170' SUB LEVEL.

A sub level was started near the North foot from #410 raise early in the year. A drift was driven 60' to the East and encountered jasper. At this point a crosscut to the South 40' holed to the #412-2 test raise for ventilation. A crosscut to the North was then started and advanced 65' when work was abandoned on account of scarcity of men. In December work was again taken up and 40' farther was advanced. This crosscut had runs of good ore alternating with jasper. In December 10' of ore was encountered, then 10' of dike, the balance being ore with small stringers of jasper. The breast at the end of the year being in good ore. The breast will be continued through to the slate and a raise put up to find the top of the ore body.

210' SUB LEVEL - CORBIT LEASE, SOUTH SIDE.

Early in the year a drift was started from #411-1 raise towards the South. At the raise was ore, but after advancing 20' encountered jasper. It continued 200' in jasper formation and was stopped. Forty feet North from the breast a raise was put up to the 170' sub level, a distance of 45', 40' of which was in jasper, the last 5' in ore, this being high in sulphur. From this development it shows a roll in the foot wall where the high sulphur ore was found last year on the 170' sub level. The ore at this point evidently being in a small pocket on the South side of a slight anticline.

275' SUB LEVEL.

From the #430 crosscut on the South side of the deposit - fourth level - two compartment raises #431 to #434 inclusive, were put up to the East and a sub level opened under the hanging at raises #431, #432 and #433 at an elevation of -275. A mining limit was established 80' East of these raises. The sub level was limited by jasper hanging on the West and North, this limit of mining on the East and the foot wall on the South. Mining started in this sub level in June and has practically been completed with the exception of a small pillar between #432 and #433 raises. In December one contract was operating opposite #433 raise, mining a small pillar.

290' SUB LEVEL.

This sub level has been opened at raises #431, #432 and #434 to the mining limit and slicing is now in progress at #431 and #434. Development drifts will connect to #433 raise during the coming month. In December three contracts were employed in this sub level, the East end of which is in Mitchell Lot #11.

FOURTH LEVEL.

The main Northwest drift on the West side of the dike was driven Southwest 365' parallel to the dike in alternate ore and jasper. A two compartment raise from the 515' sub level holed to this drift in April. Two hundred feet beyond the end of this drift, raise #811-2 from the 515' sub had reached the hanging and a sub level opened at the fourth level elevation. This was small being 70' by 30' in area.

On the South side in the extreme Western end of the main level, the drift being driven to the South to find the South foot, was continued 30' in January in mixed material to the slate foot wall. Seventy feet back of this breast a crosscut was driven West for 50' where it encountered jasper hanging. At a point 130' East of this crosscut a second crosscut to the South was started, namely #430, which encountered the foot at 210' South of the main drift. From this four raises, #431 to #434 inclusive, were put up towards the East to the hanging. As mentioned above a sub level was opened at an elevation of -275 and mining is now in progress above the level in all of these raises.

SUBS ABOVE THE SIXTH LEVEL.

415' SUB LEVEL.

Raise #811-1 from the 515' sub level was opened between the dike and the hanging. The ore was removed early in the year. The sub level was small extending over an area of 25' in width by 110' in length. At raise #452-2 also from the 515' sub level a drift was driven East 60' in mixed material.

430' SUB LEVEL.

In the same area as above, a small sub level was opened between the dike and hanging at #852-2 and #811-2 raises. Mining is still in progress at

this elevation and most of the ore is being handled on the sixth level through raise #647 which recently holed to this sub level. The area of this sub level of 40' by 250'. During the month of December two contracts were employed here. They should complete the mining of the sub level by the end of January. This sub level is considerably longer than the sub above showing that the ore body is increasing in size as it approaches the sixth level.

445' SUB LEVEL.

At raises #646, #647 and #648 a sub level has been opened and a drift connects these three raises. Development work is still in progress and will be carried to the Northeast as rapidly as possible, now that the 430' sub level is about completed. During the month of December one contract was employed on this sub level drifting near #648 raise.

515' SUB LEVEL.

At the end of last year this was the principal development sub level above the sixth - the work being carried on from raise #853. Early in the year the main drift to the Northeast was continued 100', from the end of which a two compartment raise was extended through to the fourth level - this finishing the development at this end of the sub level. Connecting drifts from this drift were driven to raises #644, #645 and #647 which extend from the sixth level.

At a point 85' East of #853 raise mining was started during the latter part of the year under the hanging and carried back to the raise. This was a narrow strip 20' wide between the hanging and the dike.

525' SUB LEVEL.

A new sub level was started at #853 raise in September. Connecting drifts were immediately driven to #852 raise and later raise #651 holed from the sixth level. At present there are two contracts mining in this area which should be completed early in the year. A limit of mining has been established about 70' Northeast of #853 raise. This sub level is cut off on the South by foot wall and dike, on the North by the hanging jasper, making the mining area only 60' by 130'.

540' SUB LEVEL.

This sub level was opened originally a year ago between #852 and #853 raises. Mining started here during the latter part of 1920 around these raises and #651 from the sixth level. Two contracts are mining there at present. The area is about the same size as that of the sub level above, being cut off on the Northeast by a mining limit and in the other directions by a dike, foot wall and hanging wall.

SIXTH LEVEL.

The development of this level started a year ago from #852 raise at #4 crosscut. In order to facilitate matters, raise #811 from the eighth level was extended through to the height of the sixth level and a crosscut driven to the line of #4 crosscut West. Here drifting started to the Southwest and Northeast. The Southwest drift connected with the drift being driven from #852 raise, while the Northeast drift after extending 300' was turned due East parallel to the foot where it met the drift to the West from the main shaft crosscut.

The shaft crosscut was started in February from the top of the South raise opposite the shaft. It advanced 640' Southerly in rock where it cut the ore. A drift was then turned to the Southwest and later to the West and early in August holed to the drift being driven to meet it.

A stub drift to the Northeast of the shaft was extended 130' in the rock for tail room and a connecting drift between the main crosscut and the cage compartment was finished early in the year.

The other developments during the year were as follows:-

No. 3 crosscut Westwas advanced 260' from the foot wall drift. Early in the year this same crosscut was started from the Southwest end from a point 100' Northeast of #852 raise. After driving 200' at that end, work was abandoned as the drift was extremely wet and required a pump to keep the breast free of water. On the first of the year the Northeast and Southwest breasts of this crosscut were 390' apart.

Early in the fall #4 crosscut West was extended to the Southwest to

the limit of the ore body in that direction which is at a point about 150' beyond #852 raise.

No. 5 crosscut West was started in August Northeast of #644 raise. This drift will nearly parallel #4 crosscut and to date has been driven to the Southwest 290'. It will shortly be cut off by the jasper hanging. From this drift the ore near the North dike will be reached.

During the year the following raises were put up from the sixth level, all of which were from #4 crosscut West:-

Raise	#644	to the	430'	sub level,	155',	material	ore.
"	645	"	515'	"	85'	"	ore, caved.
"	646	"	430'	"	155'	"	ore.
"	647	"	445'	"	145'	"	ore.
"	648	"	515'	"	85'	"	ore, holed under #852-2 raise.
"	649	"	540'	"	65'	"	ore, caved.
"	650	"	540'	"	65'	"	ore.
"	651	"	525'