day, Tons	444	584

Table III.

Distribution of Product by Levels.

Level	Holmes Bessemer Tons	Holmes Tons	Junction Bessemer Tons	Junction Tons	Total Ore Tons
First	53,625	35,944		30,488	120,057
Second	6,694		889	4,311	11,894
Third				624	624
Fourth				556	556
Total	60,319	35,944	889	35,979	133,131

Table IV.

Production by Months.

Month	Days	Ore per Day Tons	Holmes Bessemer Tons	Holmes Tons	Junction Bessemer Tons	Junction Tons	Total Ore Tons	Rock Tons	Total Ore and Rock Tons
January	26	346	3,137	2,996		2,864	8,997	1,352	10,349
February	23	400	5,424	2,068		1,716	9,208	1,980	11,188
March	26	415	5,200	2,332		3,260	10,792	1,856	12,648
April	24	410	3,552	3,376		2,900	9,828	976	10,804
May	25	430	3,716	3,524		3,504	10,744	746	11,490
June	24	466	6,027	4,020		1,144	11,191	7,288	18,479
July	25	432	5,531	3,872		1,408	10,811	6,640	17,451
August	26	469	6,318	2,768		3,120	12,206	5,888	18,094
September	25	485	6,683	2,364	440	2,628	12,115	4,724	16,839
October	27	457	5,422	2,496	103	4,324	12,345	4,272	16,617
November	24	458	4,131	2,988	24	3,846	10,989	3,387	14,376
December	24	521	3,788	3,140	322	5,265	12,515	2,599	15,114
Total	299	441	58,929	35,944	889	35,979	131,741	41,708	173,449
Overrun from Stock-Pile		4	1,390				1,390		1,390
Total	299	445	60,319	35,944	889	35,979	133,131	41,708	174,839

Table V.

Shipments 1919.

Grade	Pocket Tons	Stock-Pile Tons	Total Tons
Holmes Bessemer Lump	420		420
Holmes Bessemer	25,448	21,465	46,913
Junction Bessemer	423		423
Junction	48		48
Total	26,339	21,465	47,804

Table VI.

Ore in Stock - Jan. 1st, 1920.

Holmes Bessemer	20,366 Tons
Holmes	40,436 "
Junction Bessemer	418 "
Junction	42,534 "
Total	103,754 "

Table VII.

Delays.

Date	Hours	Tons Lost	Cause	Cost of Repairs
Aug. 20	1	100	No current. Main Line.	
Oct. 16	6	200	Rotary converter for motor haulage out of order.	$ 18.46
Nov. 18	2	50	No current. Main Line.	
Total	9	350		$ 18.46

Table VIII.

Delays Due to Lack of Current.

Date	Hours	Tons Lost	Cause
Aug. 20	1	100	Main Line trouble.
Nov. 18	2	50	Main Line trouble.
Total	3	150	

Table IX.

Estimate of Ore Reserves.

Level	Holmes Bessemer Tons	Holmes Tons	Junction Bessemer Tons	Junction Tons	Total Tons
		Developed Ore.			
First	15,000	10,000		64,000	89,000
Second	50,000	20,000	40,000	219,000	329,000
Total Above Second Level	65,000	30,000	40,000	283,000	418,000
Less 10% Rock and 10% Loss in Mining	13,000	6,000	8,000	57,000	84,000
Net Ore Developed	52,000	24,000	32,000	226,000	334,000
		Probable Ore Partly Developed.			
Third	185,000	67,000	50,000	320,000	622,000
Fourth	165,000	90,000	20,000	340,000	615,000
Total Ore Partly Developed	350,000	157,000	70,000	660,000	1,237,000
Less 10% Rock and 10% Loss in Mining	70,000	31,000	14,000	132,000	247,000
Net Total Partly Developed	280,000	126,000	56,000	528,000	990,000
Total Ore Reserves	332,000	150,000	88,000	754,000	1,324,000

Factors Used:-

Hard Ore - Above Second Level - 8 cu. ft.

Below Second Level - 9 cu. ft.

Soft Ore - - 11 cu. ft.

Classification of Contracts.

The average number of contracts working during the year was 23, of which 11 were stoping, 9 drifting in ore and 3 in rock. The number of men in rock was much larger than the number of contracts would indicate, because of the intensity of the work in the shaft and on the third and fourth levels. The average number of contracts working in hard ore was 15 and in soft ore 5. In December there were 8 gangs in hard ore and 13 in soft ore.

Sinking No. 1 Shaft.

Sinking No. 1 shaft was continued until the middle of April, working two 8-hour shifts at night. The shaft was sunk 170 feet to a depth of 1,329 feet, and plats and pockets were cut at the third and fourth levels. All this work was in diorite. At the bottom of the shaft, 63 feet below the fourth level, enough ground was cut out to allow pockets to be built under the skip-pits, so that spilled dirt can be drawn off into a car and hoisted on the cage.

Pumping.

The water from the Section 16 Mine decreased soon after the first of the year, but pumping was continued. A sump was cut in a cross-cut on the second level 400 feet west of the boundary, and in this was installed a 300 gal. automatic bilge pump, which throws to the sump near the shaft. Near the shaft a 150 gal. plunger pump was installed, throwing direct to surface. The big centrifugal pump and the Cameron pump near the boundary were removed.

When the fourth level was opened a large sump and pump-house were cut out, and a 600 gal. Aldrich pump and 700 gal. Cameron centrifugal pump were installed, throwing direct to surface.

In December another heavy flow of water came from Section 16, due to cracks on surface, but it lasted only a few days.

A concrete dam was built on the second level early in the year, with stop-logs that could be inserted to close the drift, should occasion arise.

Surface.

There was little new construction on surface during the year. Some additional grading was done in the timber-yard, and the sub-grade for a new road was built around the south end of the rock-pile to the railroad crossing on Excelsior Street. This was built because east of our boundary Excelsior Street is undermined by the Section 16 Mine. The stocking trestles and floors were slightly extended to make room for the winter's production.

Underground.

Nearly all of the stoping done during the year was above the first level. The 620, 605, 600, 590 and 580 foot sub-levels were worked out, and practically all the ore on the 570 foot sub-level was finished. The hard ore vein has been nearly all mined down to the 520 foot sub-level, but only a small amount of the soft ore below the 570 foot sub-level has been worked out. At the end of the year there were five gangs working on the 570 foot sub-level, one on the 545, one on the 535, one on the 520, four on the 510, one on the 500 and four on the first level, of which ten were in hard ore and seven in soft ore. During the first of the year a drift near the contact between the hard and soft ore formations was driven west to the main cross-cut, providing another haulage-road and proving up a considerable amount of lean ore, analzing about 50 per cent in iron. This ore is not included in any of the estimates.

Between the second level and the first level the only stoping was in a small shrinkage-stope opened in the west end of the vein. The ore was narrow and poor in quality. Seven raises were put up to the first level, three in soft ore and four in hard ore. Over 600 feet of drifting was also done on the 445 foot sub-level in both veins. At the end of the year two gangs were raising, and a third was drifting in the hard ore on the 445 foot sub-level.

The third level was opened for a distance of 1,210 feet, the ore-formation being reached 900 feet south from the shaft. The cross-cut had just reached the hard ore at the end of the year. Drifts east and west in the soft ore-formation have been started. The soft ore is badly cut up by dikes. There are two contracts working on this level.

The fourth level was opened for a length of 1,130 feet, the soft ore being reached 920 feet south of the shaft. The ore was clean for 78 feet in the cross-cut, the breast of which has been in rock for 35 feet. Drifts east and west in the ore have been started. There is one contract working on this level.

A "Hoar Ore-Loader" is being tried out on the third level with considerable success.

HOLMES MINE.

COMPARISON OF COST SHEETS FOR 1918 AND 1919.

The Holmes Mine worked on double shift during all of 1919. Hoisting was done on day-shift only, except for the development work on the third and fourth levels, until the Monday after Christmas, December 29th, at which time hoisting on both shifts from all levels was started. The amount of rock-work charged against the ore was extraordinarily large, as noted in the description of operations, and the product was kept down by the small number of working-places and the large amount of rock that had to be handled. The shaft was sunk 172 feet in 1919 compared with 41 feet in 1918 and 2853 feet of rock-drifts and raises were driven compared with 920 feet in 1918. One ton of rock was hoisted for every 3.19 tons of ore. In both years Section 16 surface drainage imposed a good deal of expense on the mine.

In 1918 wages were increased 10% successively on April 16th, Aug. 1st and Oct. 1st, and the latter rate was maintained throughout 1919, making the rate for 1919 18.4% greater than the average for 1918.

The increase in cost per ton for labor was $ .681, of which $ .336 was due to the higher wage-rate. By calculating the cost per ton for ore and rock for both years and deducting 18.4% of the 1918 cost per ton for labor from the 1919 figures, the two years compare as follows:-

Comparison of Cost per Ton for Ore and Rock.

	1918	1919
Tons of Ore and Rock	132,376	174,839
Cost per Ton for Labor	1.909	1.671
Cost per Ton for Supplies	.885	.813
Cost per Ton, Total	2.794	2.484
Corrected for Wage Increase	.307	____
	2.487	2.484

Production.

	Total	Per Day
Year 1918	121,336 Tons	407 Tons
Year 1919	133,131 "	445 "
Increase	11,795 "	38 "

Labor.

	1918	1919
Average number of men	164	201
Average rate per day	$ 4.85	$ 5.60

Tons per Man per Day.

	1918	1919
Surface	8.75	9.96
Underground	3.60	2.85
Total	2.55	2.22

Cost of Production.

	1918	1919
Labor	$ 1.826	$ 2.507
Supplies	.884	1.162
Total	$ 2.710	$ 3.669

GENERAL EXPENSE.

No. 26 - Insurance.

1918	$ 346.73	$ .003
1919	829.30	.006
Increase	$ 482.57	$ .003

The increase is in Riot Insurance.

No. 27 - Engineering.

1918	$ 1504.49	$ .012
1919	2183.97	.017
Increase	$ 679.48	$ .005

1919 charges were higher on account of higher wages and opening the third and fourth levels. This is a Central Office charge.

GENERAL EXPENSE. (Continued)

No. 28 - Analysis.

1918	$ 4086.92	$ .034
1919	5194.26	.039
Increase	$ 1107.34	$ .005

The increase is due to more samples and higher cost per determination at central laboratory.

No. 30 - Personal Injury Expense.

1918	$ 5321.10	$ .044
1919	6029.20	.045
Increase	$ 708.10	$ .001

This is a Central Office charge. Charges for both years were as follows:-

	1918	1919
Medical & Hospital Exp.	$ 768.98	$ 1221.24
Compensation Charges	3733.70	2209.39
½ Day Funeral Expense	206.68	
First Aid Room	8.29	
Hospital Deficit	603.45	2598.57
Total for Year	$ 5321.10	$ 6029.20

No. 30a - Mine Office.

1918	$ 7304.62	$ .060
1919	8949.66	.067
Increase	$ 1645.04	$ .007

There was one more man in the office in 1919, due to the employment of a returned soldier.

MAINTENANCE.

No. 125 - Tracks and Yards.

1918	$ 2994.46	$ .025
1919	2910.36	.022
Decrease	$ 84.10	$ .003

This account is high for both years on account of railroad charges for track maintenance.

No. 126 - Docks, Trestles and Pockets.

1918	$ 1296.53	$ .011
1919	796.15	.006
Decrease	$ 500.38	$ .005

Charges were high in 1918 on account of changes in shaft-house loading pockets and plates for lining. In 1919 principal charges were for extension of stock-pile floors.

No. 127 - Buildings.

1918	$ 1121.33	$ .009
1919	206.18	.002
Decrease	$ 915.15	$ .007

1918 charges were high on account of covering the coal-dock and building a horse-shed.

No. 128 - Shop Machinery.

1918	$ 398.98	$ .003
1919	635.33	.005
Increase	$ 236.35	$ .002

In 1919 a circular saw and wood-borer were set up in the carpenter-shop and a hack-saw in the machine shop. Machine-tools were also purchased.

No. 129 - Boiler Plant.

1918	$ 56.18	$ .000
1919	2.70	.000
Decrease	$ 53.48	$ .000

MAINTENANCE. (Continued)

No. 130 - Hoisting Machinery.

1918	$ 1612.91	$ .013
1919	2609.06	.020
Increase	$ 996.15	$ .007

In 1918 the principal items were bell-signals $ 123.64, wire-rope $ 904.02, and cutting rope and putting it on drums, $ 229. In 1919 the principal items were 12" counter-weight pipe to fourth level $ 470.31, wire-rope $ 1128.60, overwind switch $ 52.98, and hoist regulator $ 423.84. The balance is repairs and labor of installation.

No. 131 - Compressors and Power Drills.

1918	$ 712.15	$ .006
1919	165.08	.001
Decrease	$ 547.07	$ .005

In 1918 there were repairs to the air-compressor and the air receiver was changed. Some labor repairing drills that should have been charged to breaking ore was charged to this account.

No. 132 - Pumping Machinery.

1918	$ 3254.62	$ .027
1919	9052.69	.068
Increase	$ 5798.07	$ .041

1919 charges included part of the cost of installing the big centrifugal pump on the second level, the cost of a dam, cutting a sump inside, and the first cost and installation of two smaller pumps, as well as the removal of the large pump later in the year.

No. 133 - Top Tram Engines and Cars.

1918	$ 1471.09	$ .012
1919	1131.05	.008
Decrease	$ 340.04	$ .004

1918 charges were high on account of Hard Ore Shop charges for a butter-fly gate, and expense of rebuilding stocking-car. In 1919 another car was rebuilt and a spare drum was fixed up for the pull-back.

No. 134 - Skips and Skip-Roads.

1918	$ 2964.12	$ .025
1919	1681.67	.013
Decrease	$ 1282.45	$ .012

In 1918 a new cage was put on, both skip and cage compartments were enclosed on surface, and skip-repairs were high following the overwinding accident in 1917.

No. 135 - Underground Tracks and Cars.

1918	$ 3396.97	$ .028
1919	4476.98	.033
Increase	$ 1080.01	$ .005

The increase is due to building new cars for hand-tramming and to new rail used. Higher wages and higher cost of material account for most of the increase.

No. 136 - Electric Tram Plant.

1918	$ 8778.29	$ .072
1919	9745.21	.073
Increase	$ 966.92	$ .001

Extensions on the first, third and fourth levels and higher wages account for the increase. In 1919 supplies were as follows:-

Car repairs	$ 210.81
New cars	1722.00
Trolley extensions	632.31
General supplies and tools	120.48
Lights	115.19
Track	2543.51
Total	$ 5344.30

Balance is labor on above items.

MAINTENANCE. (Continued)

No. 137 - Telephones and Safety Devices.

1918	$ 1212.03	$ .010
1919	467.43	.004
Decrease	$ 744.60	$ .006

In 1918 charges were higher principally for safety-gates, lights on levels, and protection of belts and openings in shaft-house. There were two telephones installed in 1919.

MINING EXPENSE.

No. 150 - Air-Pipes.

1918	$ 3817.67	$ .032
1919	5277.50	.040
Increase	$ 1459.83	$ .008

Extensions on the third and fourth levels and higher wages account for the increase in 1919.

No. 151 - Compressors.

1918	$ 17203.91	$ .142
1919	21791.52	.164
Increase	$ 4587.61	$ .022

The increase is due to higher wages and to more air used for rock-work.

No. 152 - Hoisting.

1918	$ 14072.52	$ .116
1919	17100.66	.128
Increase	$ 3028.14	$ .012

The increase is due to higher wages and more ore and rock hoisted.

No. 153 - Pumping.

1918	$ 1590.60	$ .013
1919	14719.19	.111
Increase	$ 13128.59	$ .098

There was very little pumping prior to December 1918. After that date the water varied from 100 to 300 gals. per min. This was handled by electric pumps. Surface pumping at Section 16 in 1919 was charged to this account.

No. 154 - Sinking and Shaft Repairs.

1918	$ 5566.24	$ .046
1919	36066.17	.271
Increase	$ 30499.93	$ .225

The shaft was sunk 41 feet in 1918 and 172 feet in 1919 and two plats with pockets were cut.

No. 155 - Rock Drifting.

1918	$ 11682.73	$ .096
1919	51708.40	.389
Increase	$ 40025.67	$ .293

In 1919 drifts aggregating 2,853 feet were driven, and in 1918 920 feet.

No. 156 - Breaking Ore.

1918	$ 126374.59	$1.041
1919	169928.22	1.276
Increase	$ 43553.63	$ .235

The increase in cost per ton is due to higher wages and to more raising and drifting in ore. The total cost is also larger on account of greater product.

No. 157 - Tramming.

1918	$ 27088.79	$ .223
1919	24747.78	.186
Decrease	$ 2341.01	$ .037

The decrease is due to less re-handling on sub-levels in 1919.

MINING EXPENSE. (Continued)

No. 158 - Filling.

1918	$ 4620.37	$ .038
1919	4924.83	.037
Increase	$ 304.46	
Decrease		$ .001

There was more rock dumped underground in 1919.

No. 159 - Timbering.

1918	$ 44113.77	$ .364
1919	57987.85	.435
Increase	$ 13874.08	$ .071

The increase is due to higher cost of timber, more timber used and to higher wages for repairing and handling.

No. 160 - Captain and Bosses.

1918	$ 6689.69	$ .055
1919	8104.08	.061
Increase	$ 1414.39	$ .006

There were four bosses during 1919 and only two in most of 1918.

No. 161 - Dry-House.

1918	$ 4641.63	$ .038
1919	4581.40	.034
Decrease	$ 60.23	$ .004

No. 162 - Top Landing and Tramming.

1918	$ 7631.43	$ .063
1919	8296.95	.062
Increase	$ 665.52	
Decrease		$ .001

In 1919 it was necessary to handle most of the rock at night.

No. 163 - Stocking Ore.

1918	$ 4029.79	$ .033
1919	4445.52	.033
Increase	$ 415.73	$ .000

The increase is due to higher wages and to extensions of the "Holmes" trestle.

No. 164 - Sorting Ore.

1918	$ 1855.89	$ .016
1919	1777.68	.013
Decrease	$ 78.21	$ .003

RECAPITULATION.

	Year 1918		Year 1919		Increase		Decrease	
	Total	Per Ton	Total	Per Ton	Total	Per Ton	Total	Per Ton
General Expense	18563.86	.153	23186.39	.174	4622.53	.021		
Maintenance	29269.67	.241	33879.89	.255	4610.22	.014		
Mining Expense	280979.62	2.316	431457.75	3.240	150478.13	.924		
Cost of Production	328813.15	2.710	488524.03	3.669	159710.88	.959		

HOLMES MINE

AVERAGE MINE ANALYSIS ON OUTPUT FOR YEAR 1919.

GRADE	IRON	PHOS.	SILICA
Holmes Bessemer Lump,	63.40	.025	5.36
Holmes Bessemer,	61.25	.036	7.84
Holmes,	59.63	.071	9.48
Junction Bessemer,	64.72	.035	3.65
Junction,	56.64	.095	10.39

AVERAGE ANALYSIS ON STRAIGHT CARGOES FOR YEAR 1919.

GRADE	Mine		Lake Erie		
	IRON	PHOS.	IRON	PHOS.	MOIST.
Holmes Bessemer,	61.27	.035	61.59	.033	3.55

(All other grades mixed).

ORE STATEMENT - DECEMBER 31ST, 1919.

	BESS. LUMP	BESS. CR.	HOLMES CR.	JUNCTION BESS.	JUNCTION	TOTAL	TOTAL LAST YEAR
On hand Jan. 1st, 1919,	1288	6092	4492	894	5661	18427	15048
Output for year,	488	58441	35944	889	35979	131741	119255
Transferred,	2746	2746		942	942		
Stockpile Shortage and Overrun,	1390					1390	2081
Total,	420	67279	40436	841	42582	151558	136384
Shipments,	420	46913		423	48	47804	117957
Balance on hand,	0	20366	40436	418	42534	105144	18427
Increase in output-11%						12486	
Increase in ore on hand,						86717	

1919 - 2-8 Hour Shifts for year
1918 - 2-8 Hour Shifts for year

HOLMES MINE.

HOLMES MINE

SHIPMENTS FOR YEAR - 1919.

GRADE	POCKET	STOCKPILE	TOTAL	TOTAL LAST YEAR
Holmes Bessemer Lump,	420		420	28,723
Holmes Bessemer Crushed,	25,449	21,464	46,913	51,391
Holmes Crushed,				13,497
Junction Bessemer,	423		423	1,662
Junction,	48		48	22,684
Total,	26,340	21,464	47,804	117,957
Total last Year,	72,337	45,620	117,957	
Decrease - 59%			70,153	

HOLMES MINE.

COMPARATIVE MINING COST FOR YEAR.

	1 9 1 9.	1 9 1 8.	INCREASE.	DECREASE.
PRODUCT	133,131	121,336	11,795	
General Expense	.174	.153	.021	
Maintenance	.255	.241	.014	
Mining Expense	3.240	2.316	.924	
Cost of Production	3.669	2.710	.959	
Exploratory	-	.049		.049
DEPRECIATION.				
Original Purchase	.002	.002	-	
Plant	.500	.500	-	
Equipment		.001		.001
Total Depreciation	.502	.503		.001
Taxes	.147	.119	.028	
Central Office	.104	.103	.001	
Supply Inventory		.032		.032
Miscellaneous	.001	.001	-	
Sundry Expense	.008	.031		.023
Total Cost on Stockpile	4.431	3.548	.883	
Loading & Shipping	.069	.094		.025
Total Cost on Cars	4.500	3.642	.858	
No.Days Operating	299	298	1	
No.Shifts & Hours	1-8hr	2-8hr		
Avg.Daily Product	445	407	38	
COST OF PRODUCTION.				
Labor	2.507	1.826	.681	
Supplies	1.162	.884	.278	
Total	3.669	2.710	.959	

Detail of principal items causing increase in mining expense.

Pumping	.098
Sinking	.225
Drifting	.293
B.Ore	.235
	.851

HOLMES MINE.

HOLMES MINE.

COMPARATIVE WAGES AND PRODUCT.

	1 9 1 9.	1 9 1 8.	INCREASE.	DECREASE.
PRODUCT	133,131	121,336	11,795	
No. Shifts and Hours	1-8hr	2-8hr		
AVERAGE NUMBER MEN WORKING				
Surface	42	44		2
Underground	153	112	41	
Total	195	156	39	
AVERAGE WAGES PER DAY				
Surface	4.96	4.32	.64-14.8%	
Underground	5.78	5.06	.72-14.2%	
Total	5.60	4.85	.75-15.5%	
WAGES PER MONTH OF 25 DAYS				
Surface	124.00	108.00	16.00	
Underground	144.50	126.50	18.00	
Total	140.00	121.25	18.75	
PRODUCT PER MAN PER DAY				
Surface	8.83	8.90		.07
Underground	3.36	3.67		.31
Total	2.43	2.60		.17
LABOR COST PER TON				
Surface	.562	.486	.076	
Underground	1.776	1.381	.395	
Total	2.338	1.867	.471-25%	
AVG. PRODUCT BRK'G & TRM'G	4.16	4.79		.63
" WAGES CONTRACT MINERS	5.93	5.22	.71	
" " " TRAMMERS	5.50	0		
" " " LABOR	5.90	5.22	.58	
TOTAL NUMBER OF DAYS				
Surface	13,222½	13,625¼	[illegible]	402¾
Underground	46,195¼	33,109⅝	13,085¾	
Total	59,417¾	46,734¾	12,683	
AMOUNT FOR LABOR				
Surface	65637.61	58913.39	6724.22	
Underground	267416.91	167549.86	99867.05	
Total	333054.52	226463.25	106,591.27	

Proportion Surface to Underground Men:
1919 - 1 to 3.64
1918 - 1 to 2.55
1917 - 1 to 2.5

HOLMES MINE.

TIMBER STATEMENT FOR THE YEAR ENDING DECEMBER 31, 1919.

KIND.	LINEAL FEET.	AVG.PRICE PER FOOT.	AMOUNT 1919.	AMOUNT 1918.
4" to 6" Timber	65,857	.0104	684.76	481.12
6" to 8" "	59,740	.03	1867.20	2239.74
8" to 10" "	35,976	.059	2078.57	1807.04
10" to 12" "	18,276	.087	1601.58	2112.00
12" to 14" "	7,000	.1179	819.68	937.36
Total - 1919	186,849	.0377	7051.79	
Total - 1918	178,896	.0423		7577.26
5' Lagging	433,500	.93	4051.41	2316.51
7' "	36,000	.60	210.50	590.70
Total - 1919	469,500	.90	4261.91	2907.21
Poles	43,552	1.24	541.72	2194.62
Total - 1919	513,052	.093	4803.63	
Total - 1918	736,361	.07		5101.83
Product			133,131	121,336
Feet Timber per ton of ore			1.403	1.474
" Lagging "			3.68	4.24
" " per ft. of timber			2.51	2.90
Cost per ton for Timber			.053	.0624
" Lagging			.032	.0239
" Poles			.0407	.0188
" Timber, Lagging & Poles			.090	.1044
Ft.Bd.Measure per ton of ore			2.72	2.68

Total Cost for Timber, Lagging & Poles - 1919 11855.42
" 1918 12679.09

HOLMES MINE.

STATEMENT OF EXPLOSIVES USED FOR BREAKING ORE.

KIND	QUANTITY.	AVERAGE PRICES.	AMOUNT. 1 9 1 9.	AMOUNT 1 9 1 8.
50% Powder	86,750	.1765	15316.50	18679.21
60% "	7,000	.1852	1296.76	6586.55
80% "				1705.50
Total Powder	93,750	.1772	16613.26	26971.26
Fuse	192,000	7.88	1513.85	2065.13
Caps	42,400	14.10	597.42	732.67
Cap Crimpers	12		6.75	26.12
Tamping Bags				21.75
Connecting Wire				12.31
Total Fuse, Etc.			2118.02	2857.98
Total Explosives,			18731.28	29829.24
Product			133,131	121,336
Pounds Powder per ton of Ore			.70	1.01
Cost per ton for Powder			.124	.222
" Fuse, Caps, Etc.			.016	.024
" All Explosives			.140	.246
Avg. Price per Lb. for Powder			.1772	.2191

NEGAUNEE MINE - 1919.

The product for the year 1919 was 498,162 tons as against 516,161 tons for 1918. In 1918, however, 10,000 tons were credited to overrun in stock piles not shipped, while in 1919 nothing was credited there. The difference in product from the mine is practically 8,000 tons. A larger product for this year was not desired, and a considerable amount of development work was done on the eleventh level. By shipping season 1920 most of this will have been completed, at least for the time being. The development of the eleventh level not only included drifting, but also raises through to the tenth level, and a considerable amount of this work is still in progress.

The operations in the mine continued in the main ore body as well as North of #2 shaft, and in the American Mining Company tract and supporting pillar to the extreme Northwest against the Maas boundary. In the former place, there was considerable crushing as the tenth level was approached. Raises have tapped this territory from the eleventh level. North of #2 shaft work has progressed nicely and has now reached the elevation of the old Third level. We find here that pillars which were left intact are now badly crushed. We also find areas where excavations were made years ago filled with jasper capping so tightly that it appears like the original rock in place. In the pillar supporting the American Mining Company strip, near the Maas boundary, the Southeast edge towards the caved area is badly crushed.

The mine showed a great decrease in the proportion of Negaunee Bessemer ore mined as compared with former years.

UNDERGROUND.

Following is a brief description of the work on the various sub levels and levels where work was done throughout the year.

AREA NORTH OF NO. 2 SHAFT.

Work was done here on the 900, 880, 866' sub levels and the old

third level.

900' SUB LEVEL.

This sub level which was opened originally by Captain Anderson years ago was partially re-opened last year and completed in April 1919.

880' SUB LEVEL.

This was opened the latter part of 1918 from #13 raise. The only ore found was at the extreme Northeast end of the sub level where a pillar approximately 100' square was removed.

A timber raise was put through from this sub to the 918' sub which was the old 400' level.

866' SUB LEVEL.

A sub level was opened at this elevation in May from #19 raise put up from the 825' sub level. A drift was driven to the Northeast from the caved pillars for a distance of 150' and Southwest for 100'. This sub was 24' above the old third level. It crushed so badly that it had to be abandoned in October. The ore will have to be reached from the third level.

THIRD LEVEL.

Work was started re-opening this old level in July from #15 raise on the 825' sub level. A connecting drift was driven Southeast to #13 raise which connects with the ninth level. This obviates transferring the ore. The level has been opened for a distance of 200' Northwest of #13 raise and 50' Southeast of this raise. Crosscuts were opened in all of the pillars to the foot and mining there is in progress. Farther to the Northwest are two pillars which will be reached later from the last crosscut to the foot.

The drift to the Southeast from #13 has encountered treacherous ground between slips and work there will be abandoned, however, the area farther to the Southeast will be explored by a drift through along the foot or from the 825' sub.

825' SUB LEVEL.

This sub level is also North of #2 shaft. During the first three

months of the year, a drift was extended to the Northeast and a raise put up to the 880' sub level. The only other work done was the development of the third level through #15 raise to that sub.

SUBS ABOVE THE NINTH LEVEL.

290' SUB LEVEL.

South Foot Wall.

Ore was found here by an exploratory raise from the 673' sub level in August. Other raises from this sub level proved an area about 100' square under the hanging where this sub level was developed. The height of the ore averaged about 20' above this new sub. Mining here is still in progress.

683' SUB LEVEL.

Northwest End.

Work was started here last year in the American Mining Company strip and the supporting pillar. The mining was completed in June.

673' SUB LEVEL.

Northwest Foot.

This sub level was opened in January in the American Mining Company strip and supporting pillar and finished in December. Two pillars on the North foot wall were so crushed and filled with broken jasper that they could not be mined.

South Foot Wall.

This sub level in 1918 was opened between raises #19-D and #19-F. This year development was extended Southwest 200'. Two new raises #12-A and #19-C for timber and ore were put up during the year. The pillars to the Northeast of #19-D have been mined, the remaining part of the sub level will be mined on the completion of the 690' sub level above.

663' SUB LEVEL.

North Foot.

A few remaining pillars between #38 and #42 raises will be taken early

the coming year.

South Foot.

A sub level was opened between #12-A and #19-F raises. In the East end mining is in progress, while in the West only development work is being done.

553' SUB LEVEL.

North Foot.

A sub level started between #38 and #41 raises found nothing but lean ore and was abandoned.

In the American Mining Company strip and supporting pillar a new sub level was opened in October. It is still being developed. This area is in the section that was caved several years ago when sand runs were frequent. The ore area is somewhat lean but would be better if it were not for caving ground.

640' SUB LEVEL.

Southeast End.

North of the dike between #17 and #18 crosscuts work was finishedin May. South of the dike adjacent to the foot wall, work was in progress throughout the year, mining pillars between old rooms.

630' SUB LEVEL.

North Side.

Work was in progress here the entire year between the North dike and the foot wall. A few pillars had been left to support the ninth level.

South Side.

North of the dike a sub level was opened from #18 crosscut East to the old workings in February. It was finished in August.

620' SUB LEVEL.

South Side.

This was opened in May through a new raise put up from the tenth level. Mining is still in progress in the Northeast end and the areas South

of the dike are being developed from raise #101 from the tenth level.

NINTH LEVEL.

The only work here has been the mining of one small pillar South-west of #31 raise and connecting the tenth level raises with the ninth level drifts. A travelling road was driven through the American Mining Company strip to connect with the 618' sub level on the Maas. In the South end two raises, #12-A and #19-C, were put up to the 673 and 690 subs, respectively. The former for timber, the latter for ore.

SUBS BETWEEN NINTH AND TENTH LEVELS.

595' SUB LEVEL.

North Side.

In this end of the mine work has been in progress the entire year, mining between the two large dikes which run through this area in a North-west-Southeast direction. Very little was found here on the foot side of the North dike.

South Side.

A small piece of ore was developed under the hanging between #127 and #128 raises, North of the winze to the eleventh level, while to the East of these raises there was development to test the hanging from #152 and #158 raises.

588' SUB LEVEL.

South Side.

The ore developed under the hanging on the 595' sub level was followd by development on this sub level at #127 and #128 raises, also at raises #156 and #152 on the North and South sides of the dike, which cuts through the formation here in an East-West direction. Nothing has been done here since June.

580' SUB LEVEL.

North Side.

In October a new sub level was opened Northwest of #24 raise where

drifting to the Northwest started. At present the breast is opposite #25. The entire distance being in foot rock.

South Side.

Development was continued here to test the hanging at #150 and #158 raises. Work was stopped in July.

565' SUB LEVEL.

In the early part of the year a small pillar located in the roll in the hanging Southwest of #167 raise was taken. In July a sub level was opened North of the dike West of #128 raise and to the Northwest of the winze. This area under the hanging is practically finished.

555' SUB LEVEL.

In the Northwest end of the mine the few pillars left between raises #95 and #100 were taken early in the year. This completed the work on this large sub level in the main ore body.

545' SUB LEVEL.

Work on this main sub level started in 1917 and was continued through 1918 and 1919. The sub is practically finished to the Northwest of the dike which runs Northeast-Southwest through the ore body from #165 raise to #20 raise with the exception of a small pillar between #172 and #174 raises which are about to be mined through raises from the eleventh level.

To the South of the dike from #165 raise, a drift connecting the raises to the Southeast has been driven as far as the South foot. To the West of #127 raise the drift to the North started last month was continued to the jasper a distance of about 30'.

530' SUB LEVEL.

This large sub level was opened in the center of the main deposit late in 1918. The Northwest end has been completed. Mining is now in progress in the Northwest end along the Southwest hanging, also to the North of the dike opposite #165 raise.

TENTH LEVEL.

Early in the year this level commenced showing weight in the three

main Northwest crosscuts due to mining above. The eleventh level raises were pushed through to the subs above the tenth as rapidly as possible and connection made with the main tenth level drifts for ventillation and for man and timber ways. The development for mining this level started in August between raises #78 and #108 on the Southeast end and at #96 raise in the Northwest end. Ten raises were put up to the ninth level, eight in the Southeast end and two in the Northwest end. The latter near the Maas boundary.

ELEVENTH LEVEL.

The development of the main level started last year, was continued through 1919. No. 10 crosscut in the Northeast end in the foot wall was driven 600' to the Southeast and 100' to the Northwest. From this drift raises to the tenth level were started in July. Ore is now being taken through these raises. Four other crosscuts to the Northwest have been driven North of the winze, nos. 6, 7, 8 and 9. These are parallel and spaced at 110' intervals center to center.

No. 6 crosscut extension is being driven to the Northeast 100' from the Maas boundary. This will connect with #9 crosscut by means of a back switch.

No. 2 crosscut 750' from the shaft was started early in the year. It crossed 50' of ore isolated from the regular ore body beyond which jasper was cut. After drifting 100' in jasper work was stopped in May and in December a diamond drill hole, #26, on the course of this drift was drilled horizontally to a depth of 316'. No ore was encountered until after cutting the two main dikes when merchantable ore for 33' was found just Northwest of the second dike. The remaining 120' was in jasper and lean ore.

The development of crosscuts #3, #7, and #8 are now in progress. A connecting drift to the Maas was driven Northwest from #6 drift. It holed to a stub drift Southeast from #120 raise Maas Mine on the 401' sub. This will act as a second opening between the Maas and Negaunee Mines.

The raises put up from the eleventh level during the year were as follows:-

No. 6 crosscut - Nos. 251, 252, and 257.

No. 7 crosscut - Nos. 240 and 241.

No. 8 crosscut - Nos. 230, 231, and 232.

No. 9 crosscut - Nos. 220, 221, and 222.

No. 10 crosscut - Nos. 207, 208, 208-A, 209, 210, 211, 212, 213, and 214, while on the main North and South drift North of the winze are raises #198 and #229.

ATHENS-NEGAUNEE MINE CONNECTING DRIFT.

The connecting drift to the Athens shaft started last year was holed in July.

ELEVENTH LEVEL PUMP STATION.

The entire excavation for this installation was made during the year with the exception of the cleanout drift and 60' of the entrance drift to the pumproom.

The pumproom is to the West of the shaft and separated from it by a pillar 65' in width. The main station is 17' wide by 50' long and 14' high. It is timbered with tamarack sets lined with 3" tamarack plank. The roof is covered with rubberoid outside and the entire room lined with hi-rib and plastered with concrete by means of the cement gun. The floor is concrete making a practically fire proof station. Before planks were placed between the sets and roof, the walls were coated with gunnite, i.e., cement applied by means of the cement gun.

The discharge from this station is carried to the tenth level sump by means of a 10" pipe through a raise which connects this new pump station with the tenth level pumproom.

The sump is to the North and is separated from the pumproom by means of a reinforced concrete dam. Two ten-inch suction pipes pass through this dam.

The pump house is isolated from the eleventh level plat by a 4' re-

inforced concrete dam which is provided with a 7' bulkhead.door with a man hole. The station is equipped with two vertical triplex Aldrich belt driven pumps of 1,000 gallons each, built for for a 200' head.

The sump has a capacity of 275,400 gallons. It is provided with two dams and three cleanout raises which connect with the cleanout drift 42' below the level. The suction for the pump enters the sump between the two dams and directly over the center of the cleanout raises.

UNDERGROUND IN GENERAL.

The flattening of the North foot between the tenth and eleventh levels made considerable more rock work necessary than was anticipated when the level was opened. Most of this is completed or will be by the opening of the shipping season.

The mine is in excellent shape and could produce a larger monthly product if it were desired and more men could be secured. The present product, however, will practically fill our stocking room by the opening of navigation.

Development will continue under the hanging between the tenth and eleventh levels and in addition some exploratory work should be carried on in the pillar between No. 1 and No. 2 shafts. Here the cross sections show a large tonnage. The maps do not give us complete information and possibly some of this territory will be unavailable on account of crushed pillars or sand. This section of the mine should be worked in connection with the mining above the ninth level #2 shaft, and for that reason should be re-opened as early as possible. There has been very little work done there since the Oliver Company had the mine under lease. At that time a sand run occurred in this territory and a number of men lost their lives.

GRADING PRODUCT.

Up to last fall the product from this mine has been graded as non-bessemer or Negaunee ore and Negaunee Bessemer with a phosphorous content of .060. During the past season the proportion of Negaunee Bessemer fell off greatly, while the Negaunee grade showed higher phosphorous. As there is no

premium on .060 ore over the regular Negaunee grade, it was decided to try and make a Bessemer ore of .048 phosphorous, even if the product were smaller. For this grade the Bessemer price is paid. It was figured that the low phosphorous ore above .048 would help to lower the phosphorous in the Negaunee and thereby benefit that grade. The tonnage of .048 Bessemer promised for the coming year is only 5% of the expected product. It is hoped this will increase from year to year.

PUMPING.

Now that the eleventh level is developed, considerable of the mine water will reach the shaft at this elevation. To date this amounts to very little, but as it increases the pumping plant on this level will be able to handle ultimately 2,000 gallons per minute, if the necessity should ever arise. The water pumped for the year was considerably less than last year when the mine pumped some of the Maas water. The average for the year was 1,014 gallons per minute.

EXPLORATIONS.

Early in December a diamond drill was moved to the Negaunee Mine from the Athens and installed on the eleventh level to test the hanging. One hole was drilled during the month and the second has just started. The details of this drilling is as follows:-

Hole #26, eleventh level, #3 shaft, coordinates South 1050 East 83; dip 0°; direction North 47° 40' West; elevation +403; material 0 to 25 soft ore jasper; 25 to 45 lean ore; 45 to 55 soft ore jasper; 55 to 72 dike; 72 to 143 soft ore jasper and lean ore; 143 to 162 paintrock; 162 to 200 ore; 200 to 305 soft ore jasper; 305 to 316 lean ore. Hole finished December 29th.

Hole #27, eleventh level, #3 shaft, coordinates South 1063 East 78.5; dip 0°; direction South 33° 50' West; elevation of collar +403. Material 0 to 36 soft ore jasper.

Exploratory work here will be stopped with the completion of hole #27.

FATAL ACCIDENT.

A fatal accident occurred on the 683' sub level in the American Mining Company strip on January 23rd in which Matt Marjamaa was instantly killed by a fall of ground. Marjamaa and his partner were engaged in stoping. They were retreating towards their raise taking down a small amount of ore that was left on top of the timbers. At supper time they blasted two legs expecting the matt above to cave. On inspection after supper they found that instead of caving, it still held up. They blasted a cap thinking possibly that would break it down, but it still held up. It was seen that the mass was held by a prop. Kalmi, Marjamaa's partner, suggested that they blast the prop, but Marjamaa, knowing that another blast would make a little smoke, decided to cut this prop with an axe. He had made but a few chops when the mass settled catching him beneath it. Marjamaa was an old miner and had been employed in this mine for a number of years, and was aware of the risk that he was taking in chopping the leg. The unfortunate accident was due to his carelessness.

SURFACE.

An addition 28' by 30' was added to the West side of the engine house to provide room for a new compressor. This addition is made of brick and is of the same design as the rest of the engine house. The compressor installed in this building was made by the Ingersoll Rand Company, is electrically driven and has a capacity of 2440 cubic feet per minute. It started operating on June 19th.

ADDITION TO SAMPLE CRUSHER ROOM.

An addition of 13½ feet was made on the North side of the sample crushing room to provide extra room for drying samples. This is a much needed improvement as the laboratory has been very much handicapped for room in preparing the samples.

ROCK TRESTLE.

Early in the season five bents were added to the rock trestle. This trestle is an extension to the West of the South track of the West ore stock-

ing trestle. When these bents are filled, it is expected to provide a place to dump rock on an extension of the North track of the West trestle. This will cut down the tram considerably, as the rock trestle has grown greatly in length during the past few years.

FIRE - CHANGE HOUSE.

At one o'clock in the morning of November sixth, a fire was discovered in the North end of the North change room of the dry by the night policeman. He immediately got help from the fireman and applied the hose which is always connected in the wash room. The Fire Department was immediately called. The dry hose was of no avail and it was nearly one-half hour before the fire department arrived. In the meantime, the interior and the roof was all ablaze. The roof was of double construction with an air space between the inner and outside parts. Fire ran through this air space and made a difficult fire to fight, particularly as the roof was of asbestos sheet construction. After three or four hours, it was gotten under control. It is thought that the cause of the fire was due to defective wiring. One hundred forty-two men lost either their mine or street clothes. The fire occurred early Thursday morning - temporary repairs were made so that this end was again in use on the following monday morning. Permanent repairs will have to be made as soon as the weather will permit.

AUGER STEEL.

For the past two or three years there has been a great scarcity of auger steel which is used in practically all of our stopes. Most of this steel comes from Sweden. This we were unable to secure during the war and until late last fall. During the summer there was such a shortage of this steel in this district that the work of the miners was very much impaired. A little over a year ago three and one-half tons of diamond section steel was purchased. During the summer this was twisted in the Negaunee blacksmith shop, heated in a crude furnace and tempered. We were able to supply not only the Negaunee Mine, but also the Maas and Athens. This home-made steel has held up very well.

ESTIMATE OF PROBABLE ORE IN NEGAUNEE MINE DECEMBER 31, 1919.

Total Ore above 9th level	2,399,642 net tons.
" " between 9th & 10th Levels	1,652,907 " "
" " " 10th & 11th "	2,117,306 " "
Total Ore above 11th level -	6,169,855 net tons.

Remaining in Mine December 31st, 1919.

Percentage of Bessemer = 5%.

GRADED AS FOLLOWS;

Bessemer Ore.	Trade Name	Tons.
Developed.	Negaunee-Bessemer.	308,493.
Non-Bessemer Ore.		
Developed	Negaunee.	5,861,362.
Total Bessemer and Non-Bessemer		6,169,855

ASSUMPTION:

12 cu. ft. equals one ton. 10% deduction for Rock.
10% " " Loss in Mining.

ESTIMATED ANALYSIS.

		IRON	PHOS.	SILICA	ALUM.	MANG.	LIME	MAG.	SUL.	LOSS BY IGNITION	MOIST
Negaunee	Dried 212°	59.10	.094	7.70	2.64	.324	.900	.306	.009	3.10	
	Natural	52.00	.083	6.78	2.32	.285	.792	.269	.008	2.73	12.00
Negaunee Bess.	Dried 212°	60.00	.048	7.04	2.72	.237	.644	.307	.009	2.07	
	Natural	52.80	.042	6.20	2.39	.209	.567	.270	.008	1.82	12.00

PRODUCTION

Month	Bessemer	Negaunee	Total	Rock
January	6,672	35,551	42,223	2,688
February	6,608	34,001	40,609	3,384
March	7,728	35,639	43,367	4,776
April	5,536	31,877	37,413	3,920
May	7,475	33,268	40,743	2,756
June	6,057	33,745	39,802	3,652
July	5,033	35,923	40,956	2,064
August	4,974	37,028	42,002	1,440
September	3,253	35,870	39,123	1,296
October	4,302	44,073	48,375	1,228
November	3,348	38,701	42,049	1,088
December	2,408	39,092	41,500	724
Total	63,394	434,768	498,162	29,026
Transferred from	3,159	to 3,159		
Total	60,235	437,927	498,162	29,026

ANALYSIS OF PRODUCTION.

Production of 1919	498,162	tons.
" 1918	516,161	"
Increase 1918	17,999	"

In 1918 there was allowed a 10,000 ton overrun for ore in stock not shipped. In 1919, no stockpile overrun was allowed. The net increase in production in 1918 over 1919 was really only 7,999 tons.

Cost of production 1919	$869,367.98	- Cost per ton	$1.745		
" " " 1918	760,135.17	" " "	1.472		
Increase 1919	109,232.81	" " "	.273		

By allowing the 10,000 tons overrun in 1918, the cost per ton was reduced for that year $.015.

During the year 1919 the mine worked one eight-hour shift for 299 days. The average number of men employed during the year was 359, for a total of 107,-340 days. In 1918 an average of 347 men was employed for a total of 103,370 days. An increase in labor for 1919 of 12 men and 3,970 days.

The increased cost of production in 1919 over 1918 was $109,232.81 of which the cost of new compressor, installing and providing an addition to the engine house was $21,636.12. This cost charged to maintenance would ordinarily be charged against an estimate and depreciated gradually. It amounted to 19.84% of the total increased cost of production. If this amount were deducted from the 1919 cost to put it on the same basis as 1918 for comparison, the net increase for the past year over 1918 would have been $87,596.69 or 11.55% - due almost wholly to increased cost of supplies and higher wages.

The cost of the compressor installation of $21,636.12 is $.0434 per ton for the entire years' production.

The average tons per man underground in 1919 was 5.64 or a decrease of .37 tons per man over 1918, when the average tons per man was 6.01. The total tons per man in 1919 was 4.77, while in 1918 the total tons per man was 4.86, a decrease of .09 tons per man.

In 1919 the total supply cost was $325,335.31 against $246,897.18 for 1918 or an increase of $78,438.13 or 31.7%, which based on the production equals an increase of $.158 per ton for supplies.

In 1919 the total labor cost was $601,433.10 against $504,847.50 for 1918 or an increase of $96,585.60 which based on the production equals an increase of $.193 per ton for labor or 19.15% over 1918.

There were three wage increases in 1918 effective as follows: April 16th, 1918, August 1st, 1918, and October 1st, 1918. These affected a general increase in operating accounts in 1919, as this year operated at the highest rate for the entire year.

The increase of $.193 per ton for labor and the increase of $.158 per ton for supplies totals an increase of $.351 per ton. This increase deducted from $1.745 - 1919 cost per ton equals $1.394 per ton, which shows that if conditions were the same during the two years, the cost per ton in 1919 would have been $.078 less than it was in 1918. This difference caused by shortage of labor in 1918.

GENERAL EXPENSE

No. 26 Insurance	1919 Amount	1,397.28 - Cost per ton	$.003
	1918	1,016.42	.002
	Increase	380.86	.001

This increase due to Riot Insurance premium $1,302.05.

No. 27 Engineering	1919	3,978.99	.008
	1918	3,230.05	.006
	Increase	748.94	.002

Increase in engineers time at Negaunee Mine.

No. 28 Analysis	1919	18,185.69	.036
	1918	17,233.23	.033
	Increase	952.46	.003

This includes operating laboratory and sampling In 1919 the total cost for the laboratory was $17,086.05 and the total number of determina-

tions was 134,165. In 1918 the cost was $14,987.19 and the total number of determinations 129,628, an increase in expenditures of $2,098.86 and an increase in determinations of 4,537.

Cost per determination	1919	$.12730
" "	" 1918	.11562
Increase		.01168

Due to increased cost of supplies and labor.

No. 30 Personal Injury Expense

1919 Amount	9,823.38	- Cost per ton	$.020
1918	9,810.37		.019
Increase	13.01		.001

No. 30a Mine Office

1919	18,048.68	.036
1918	19,482.35	.038
Decrease	1,433.67	.002

	Sub Division	
	Direct Charges	Central Office
1919	6,855.74	11,192.95
1918	7,572.61	11,909.74
Decrease	716.87	716.79

Decrease in District Office charge due to transfer of mine clerks salaries to Central Office in June 1918.

Decrease in Central Office due to donation to Marquette County War Relief Association June 1918 - $878.26.

MAINTENANCE

No. 125 Tracks and Yards

1919	2,924.25	- Cost per ton	.006
1918	4,515.02		.009
Decrease	1,590.77		.003

Decrease due to general decrease in surface labor and dismantling old #2 shaft house in 1918.

No. 126 Docks, Trestles & Pockets	1919 Amount	$1,123.73	- Cost per ton $.002
	1918	2,530.60	.005
	Decrease	1,406.87	.003

Decrease due to extending rock trestle and removing ties on steel stocking trestle, also repairs to skip dump butterfly in 1918.

No. 127 Buildings	1919	3,646.37	.007
	1918	1,405.99	.003
	Increase	2,240.38	.004

Increase due to addition to engine house building $2,391.00

No. 128 Shop Machinery	1919	187.73	.000
	1918	83.85	.000
	Increase	103.88	

Increase due to repairing shop motor $166.00

No. 129 Boiler Plant	1919	93.63	.000
	1918	381.99	.001
	Decrease	288.36	.001

Less repair work in 1919.

No. 130 Hoisting Machinery	1919	3,967.22	.008
	1918	3,714.11	.007
	Increase	253.11	.001

	Sub Division			
	Wire Rope		Machinery repairs	
1919	1,073.56		2,893.66	
1918	1,703.23		2,010.88	
Decrease	629.67	Increase	882.78	

Increase due to new roller bearing sheaves and electricians time on hoists.

Decrease wire rope due to two new ropes put on, one on North and one on South skip roads 1919, and three in 1918 North and South skip and cage rope.

No. 131 Compressors & Power Drills

1919 Amount	$19,920.91	- Cost per ton	$.040
1918	211.44		.000
Increase	19,709.47		.040

	Sub Division		
	Rep. Comp.	Installing Comp.	Power Drills
1919	714.66	18,741.90	464.35
1918	211.44	-	-
Incr.	503.22	18,741.90	464.35

Changing old compressor outlet for new compressor connections.

Purchasing new compressor and motor, also installing and freight on same.

Two drill machines bought in 1919; one #148 Leyner drill and one BBR13 Auger Drill.

No. 143 Pumping Machinery

1919 Amount	$4,313.37	- Cost per ton	$.009
1918	5,570.19		.010
Decrease	1,256.82		.001

Decrease due to 1500 feet armoured cable installed in 1918 - $3,400.00. Difference increase in cost of pump repair parts.

No. 133 Top Tram Engine & Cars

1919 Amount	$4,115.33	- Cost per ton	$.008
1918	6,458.68		.013
Decrease	2,343.35		.005

	Sub Division	
	General Repairs	Wire Rope
1919	2,409.73	1,705.60
1918	5,840.65	618.03
Decrease	3,430.92	Increase 1,087.57

Decrease in general repairs due to machinery for new transfer purchased and installed in 1918 $3,400.00.

Increase in wire rope due to 5500 ft. 5/8" wire rope at $618.03 put on in 1918 and three 5700 ft. 5/8" wire rope put on in 1919 at $1705.60. Two ropes should have been charged in 1918 and two in 1919, which would have made the cost for the two years nearly the same.

No. 134 Skips and Skip Roads

1919 Amount	$3,115.27 - Cost per ton	$.006
1918	3,453.28	.007
Decrease	338.01	.001

Decrease due to building two new skips in 1918.

No. 135 Underground Tracks and Cars

1919 Amount	$4,653.82 - Cost per ton	$.009
1918	3,847.99	.007
Increase	805.83	.002

Increase due to purchase of 12 sets of 10" roller bearing trucks and general increase in price of material.

No. 136 Electric Tram Plant

1919 Amount	$37,245.84 - Cost per ton	$.075
1918	34,002.91	.066
Increase	3,242.93	.009

	Sub Division		
	Eng.&Dynamo	Locomotives	Wiring
1919	156.85	5406.55	5750.28
1918	1375.66	7494.01	3996.83
Decr.	1218.81	2087.46	
Incr.			1753.45

	M.L. Tracks		M. L. Cars
1919	19120.75		6811.41
1918	14147.67		6988.74
Incr.	4973.08	Decr.	177.73

Decrease in Engine & Dynamo due to new armature for haulage generator charged in 1918, cost $1200.00.

Decrease in Locomotives due to one new 10-ton locomotive purchased and used on the new 11th level, cost $3,115.00.

Increase in wiring due to opening the 11th level.

Increase in Main Line Tracks due to increase in price of rail and replacing some 30# rail with 40# rail.

Decrease in M. L. Cars due to purchase of new motor cars in 1918.

No. 137 Telephone & Safety Devices	1919 Amount $	301.34 - Cost per ton	$.001
	1918	315.90	.001
	Decrease	14.56	.000
No. 140 Fire Expense & Damage	1919	703.58 - Cost per ton	$.002
	1918	80.03	.000
	Increase	623.55	.002

This charge occurred account of fire in dry house.

Total Maintenance	1919 Amount	86,312.39 - Cost per ton	$.173
	1918	66,571.98	.129
	Increase	19,740.41	.044

MINING EXPENSE

No. 150 Air Pipes

1919 Amount $8,693.83 - Cost per ton $.018

1918 6,229.30 .012

Increase 2,464.53 .016

Increase due to increase in price of material; pipe and labor.

No. 151 Compressor

1919 Amount 22,603.64 - Cost per ton $.045

1918 15,163.03 .029

Increase 7,440.61 .016

Air made by Negaunee compressor,
1919 633,172,500 cu. ft.
1918 443,976,750 "
Increase 189,195,750 "

In 1918 current cost six months at ¼¢ per K.W. hr., six months at 1½¢ per K.W. hr. Whole year 1919 at 1½¢ per K.W. hr., and increase in labor.

	1919	1918
Cost of operating Compressor	22,603.64	15,374.47
Cost per cubic foot	.0346	.0346

Sold to Maas Mine 60,192,900 cu.ft. of Air $2,006.43.

In 1918 the Negaunee Mine bought part of its compressed air from the Maas.

No. 152 Hoisting

1919 Amount $27,739.42 - Cost per ton $.056

1918 30,492.02 .059

Decrease 2,752.60 .003

Decrease account of decrease in use of electric power.

No. 153 Pumping

1919 Amount $41,972.97 - Cost per ton $.084

1918 46,575.72 .090

Decrease 4,602.75 .006

Decrease due to decrease in electric power on account of less water pumped.

	Sub Division. 1919	1918
Operating Elec. Pumps	41,874.14	46,365.94
Cleaning Sump	98.83	209.78
	41,972.97	46,575.72
Total gals. of water pumped	534281216	694121136
Gals. pumped per min.	1014	1327

There has been a gradual decrease in water pumped at the Negaunee since the cave to surface at the Maas in 1918.

No. 154 Sinking & Shaft Repairs

1919 Amount $ 1,704.92 - Cost per ton $.004

1918 16,878.27 .033

Decrease 15,173.35 .029

Decrease 1919 account of extensive work in 1918 for development of the 11th level. The shaft was completed to the 11th level, the plat was finished and 11th level pocket installed in 1918.

No. 155 Rock Drifting

1919 Amount $31,518.20 - Cost per ton $.063

1918 30,139.82 .058

Increase 1,378.38 .005

	Sub Division Drifting	Per Ft.	Raising	Per ft.
1919	2866	5.40	1459	4.37
1918	3578	5.17	658	3.32
Decr.	712			
Incr.		.23	801	1.05

Increase due to increase in labor in 1919 and supplies.

No. 156 Breaking Ore

1919 Amount $353,330.81 - Cost per ton $.709

1918 306,379.59 .594

Increase 46,951.22 .115

This increase due to increase in cost of labor and supplies.

Explosives

	1919	1918
Total lbs. of Powder	209,200	203,900
Average price per lb.	.181	.1971
Total Amount	37,867.03	40,188.46
Fuse, Capt, etc.	6,840.67	6,733.85
Grand total	44,707.70	46,922.31
Lbs. powder per ton of ore	.4199	.395
Cost per ton for powder	.0760	.0779
" " " all explosives	.0897	.0909

Harder ground and opening many new places, also 1918 credited with 10,000 tons overrun.

No. 157 Tramming

1919 Amount $55,856.45 - Cost per ton $.112

1918 46,448.80 .090

Increase 9,407.65 .022

Sub Division.

	1919	1918
Tramming	47,872.53	39,826.38
Skip Tender & Bellman	4,165.32	3,882.64
Cleaning Sumps	3,818.60	2,739.78

Increase due to increase in cost of labor.

No. 158 Filling

1919 Amount $8,317.74 - Cost per ton $.017

1918 5,408.04 .010

Increase 2,909.74 .007

Increase due to filling in 690 and 673' sub levels. Also general increase in filling and cost of labor.

No. 159 Timbering

1919 Amount $140,050.26 - Cost per ton $.281

1918 104,423.31 .202

Increase 35,626.95 .099

	1919	1918
Timber Cost	18,143.05	10,821.95
Lagging & Poles	17,477.68	10,582.01
	35,620.73	21,403.96
Ft. Timber per ton of ore	.6333	.454
Cost per ton for Timber lagging andpoles	.07151	.0415

The increase in the use of timber was due to crushing of the 10th level and development of the 11th level. In the latter place a large quantity of cribbing timber was used for raises and also a great deal of large sized timber for the main level drifts. The average price per foot for timber in 1919 was 24% over 1918 price, and the increase in the price for lagging or poles per foot in 1919 over 1918 was 53%.

No. 160 Captain and Bosses

1919 Amount $20,640.41 - Cost per ton $.041

1918 17,250.68 .034

Increase 3,389.73 .007

Increase due to putting on extra shift-boss on Maas side. Also increase in wages over 1918.

No. 161 Dry House.

1919 Amount $ 8,509.04 - Cost per ton $.017

1918 8,363.80 .016

Increase 145.24 .001

Increase due to increase in price of 3/4 coal and labor.

No. 162 Top Landing & Traming	1919 Amount	$9,295.27 - Cost per ton	$.019
	1918	7,665.43	.015
	Increase	1,629.84	.004

Increase due to increase in cost of labor over 1918 and supplies.

No. 163 Stocking Ore	1919 Amount	$ 81.54 - Cost per ton	$.000
	1918	- -	.000
	Increase	81.54	.000

Increase due to shoveling snow from stocking grounds.

164 Sorting Ore	1919 Amount	767.94 - Cost per ton	$.002
	1918	363.46	.001
	Increase	404.48	.001

Increase due to increase in labor over 1918 and more time spent sorting.

No. 166 Cave-In	1919 Amount	$14.30 - Cost per ton	$.000
	1918	884.50	.002
	Decrease	870.20	.002

Decrease due to cave underground in December 1918.

No. 171 Ventilation	1919 Amount	399.83 - Cost per ton	$.001
	1918	- -	.000
	Increase	399.83	.001

Increase due to installing 310 ft. 10" spiral pipe.

Flooding-Lands-Rental	1919 Amount	125.00 - Cost per ton	$.000
	1918	125.00	.000

Total Mining Expense	1919 Amount	731,621.57 - Cost per ton	$1.469
	1918	642,790.77	1.245
	Increase	88,830.80	.224

DELAYS - ELECTRICAL.

March 15th	One hour delay, current being off several times during the day.
June 5th	Electric power off one hour and forty minutes due to transformer at Carp Plant burnt out.
November 18th	Two hours delay, no current from 3 to 5 o'clock A.M.

DELAYS - NON ELECTRICAL.

July 19th	Short of men account of Sons of St. George Reunion.

NEGAUNEE MINE

AVERAGE MINE ANALYSIS ON OUTPUT FOR YEAR 1919.

GRADE	IRON	PHOS.	SILICA
Negaunee Bessemer,	60.78	.058	6.87
Negaunee,	59.26	.094	7.74

AVERAGE ANALYSIS ON STRAIGHT CARGOES FOR YEAR 1919.

GRADE	Mine		Lake Erie	
	IRON	PHOS.	IRON	MOIST.
Negaunee Bessemer,	(All Mixed).			
Negaunee,	59.01	.094	59.00	12.10

ORE STATEMENT - DECEMBER 31ST, 1919.

	NEGAUNEE BESSEMER	NEGAUNEE	TOTAL	TOTAL LAST YEAR
On hand January 1st,1919,	8,620	61,067	69,687	82,230
Output for Year,	60,235	437,927	498,162	506,161
Stockpile Overrun,				10,000
Total,	68,855	498,994	567,849	598,391
Shipments,	42,092	382,020	424,112	528,704
Balance on hand,	26,763	116,974	143,737	69,687
Decrease in output-1.5%			7,999	
Increase in ore on hand,			74,050	

1919 - 1-8 Hour Shift
1918 - 1-8 Hour Shift.

NEGAUNEE MINE.

NEGAUNEE MINE

SHIPMENTS FOR YEAR 1919.

GRADE	POCKET	STOCKPILE	TOTAL	TOTAL LAST YEAR
Negaunee Bessemer,	6,903	35,189	42,092	123,798
Negaunee,	206,058	175,962	382,020	404,906
Total,	212,961	211,151	424,112	528,704
Total last Year,	290,337	238,367	528,704	
Decrease - 20%			104,592	

NEGAUNEE MINE.

NEGAUNEE MINE.

COMPARATIVE MINING COST FOR YEAR.

	1 9 1 9.	1 9 1 8.	INCREASE.	DECREASE.
PRODUCT	498,162	216,161		17,999
General Expense	.103	.098	.005	
Maintenance	.173	.129	.044	
Mining Expense	1.469	1.245	.224	
Cost of Production	1.745	1.472	.273	
Exploratory	.003	-	.003	
DEPRECIATION.				
Plant Account	.030	.030	-	
Total Depreciation	.030	.030	-	
Taxes	.300	.231	.069	
Central Office	.046	.044	.002	
Supply Inventory	-	.010		.010
Fire Loss	.003	-	.003	
Miscellaneous	.054	.014	.068	
Cost on Stockpile	2.181	1.773	.408	
Loading & Shipping	.042	.041	.001	
Administrative	.010	.010	-	
Total Cost on Cars	2.233	1.824	.409	
No.Days Operating	299	298	1	
No.Shifts & Hours	1-8hr	1-8hr		
Avg. Daily Product	1,666	1,742		76
COST OF PRODUCTION.				
Labor	1.179	.970	.209	
Supplies	.566	.502	.064	
Total	1.745	1.472	.273	

NEGAUNEE MINE.

COMPARATIVE WAGES AND PRODUCT.

	1 9 1 9.	1 9 1 8.	INCREASE.	DECREASE.
PRODUCT	498,162	516,161		17,199
No.Shifts and Hours	1-8hr	1-8hr		
AVERAGE NUMBER MEN WORKING				
Surface	55	56		1
Underground	294	285	9	
Total	349	341	8	
AVERAGE WAGES PER DAY				
Surface	4.92	4.20	.72-17%	
Underground	5.85	5.02	.83-16.5	
Total	5.70	4.88	.82-16.8	
WAGES PER MONTH OF 25 DAYS				
Surface	123.00	105.00	18.00	
Underground	146.25	125.00	20.75	
Total	142.50	122.00	20.50	
PRODUCT PER MAN PER DAY				
Surface	29.08	29.74		.66
Underground	5.63	6.00		.37
Total	4.72	4.99		.27
LABOR COST PER TON				
Surface	.169	.141	.028	
Underground	1.038	.837	.201	
Total	1.207	.978	.229	
AVG. PRODUCT BRK'G & TRM'G	8.43	8.88		.45
" WAGES CONTRACT MINERS	6.14	5.27	.87	
" " " TRAMMERS	0			
" " " LABOR	6.14	5.27	.87	
TOTAL NUMBER OF DAYS				
Surface	17,128	17,353¾		225¾
Underground	88,341¼	86,016¾	2,324½	
Total	105,469¼	103,370½	2,098¾	
AMOUNT FOR LABOR				
Surface	84,203.14	72,847.76	11,355.38	
Underground	517,229.96	431,999.74	85,230.22	
Total	601,433.10	504,847.50	96,585.60	

Proportion Surface to Underground Men:

1919 - 1 to 5.35
1918 - 1 to 5.10
1917 - 1 to 5.20
1916 - 1 to 5.63
1915 - 1 to 5.05
1914 - 1 to 4.69

NEGAUNEE MINE.

TIMBER STATEMENT FOR YEAR ENDING DECEMBER 31, 1919.

KIND.	LINEAL FEET.	AVG. PRICE PER FOOT.	AMOUNT 1 9 1 9.	AMOUNT 1 9 1 8.
4" to 6" Timber	760	.0171	13.00	
6" to 8" "	108,576	.0292	3177.49	2597.44
8" to 10" "	150,112	.0678	10180.85	4625.42
10" to 12" "	28,424	.0763	2170.07	2459.14
12" to 14" "	27,624	.094	2601.64	1139.95
Total - 1919	315,496	.0575	18143.05	
Total - 1918	234,233	.0462		10821.95
	LINEAL FEET.	PER 100'.		
7' Lagging	1,282,604	.994	12749.31	7156.64
Poles	352,520	1.341	4728.37	3425.37
Total - 1919	1,635,124	1.07	17477.68	
Total - 1918	1,513,635	.699		10582.01

Product	498,162	516,161
Feet. timber per ton of ore	.6333	.4538
Feet lagging "	2.5746	2.2873
Feet lagging per ft. of timber	4.0653	5.0404
Cost per ton for Timber	.03642	.0210
" Lagging	.0256	.0139
" Poles	.00949	.0066
" Timber, Lagging & Poles	.07151	.0415
Equivalent of stull timber to Bd.Measure	604,926	422,328
Ft.Bd.Measure per ton of ore	1.214	.8182

Total cost for Timber, Lagging & Poles -	1919	35620.73
"	1918	21403.96
"	1917	22137.51
"	1916	21510.67
"	1915	19783.21
"	1914	13236.64
"	1913	12327.95

NEGAUNEE MINE.

STATEMENT OF EXPLOSIVES USED FOR BREAKING ORE.

KIND.	QUANTITY.	AVERAGE PRICES.	AMOUNT 1 9 1 9.	AMOUNT 1 9 1 8.
35% Powder	200	.163	32.60	8.83
40% "	147,800	.1687	24930.14	31614.08
50% "	150	.1857	27.85	
60% "	61,050	.2109	12876.44	8565.55
Total Powder	209,200	.181	37867.03	40188.46
Fuse	646,200	7.64	4942.62	4559.31
Caps	115,700	14.13	1635.46	1674.06
Cap Crimpers	143	.367	52.50	80.16
Tamping Bags	68,700	1.77	121.74	152.11
Connecting Wire	36½	.536	19.57	51.68
Electric Exploders	75	7.813	5.86	27.71
Powder Bags	55	1.114	62.92	188.82
Total Fuse, Etc.			6840.67	6733.85
Total Explosives,			44707.70	46922.31
Product			498,162	516,161
Pounds Powder per ton of Ore			.4199	.395
Cost per ton for Powder			.0760	.0779
" Fuse, Caps, Etc.			.0137	.013
" All Explosives,			.0897	.0909
Avg. Price per Lb. for Powder			.181	.1971

MAAS MINE - 1919.

The product for the year was 337,030 tons which is an increase of 29,594 tons over 1918, and is the largest yearly product the mine has made. Most of this ore came from the East end of the mine towards the Negaunee boundary, between the first and third levels, and in the South end of the mine near the Negaunee boundary between the third and fourth levels. Most of the ore from this latter territory was of the Bessemer grade. The product for the year by grades shows 63% Maas and 37% Bessemer. This is a considerable increase in the Bessemer product over previous years. Throughout the first half of the year considerable trouble was had with the caving of the hanging above the third level. This extended down to the main tramming drift and required considerable retimbering. For weeks at a time contracts immediately above the third level were unable to reach their workingplaces and had to be employed in re-opening drifts.

The pocket at the fourth level and the shaft were completed early in the year and hoisting started from this new station early in April. This made a considerable saving, as previous to this time all of the ore from this level had to be rehandled at the winze on the third level.

UNDERGROUND.

SUBS ABOVE THE FIRST LEVEL.

720' SUB LEVEL.

South of the dike near the Northwest boundary of the Roman Catholic Cemetery tract, the remaining pillars were taken during January. Opposite this on the North side of the dike, pillars were removed in April.

FIRST LEVEL.

A pillar 40' by 60' along the Northwest side of the Cemetery Tract was taken out early in the year through #61 raise from the second level. This completed the mining on this level. Later in the year, however, a raise was put up in the foot to the first level from the 618' sub level.

SUBS BETWEEN THE FIRST AND SECOND LEVELS.

695' SUB LEVEL.

The ore South of the dike under the hanging was finished by the middle of the year near #61 raise in the Roman Catholic Cemetery Tract.

675' SUB LEVEL.

Work has been in progress here during the entire year. Only a few small pillars now remain in the West end of the sub level between #61 and #63 raises.

655' SUB LEVEL.

This sub level was opened the latter part of 1918 and was practically mined out during the past year with the exception of a few pillars North of #63 raise.

645' SUB LEVEL.

Here a new sub level near the Negaunee boundary was opened in October at #67, #68 and #68-A raises. These raises have been connected and the development to the foot has started.

623' SUB LEVEL.

One small pillar was taken here in the Southwest end of this sub level in January, completing the work in this area.

618' SUB LEVEL.

In the latter part of the year a travelling road connecting the ninth level Negaunee with the first level Maas was made on this sub by means of a raise to the first level, to the North of #43 and #44 raises.

596' SUB LEVEL.

A few pillars were taken early in the year between #69 and #72 raises in the West end of this sub level completing the work in that area.

575' SUB LEVEL.

In the West end of this sub level which was opened in 1917, mining has been in progress the entire year. A few scattered pillars still remain.

565' SUB LEVEL.

This was opened at #72 raise early in the year and was lost in March due to crushing. It was reopened in September at #70 raise and after connecting with #72 raise, development to the hanging was started and is still in progress.

SECOND LEVEL.

Testing the formation towards the foot was started March 22nd in the West end of the mine by means of a diamond drill - three holes were drilled. No merchantable ore was found.

Five raises were put up from this level during the year; two in the West end, namely #70 and #70-A to the 575' sub and three in the East end #67, #68 and #68-A to the 675' sub.

SUBS BETWEEN THE SECOND AND THIRD LEVELS.

401' SUB LEVEL.

A raise was put up to this elevation from the third level in December and a drift opened on the hanging side connecting the old workings on this level with the Eleventh level Negaunee.

595' SUB LEVEL.

In January a small pillar was taken opposite #3-G raise under the hanging, completing the ore that can be taken there at present.

375' SUB LEVEL.

Mining on this sub level in the East end of the mine has been in progress the entire year from G crosscut East to the Negaunee boundary under the hanging. The mining limit on this sub level being the 200' South coordinate.

365' SUB LEVEL.

West End.

One contract mined here the entire year, West and South of #81 raise. In order to protect the third level main drift, no other mining will be done below this elevation, for the present, in this area.

355' SUB LEVEL.

In both the East and West ends of this sub level mining was in progress during the entire year. The West end is practically completed, while in the East there still remains a considerable area to be mined under the hanging.

345' SUB LEVEL.

A new sub level was opened from #107 raise towards the North foot wall in November.

335' SUB LEVEL.

Mining on this sub level was in progress East of #8-G raise until May when, on account of the crushing of the third level, it made the workingplaces inaccessible.

325' SUB LEVEL.

The mining under the hanging to the West of F and G crosscuts was continued until May after which the work was abandoned until December when one contract started mining to the West of #11-G raise.

THIRD LEVEL.

The new foot wall drift to the East was extended from #114 raise to the Negaunee boundary completing the work started in 1918. The distance drifted being practically 350'.

I crosscut was extended to the South 70' to enable a raise to be put up to this area.

Two other raises were put up from the third level during the year; one #110 raise to the 365' sub for a travelling and timber way, the other #2-H raise to the 375' sub level for ore.

Raises from the 270' sub connected with the third level at G and H crosscuts providing a travelling road to the fourth level in this end of the mine.

SUBS BETWEEN THE THIRD AND FOURTH LEVELS.

280' SUB LEVEL.

In the Southwest end mining started adjacent to the Negaunee boundary

under the hanging. Work was continued this year until September when this area was completed. Developments from the 270' sub level found ore at this elevation to the Northeast of #425 raise in October. Drifting along the Negaunee boundary in the American Mining Company pillar has progressed 150' and test raises are now being put up to find the hanging which is evidently at a considerable height above this sub level. This is in the Bessemer area.

270' SUB LEVEL.

This was opened last year from #224 raise and extended 360' due South. During 1919 this drift was continued 180' farther South and development drifts driven East and West to outline the ore. From the drift to the East along the 400' South coordinate two raises were put up to the third level under the crushed area to act as a second outlet.

260' SUB LEVEL.

This sub level was started in the latter part of 1918 in the extreme South end of the mine along the Negaunee boundary. Work was continued here during the entire year. The product being almost wholly Bessemer. Work in this area is practically completed.

240' SUB LEVEL.

The development of last year was continued through 1919. A connection was made in the Northeast end to the 270' sub level. Mining in the South end along the Negaunee boundary and in the American Mining Company pillar started in September.

220' SUB LEVEL.

A few remaining pillars were taken here under the hanging near #408 raise, the work being finished in March.

200' SUB LEVEL.

In September mining was started between D and F crosscuts along the Negaunee boundary. Mining also started under the hanging in November North of #412 raise.

185' SUB LEVEL.

The only work here was a diamond drill hole #27, which was drilled horizontally due South to explore the territory on the Negaunee side of the line adjacent to these workings.

FOURTH LEVEL.

A new main drift 240' in length has been extended to the Northeast between #418 and #420 raises. The foot wall was cut at 160' from the starting point, and a raise has been started to the Southeast to reach the ore shown above the 280' sub near the Negaunee boundary.

Raise #425 was put up to the South from the 400 crosscut to the area developed on the 280' sub.

The main drift to the Southeast paralleling the Race Track property was extended 280' to the Negaunee boundary and raises #600 and #602 put up to the Northeast to the 260' sub.

At the shaft plat in January the concreting of the storage pocket was completed and the measuring pocket installed. The plat was also extended to the West to provide additional room. Later a motor barn was installed in the extreme North end of the tail track North of the shaft.

SHAFT.

The new lift from the third to the fourth levels was completed in March and hoisting started from the fourth level early in April.

The runners in the skip compartment of the shaft are of 40# rail. These have been in use several years and their surface has worn considerably. During the past two months, these have been re-gauged to make a uniform road from surface to the bottom. The gauge of the skip guides will be increased to conform to the runners.

UNDERGROUND IN GENERAL.

The mine is now in better shape than it has been in any period of its history for an increased production. The work on the hanging has advanced

more rapidly than on the foot side of the deposit, the latter having been held up several years on account of the American Mining Company strip which separates the Maas from the Negaunee Mine. Here is happened that the ore reached a greater height than in any other section of the mine. During the past few years every effort has been bent towards mining here as rapidly as possible, both on the Negaunee side of the line as well as on the Maas. Contracts have been employed on both the day and night shifts in order to expedite the work. In this section too have occurred the most recent sand runs. As the mining progresses, however, less danger from this source is expected, as the timber matt is increased in thickness with each new sub level.

During the past year, there was evidently a settlement of the hanging wall between the second and third levels. This was noticeable from the lst of May well into July. The sub levels were crushed and the main tramming drifts at one time were practically flat, due to pressure. For several months it required continual retimbering to keep these drifts open. During the most of that time very little product was gotten from this section of the mine.

Between the second and first levels practically all of the ore is now coming through raises from the hanging side of the deposit. These, where possible, were timbered - the old open ore raises on the foot side having all caved and run together, making it impossible to use them further. Between the third and fourth levels most of the mining is coming from the South end of the deposit next to the Negaunee Mine where work started two years ago. Further to the Northeast along the American Mining Company strip, the territory is being developed where the ore was found at 60' above the 280' sub level. This is on the South side of the fold. Raises are being extended to this territory and during the year several contracts will probably be added there as most of the ore should be of Bessemer grade.

The development of the fourth level will continue. The drift Northeast from #418 raise which is now in foot wall should hole to the North foot

wall drift sometime before the list of April. It is possible too that the North foot wall drift will be driven further to the East to reach the ore under the hanging in that territory, unless it can be more cheaply mined by means of establishing an intermediate level between the third and fourth and transferring the ore. If this were done it would save a tremendous amount of rock drifting and raising, while on the other hand, it would mean the rehandling of the entire product in that section.

WATER.

During the year the total water pumped was 573,373,848 gallons or an average of 1,070 gallons per minute. Twice during the year it was necessary to turn part of the water into the Negaunee Mine; the first time when trouble was had with the Aldrich pump on the second level due to the belt failing and the second when a bearing ran hot on the Prescott plunger pump, third level.

FOURTH LEVEL PILLARS.

As mentioned in last years' report pillars are being left above the fourth level to support surface. These pillars contain 1,407,000 tons which are temporarily unavailable for mining. The surface supported is that known as the Race Course property which is under lease to the Oliver Mining Company and which joins the Maas Mine to the West. The estimated tonnage in sight in the mine above the fourth level outside of these pillars is 4,452,000 tons, which is the tonnage that is expected to be mined from this property by the middle of the year 1928. If the estimated yearly product is to be maintained, however, something should be done shortly with reference to removing the houses on the Race Course property, if not, in a period of about five years, the yearly product will be diminished, as practically all of the available ore in the mining area above the fourth level will have been mined by that time and nothing will be left except the territory above the third level which will be too small to accomodate the contracts necessary for a product of 500,000 tons per year. I am calling attention to this fact now, as it may take several

years before an arrangement could be made with the Oliver Company for the removel of these houses, of which there are a large number, and which would entail a considerable expenditure. They might desire to make some arrangement with our Company to mine their ore. Our present mining operations extend directly alongside of their property.

BULKHEAD.

A concrete bulkhead was placed in the fourth level shaft crosscut 100' South of the shaft and provided with timber stop logs. In case of an emergency, this bulkhead will hold a large quantity of water and can be used whenever the pumps are shut down through lack of current or other accident to equipment.

EXPLORATIONS.

Four holes were drilled in the Maas Mine during the year; three on the second level - all of them horizontal, to test the formation towards the foot to the West of the shaft crosscut. The fourth was from the 185' sub level drilled South into the Negaunee Mine territory to test the formation on the Negaunee side of the line.

The detail of this drilling is as follows:-

Hole #24, second level, #1 shaft, Maas Mine, location North 26.80 West 846; dip 0°; direction North 31° 92' East; material 0 to 90 soft ore jasper; lean ore 90 to 100; soft ore jasper 100 to 155; mixed soft ore jasper, paintrock, dike and quartz 155 to 175; dike 175 to 209; transition jasper 209 to 246. Hole stopped April 9th, 1919.

Hole #25, second level, #1 shaft, Maas Mine; location North 26.5 West 854.5; dip 0°; direction North 0° 49' West; material, soft ore jasper 0 to 25; dike 25 to 46; soft ore jasper 46 to 172; slate 172 to 201; siderite 201 to 206. Hole stopped April 22nd, 1919.

Hole #26, second level, #1 shaft, Maas Mine; location North 47 West 1155; dip 0°; direction North 52° 10' West; material 0 to 118 soft ore jasper;

118 to 136 transition jasper; 136 to 154 soft ore jasper; 154 to 166 transition jasper. Hole stopped May 6th, 1919.

Hole #27, 185' sub level, #1 shaft, Maas Mine; location South 1356 West 1854; dip 0°; direction South 4° 51' West; material 0 to 10 ore; 10 to 20 lean ore; 20 to 50 ore; 50 to 290 soft ore jasper with runs of lean ore averaging about 47% iron and .025 phosphorous; 290 to 306 ore; 306 to 340 soft ore jasper; 340 to 404 transition jasper. Hole stopped July 18th, 1919.

FATAL ACCIDENT.

Tom Mazar, a miner, was killed on the morning of March 12th by being run down by a motor train. The accident happened a few minutes before the end of the shift as Mazar was on his way to the shaft on the second level. Mazar stepped to one side to permit a motor train to pass and after the motor and two cars had gone by, he stepped back onto the track, not noticing that the train had broken in two; the rear section being about 30' distant from the front section. He was hit by the rear section and was crushed between the car and the side of the drift, dying instantly. The drift were the accident occurred was well lighted. The rear end of the trains always carry a red light which Mazar should have noticed was absent from the cars as they passed him. The cause of the uncoupling of the cars was due to a low joint in the track which permitted the automatic couplers to separate on account of verticle play.

The uncoupling of cars frequently happens in mines, and all new couplers are ordered with a broader face, which will gradually replace the original couplers. If Mazar had looked behind before stepping onto the track, the accident would have been avoided.

SURFACE.

ENGINE HOUSE.

An addition of 27 feet was added to the Maas engine house to provide room for new skip and cage hoists. The foundation for this addition was layed in August and the walls and roof completed in September. This addition is built of buff brick and corresponds with the rest of this structure.

CAGE HOIST.

A new electrically operated cage hoist was ordered early in the Summer to replace the present steam hoist. The concrete foundation was poured in September and the hoist is installed with the exception of the motor which should arrive sometime before the first of March. The engine was built by the Lake Shore Engine Works.

SKIP HOIST.

A new skip hoist for this property to be electrically operated was ordered from the Lake Shore Engine Works early in the fall and the frame for the foundation was built in October, the concrete being poured early in November. This hoist is expected within a few weeks.

NEW COMPRESSOR.

A new Ingersoll-Rand compressor with a capacity of 2440 cubic feet per minute was installed in the old steam transfer engine room just West of the headframe in May. Due to an accident, a new cylinder had to be procured so that it was not ready for operation until the middle of August. This compressor is a duplicate of the one installed during the summer at the Negaunee Mine and has worked very satisfactorily. During the latter part of the year it was shut down on account of lack of current to operate it, at which time the steam plant was put into commission. This compressor will eventually be placed in the engine house where either the steam cage or skip hoist now stands.

ROCK TRANSFER ENGINE.

A new transfer engine for the rock tram has been purchased and is installed in the concrete plaster engine room located just North of the headframe under the permanent trestle. This transfer engine is of the same type as those used for tramming ore with the exception that a six foot rubber lined sheave is used whereas the ore engine sheave is eight feet in diameter.

NEW FLOOR IN WAREHOUSE.

In October the wooden floor in the warehouse which had settled badly

and worn through in several places was replaced by concrete. This floor will last indefinitely.

EXTENSION STOCKPILE GROUND.

The Bessemer stockpile sollar was extended to the West 150' in order to provide sufficient room for our Bessemer product which is considerably larger than heretofore. Jasper was used in place of plank.

MAAS CRUSHER.

During the season the Crusher North of the Maas Mine handled 128,451 tons of ore, distributed as follows:-

South Jackson Ore	56,840	tons,
Lake Ore,	21,964	"
Morris-LLoyd,	23,966	"
Angeline Bessemer,	15,923	"
Salisbury,	5,901	"
Holmes Bessemer,	2,746	"
Quayle Ore,	1,111	"

This crusher has now run three seasons and quite extensive repairs should be made this spring before it goes into operation.

ESTIMATE OF ORE RESERVES IN MAAS MINE DECEMBER 31, 1919.

Assumption: 12 cu. ft. equals one ton.

10% Deduction for Rock.

10% " " Loss in Mining.

Percentage of Bessemer equals 10%

Developed ore between 1st and 2nd levels - - - 516,590 net tons.

Developed ore between 2nd and 3rd levels - - - 1,562,606 " "

Developed ore between 3rd and 4th levels - - - 2,373,152 " "

Total developed available ore - - - - - - - 4,452,348 net tons.

Unavailable ore in pillars - - - - - - - - 1,407,586 net tons.

Available ore graded as follows:

BESSEMER ORE.	TRADE NAME.	TONS.
Developed.	Maas-Bessemer.	445,235.
NON BESSEMER ORE		
Developed.	Maas.	4,007,113.
Total Bessemer and Non-Bessemer - - - - - - -		4,452,348

ESTIMATED ANALYSIS.

	IRON	PHOS.	SILICA.	ALUM.	MANG.	LIME	MAG.	SUL.	IGNI.	MOIST
Dried 212°										
Mass-Bessemer	60.30	.043	9.30	1.88	.265	.625	.216	.007	1.50	
Natural	53.06	.038	8.18	1.65	.233	.550	.190	.006	1.32	12.00
Dried 212°										
Maas	59.00	.091	8.90	2.34	.309	1.02	.288	.009	2.20	
Natural	52.06	.080	7.85	2.06	.273	.90	.254	.008	1.94	11.75

PRODUCTION

Month	Bessemer	Maas	Total	Rock
January	9,552	18,056	27,608	440
February	10,816	17,546	28,362	280
March	13,488	16,320	29,808	516
April	12,216	14,544	26,760	224
May	10,556	15,426	25,982	48
June	9,715	13,551	23,266	132
July	10,162	17,169	27,331	336
August	10,690	18,084	28,774	1,144
September	8,827	18,113	26,940	832
October	10,690	22,748	33,438	728
November	8,942	19,835	28,777	1,316
December	9,852	20,132	29,984	764
Total	125,506	211,524	337,030	6,760
Transferred from	2,145 to	2,145		
Total	123,361	213,669	337,030	6,760

ANALYSIS OF PRODUCTION.

Production of 1919	337,030 tons.		
" 1918	317,009 "		
Increase 1919	20,021 tons.		
Cost of production 1919	$746,593.60	- Cost per ton	$2.215
" " " 1918	636,064.03	" " "	2.006
Increase 1919	$110,529.57		$ .209

During the year 1919 the mine worked two eight hour shifts for 299 days. The average number of men employed during the year was 288 for a total of 93,558 days.

In 1918 an average of 296 men were employed for a total of 98,948 days. A decrease in labor in 1919 of 8 men and 5,390 days.

The average tons per man underground in 1919 was 4.68 or an increase of .46 tons per man over 1918, when the average tons per man was 4.22.

There were three increases in wages in 1918; April 16th, August 1st, and October 1st. While each of these raises affected the cost of production proportionately in 1918, the year of 1919 continued to operate at the highest rate for the entire year.

The total increase this year over 1918 is $.86 per day or 18.1%. The actual amount paid due to the entire year working at the increased set of wages is $80,459.88; which based on the production mined equals $.238 per ton.

In 1919 the total supply cost was $230,107.47 which also includes charges transferred from E. & A. accounts to operating cost, amount to $34,351.59.

E.&A. #370	Electric Compressor	$18,347.82
" 377	Electric Cage & Skip Hoist	15,839.16
" 390	Electric Rock Tram	164.61
	Total -	$34,351.59

This supply cost compared with $196,044.40 in 1918 shows an increase

of $34,063.07 which based on the production equals an increase of $.101 per ton.

The increase of $.238 per ton for labor account of increases in wages and the increase of $101 per ton for supplies, totals an increase of $339 per ton. This increase deducted from $2.215 1919 cost per ton, equals $1.876 per ton, which shows that if conditions were similar during the two years, the 1919 cost would have been $.13 less per ton than the year 1918.

This decrease can readily be explained by the increased production of .46 tons per man.

GENERAL EXPENSE.

No. 26 Insurance,

1919 Amount	$1,429.38	- Cost per ton	$.004
1918	755.12		.002
Increase	674.26		.002

This increase due to premium on Use and Occupancy and Riot Insurance paid in November Amount $1290.65.

No. 27 Engineering,

1919 Amount	$2,688.29	- Cost per ton	$.008
1918	2,662.04		.009
Increase	26.25	Decrease	.001

No. 28 Analysis,

1919 Amount	$11,165.14	- Cost per ton	$.033
1918	10,638.95		.034
Increase	526.19	Decrease	.001

This includes the operating laboratory charge. In 1919 the total number of determinations was 37,978 at .1273 per det. for a total of $4828.54. In 1918, 41,458 dets. were worked at .11562 per det. for a total of $4794.30; showing an increase of $34.24. The balance of the increase is sampling at the mine, the increase due to increased wages entirely.

No. 30 Personal Injury Expense,

1919 Amount	$4,326.21	- Cost per ton $.013
1918	5,135.49	.016
Decrease	809.28	.003

The 1919 charges include deferred payment for fatal accident to George Hooper which occurred in December 1918, also payments account of fatal accident to Tom Mazar, fatally injured March 1919.

No. 30-A Mine Office,

1919 Amount	$18,229.78	- Cost per ton $.054
1918	14,927.25	.047
Increase	3,302.53	.007

Increase due to Central office charges.

Total General Expense,

1919 Amount	$37,837.80	- Cost per ton $.112
1918	34,118.85	.108
Increase	3,718.95	.004

Accounted for in 26, 27, 28 and 30.

MAINTENANCE.

No. 125 Tracks and Yards,

1919 Amount	$ 2,659.87	- Cost per ton $.008
1918	3,955.36	.012
Decrease	1,295.49	.004

The extra charge in 1918 was due to surface improvements.

No. 126 Docks, Trestles and Pockets,

1919 Amount	$ 990.11	- Cost per ton $.003
1918	1,738.29	.005
Decrease	748.18	.002

Extensive repairs were made to the permanent trestle in 1918, $1500.00 being expended.

No. 127 Buildings,

1919 Amount	$ 2,458.16	- Cost per ton $.008
1918	1,995.82	.006
Increase	462.34	.002

This increase due to repairs made to warehouse in 1919, a concrete floor being laid in Nov.

No. 128 Shop Machinery,

1919 Amount	$ 151.00	- Cost per ton $.000
1918	263.14	.001
Decrease	112.14	.001

A rotary air drill costing $90.00 was installed in 1918.

No. 129 Boiler Plant,

1919 Amount	$ 2,069.69	- Cost per ton $.006
1918	3,774.74	.012
Decrease	1,705.05	.006

A larger proportion of boiler expense was charged to operating turbine in 1919 than in 1918.

No. 130 Hoisting Machinery,

1919 Amount	$20,540.31	- Cost per ton $.061
1918	4,465.20	.014
Increase	16,075.11	.047

This large increase is due to transferring E. & A. acct. #377 Electric Cage and Skip Hoist from E. & A. charge to maintenance. The amount transferred to Jan. 1st was $18,191.31.

No. 131 Compressor and Power Drills

1919 Amount	$21,447.24	- Cost per ton $.064
1918	1,202.19	.004
Increase	20,245.05	.060

This large increase due to transferring E. & A. Acct. #370 Electric Compressor from

E. & A. account to Maintenance. The amount transferred to Jan. 1st was $19,964.56.

Two new machines were added to equipment in 1919.

1 BBR 130 Rand for $155.00

1 DP33 and Cradle Sullivan $260.00

No. 132 Pumping Machinery,

1919 Amount	$ 5,040.63	- Cost per ton $.015
1918	3,352.14	.011
Increase	1,688.49	.004

Increase due to extensive repairs made on second level pump during 1919.

No. 133 Top Tram Engine & Cars,

1919 Amount	$ 1,813.07	- Cost per ton $.005
1918	1,433.58	.005
Increase	379.49	.000

Increase due to one new brake installed in November. Renewals to roller and top tram cars make up the balance.

No. 134 Skip and Skip Roads,

1919 Amount	$ 3,046.18	- Cost per ton $.009
1918	2,612.09	.008
Increase	434.09	.001

This increase due to repairs made to skip road and rebuilding skips. On account of the irregular gauge in the skip compartment, much extra labor is being done to make a uniform gauge.

No. 135 Underground Tracks & Cars,

1919 Amount	$ 3,431.62	- Cost per ton $.010
1918	2,818.74	.009
Increase	612.88	.001

Increase due to 28 tons 12# rail used in 1919 against 18 tons used in 1918.

No. 136 Electric Tram Plant,

1919 Amount $19,107.31 - Cost per ton $.057

1918 16,459.61 .052

Increase 2,647.70 .005

	Sub Division.		
	Eng. & Dyn.	Locomotives	Wiring
1919	24.85	3701.34	2127.98
1918	93.98	2994.24	1439.05
Decr.	69.13	Incr. 707.10	688.93

	M. L. Tracks	M. L. Cars
1919	9805.83	3447.31
1918	8062.39	3869.95
Incr.	1743.44	Decr. 422.64

Increase in Locomotives due to increase in general repairs to the Locomotives

Increase in Wiring due to extensions to underground tolley wire.

Increase in Main Line Tracks due to a large amount of 30# rail used in 1919.

Decrease in Main Line Cars due to 1918 charge included general overhauling of the cars. A blacksmith and helper were employed the whole year repairing the cars underground.

No. 137 Telephone and Safety Devices

1919 Amount $ 1,115.69 - Cost per ton $.003

1918 1,067.44 .003

Increase 48.25 .000

Total Maintenance,

1919 Amount $83,870.88 - Cost per ton $.249

1918 45,138.34 .142

Increase 38,732.54 .107

MINING EXPENSE.
No. 150 Air Pipes,

1919 Amount $ 7,367.60 - Cost per ton $.022

1918 6,984.97 .022

Increase 382.63 .000

A larger amount of pipe used for air lines underground is the cause of this increase.

No. 151 Compressors,

1919 Amount $24,017.71 - Cost per ton $.071

1918 29,697.45 .094

Decrease 5,679.74 .023

	1919	1918
Air made by Maas Compressor	584404549	935128335
" " " Neg. "	32067900	
Total cubic feet	616472449	935128335

Cost of operating Maas Compressor $23,350.78

Amount charged by Negaunee Mine 2,006.43

Total - $25,357.21

A PRE-2 Rand compressor was installed in 1919, but only worked a few months account of shortage of electric current.

No. 152 Hoisting,

1919 Amount $48,960.99 - Cost per ton $.145

1918 42,954.44 .136

Increase 6,006.55 .009

This increase is due to labor and supply cost. Current costing to July 1918 1¢ per K.W. hr., from that time on 1½¢ per K.W. hr.

153 Pumping,

1919 Amount $41,785.34 - Cost per ton $.124

1918 42,954.44 .136

Decrease 1,169.10 .012

Total Gallons pumped 1919 - 573,373,848

" " " 1918 - 510,265,180

Increase 63,108,668

Gallons of water pumped per minute 1919, 1070.

An extra air pump was maintained on the second level part of 1918 to send water to the Negaunee Mine. This added to pumping cost for year. Also had to use air pump to reclaim 4th level.

No. 154 Sinking and Shaft Repairs,

1919 Amount	$15,359.15 - Cost per ton	$.046
1918	34,986.12	.110
Decrease	19,626.97	.064

The total charge to this account was for completing the new lift from the third to fourth levels, which was started in 1917.

No. 155 Rock Drifting,

1919 Amount	$20,482.87 - Cost per ton	$.061
1918	12,977.54	.041
Increase	7,505.33	.021

2,728 ft. Rock work in 1919 for $7.51 per ft. 2,113 ft. rock work in 1918 for $6.14 per foot.

No. 156 Breaking Ore,

1919 Amount	268,132.83 - Cost per ton	$.795
1918	232,656.82	.733
Increase	35,472.01	.062

This was due to increase in wages and cost of supplies; the exception in the latter being explosives which showed a decrease in 1919.

Explosives.

	1919	1918
Total lbs. of powder	130,000	134,700
Average price per lb.	.1729	.1829
Total Amount	22530.23	24648.43
Fuse, Caps, etc.	3558.16	4104.60
Grand total	26088.39	28753.03
Lbs. powder per ton of ore	.387	.449
Cost per ton for powder	.0668	.0823
Cost per ton all explosives	.0773	.096

No. 157 Tramming,

1919 Amount	$51,476.65	- Cost per ton $.153
1918	48,055.81	.151
Increase	3,420.84	.002

Sub Division	1919	1918
Tramming	37466.39	39268.27
Skip Tender & Bellmen	11184.39	8200.42
Clean Skip Pit	2825.87	587.12

The increase in cleaning skip pit due to a crew of four to six men employed on night shift to clean the skip pit.

No. 158 Filling,

1919 Amount	$ 855.90	- Cost per ton $.003
1918	3,376.84	.011
Decrease	2,520.94	.008

Considerable more filling necessary in mining operations in 1918.

No. 159 Timbering,

1919 Amount	104,311.40	- Cost per ton $.309
1918	70,765.30	.223
Increase	33,546.10	.086

	1919	1918
Timber cost	14866.44	10040.93
Lagging and Poles	12417.64	7386.03
Total	27284.08	17426.96
Ft. of timber per ton of ore	.602	.678
Cost per ton for timber, lagging and poles	.0808	.0581

The large increase is due mostly to increased cost of timber and extensive repairs on third level main drifts.

No. 160 Captain and Bosses,

1919 Amount	$15,637.50	- Cost per ton $.046
1918	12,526.95	.039
Increase	3,110.55	.007

This increase due to increase in wages, also an underground captain employed from the 1st of August 1919.

No. 161 Dry House,

1919 Amount	$ 8,007.51	- Cost per ton $.024
1918	6,250.47	.020
Increase	1,757.04	.004

This increase due to increase in Boiler House charge to dry house.

No. 162 Top Landing & Tramming,

1919 Amount	$10,484.97	- Cost per ton $.031
1918	7,883.62	.025
Increase	2,601.35	.006

This increase due to increase in Boiler House charge for handling rock car and heating.

No. 163 Stocking Ore,

1919 Amount	$ 7,431.46	- Cost per ton $.022
1918	5,956.26	.019
Increase	1,475.20	.003

In the fall of 1919 due to irregular shipping orders, several bents of the stocking trestle were dismantled and rebuilt on several occasions. This together with increased cost for labor and supplies, make the increase.

No. 164 Sorting Ore,

1919 Amount	$ 573.04	- Cost per ton $.002
1918	81.56	.000
Increase	491.48	.002

During the stocking season of 1919, a rock picker has been employed continuously on the stock pile.

No. 171 Mine Ventilation,

1919 Amount No charge
1918 $1.20

No. 166 Cave-In,

1919 Amount No charge
1918 $7,200.04 - Cost per ton $.023
Decrease 7,200.04 .023

1918 charge includes the cost of a sand run which occurred in March 1918.

Total Mining Expense

1919 Amount $624,884.92 - Cost per ton $1.854
1918 556,806.84 1.756
Increase 68,078.08 .098

DELAYS - ELECTRICAL.

March 15th, Two hours delay, no current.

June 5th, One hour and forty minutes delay account of electric current being off.

November 18th, Two hours delay, no current from 3 to 5 o'clock A.M.

DELAYS - NON ELECTRICAL.

January 7th Cage hoist broke. Men went down Negaunee Mine. About forty men went home.

" 11th Do.

February 27th Coal elevator broke, couldn't hoist from 8 P.M. to 1:30 A.M. Hoisted until 7 A.M. to get product.

March 3rd Five dividings pulled out of shaft, one and one-half hours delay.

March 7th Air compressor broke down at noon.

March 10th No steam from one to five o'clock P.M.

May 8th, Cage hoist broke down at noon. Men had to walk to the Negaunee Mine to go down. Skip turned over in the shaft at 11:30 P.M., not able to hoist until 8 A.M. 5/9/19.

July 22nd, Cage hoist broke at one P.M. with men on cage. Cage lowered to the bottom of the shaft. No one hurt, cage damaged a little. Fixed again at 7:30 P.M.

August 4th, Cage hoist broke down, accident to cylinder.

October 21st, Delay on account of skip being hoisted too high.

" 28th, Two hours delay on account of cage hoist.

November 10th, Top tram car went over the dump. Hoisting on one side. Four hours delay.

" 19th, About thirty feet of water in the shaft on account of current being off. Skip turned over in water and caught in the lip of the fourth level pocket damaging same.

December 8th, Water in skip pit account of bearing on Prescott pump burnt out.

" 9th, Engineer overhoisted the skip. The box of the skip came out of the guide and went down, striking the collar of the shaft and breaking off two rails on the South side. Accident happened at 11:50 P.M.

MAAS MINE

AVERAGE MINE ANALYSIS ON OUTPUT FOR YEAR 1919.

GRADE	IRON	PHOS.	SILICA
Maas Bessemer,	60.52	.045	9.19
Maas,	58.96	.090	9.08

AVERAGE ANALYSIS ON STRAIGHT CARGOES FOR YEAR 1919.

GRADE	Mine		Lake Erie		
	IRON	PHOS.	IRON	PHOS.	MOIST.
Maas Bessemer,	60.34	.045	60.56	.043	12.18
Maas,	58.24	.091	59.47		11.43

ORE STATEMENT - DECEMBER 31ST, 1919.

	MAAS BESSEMER	MAAS	TOTAL	TOTAL LAST YEAR
On hand January 1st, 1919,	9,900	53,327	63,227	107,116
Output for Year,	123,361	213,669	337,030	299,371
Stockpile Overrun,				17,638
Total,	133,261	266,996	400,257	424,125
Shipments,	97,588	146,355	243,943	360,898
Balance on hand,	35,673	120,641	156,314	63,227
Increase in output-12%			37,659	
Increase in ore on hand,			93,087	

1919 - 1-8 Hour Shift

1918 - 1-8 Hour Shift

MAAS MINE.

MAAS MINE

SHIPMENTS FOR YEAR 1919.

GRADE	POCKET	STOCKPILE	TOTAL	TOTAL LAST YEAR	
Maas Bessemer,	49,397	48,191	97,588	69,458	
Maas,	65,077	81,278	146,355	291,440	
Total,	114,474	129,469	243,943	360,898	
Total last Year,	176,371	184,527	360,898		
Decrease - 32%			116,955		

MAAS MINE.

MAAS MINE.

COMPARATIVE MINING COST FOR YEAR.

	1919.	1918.	INCREASE.	DECREASE.
PRODUCT	337,030	317,009	19,931	
General Expense	.112	.108	.004	
Maintenance	.249	.142	.107	
Mining Expense	1.854	1.756	.098	
Cost of Production	2.215	2.006	.209	
Exploratory	.013		.013	
DEPRECIATION.				
Original Purchase	.078	.077	.001	
Plant Account	.251	.251	-	
Equipment	.004		.004	
Total Depreciation	.333	.328	.005	
Taxes	.228	.208	.020	
Central Office	.063	.079		.016
Supply Inventory	-	.016		.016
Miscellaneous	.007	.009		.002
Fire Loss	.002	.003		.005
Sundry Expense	.007	.034		.027
Cost on Stockpile	2.864	2.683	.181	
Loading & Shipping	.038	.056		.018
Total Cost on Cars	2.902	2.739	.163	
No.Days Operating	299	296	3	
No.Shifts & Hours	1-8hr	1-8hr		
Avg.Daily Product	1,127	1,071	56	
COST OF PRODUCTION.				
Labor	1.499	1.373	.126	
Supplies	.716	.633	.083	
Total	2.215	2.006	.209	

MAAS MINE.

COMPARATIVE WAGES AND PRODUCT.

	1 9 1 9.	1 9 1 8.	INCREASE.	DECREASE.
PRODUCT	337,030	317,009	19,931	
No. Dhifts and Hours	1-8hr	1-8hr		
AVERAGE NUMBER MEN WORKING				
Surface	56	59		3
Underground	237	241		4
Total	293	300		7
AVERAGE WAGES PER DAY				
Surface	4.95	4.15	.80-19.3%	
Underground	5.76	4.89	.87-18 %	
Total	5.60	4.66	.94-20 %	
WAGES PER MONTH OF 25 DAYS				
Surface	123.75	103.75	20.00	
Underground	144.00	122.25	21.75	
Total	140.00	116.50	23.50	
PRODUCT PER MAN PER DAY				
Surface	18.75	16.94	1.81	
Underground	4.69	4.31	.38	
Total	3.75	3.44	.31	
LABOR COST PER TON				
Surface	.264	.245	.019	
Underground	1.230	1.134	.096	
Total	1.494	1.379	.115-8.4%	
AVG. PRODUCT BRK'G & TRM'G	7.86	6.61	.65	
" WAGES CONTRACT MINERS	5.81	4.92	.89	
" " " TRAMMERS	0	0		
" " " LABOR	5.81	4.92	.89	
TOTAL NUMBER OF DAYS				
Surface	17,975	18,715		.740
Underground	71,947¾	73,480		1,532¼
Total	89,922¾	92,195		2,272¼
AMOUNT FOR LABOR				
Surface	88,909.69	77645.62	11264.07	
Underground	414,719.59	359567.53	55152.06	
Total	503,629.28	437213.15	66416.13	

Proportion Surface to Underground Men:

1919 - 1 to 4.23
1918 - 1 to 4.08
1917 - 1 to 4.50
1916 - 1 to 4.24
1915 - 1 to 2.5
1914 - 1 to 5.48

MAAS MINE.

TIMBER STATEMENT FOR YEAR ENDING DECEMBER 31, 1919.

KIND.	LINEAL FEET.	AVG. PRICE PER FOOT.	AMOUNT 1 9 1 9.	AMOUNT 1 9 1 8.
6" to 8" Timber	59,901	.0417	2497.60	1694.30
8" to 10" "	89,058	.07007	6240.71	4427.60
10" to 12" "	53,458	.1135	6066.53	3072.55
12" to 14" "	560	.11	61.60	800.24
Total - 1919	202,977	.07324	14866.44	
Total - 1918	202,963	.0494		10040.93
	LINEAL FEET.	PER 100'.		
7' Lagging	1,057,800	1.11	11742.26	7167.25
Poles	71,090	.95	675.38	218.78
Total - 1919	1,128,890	1.10	12417.64	
Total - 1918	1,146,262	.644		7386.03

Product	377,030	299,371
Feet Timber per ton of ore	.602	.678
Feet Lagging "	3.14	3.75
Feet Lagging per Ft. of Timber	5.21	5.53
Cost per ton for Timber	.044	.0335
" Lagging	.0348	.0239
" Poles	.002	.00073
" Timber, Lagging & Poles	.0808	.0581
Equivalent of stull timber to Bd.Measure	305,077	383,554
Ft. Bd.Measure per ton of ore	.91	1.28

Total Cost for Timber,Lagging & Poles - 1919	27284.08
" 1918	17426.96
" 1917	14762.71
" 1916	12790.85
" 1915	3980.85
" 1914	7411.85
" 1913	11005.86

MAAS MINE.

STATEMENT OF EXPLOSIVES USED FOR BREAKING ORE.

KIND.	QUANTITY.	AVERAGE PRICES.	AMOUNT 1 9 1 9 .	AMOUNT 1 9 1 8.
40% Powder	124,650	.1724	21,489.56	24,492.03
50% "				10.07
60% "				146.33
80% "	5,650	.18418	1,040.67	
Total Powder	130,300	.17291	22,530.23	24,648.43
Fuse	338,200	.7398	2,501.96	2,928.58
Caps	71,100	1.435	1,020.48	1,124.64
Cap Crimpers	47	.447	21.00	15.62
Tamping Bags	9,200	.16	14.72	25.20
Connecting Wire				7.81
Electric Exploders				2.75
Total Fuse, Etc.	418,547		3,558.16	4,104.60
Total Explosives			26,088.39	28,753.03
Product			337,030	299,371
Pounds Powder per ton of Ore			.387	.449
Cost per ton for Powder			.0668	.0823
" Fuse, Caps, Etc.			.0105	.0137
" All Explosives			.0773	.0960
Avg.Price per Lb. for Powder			.1729	.1829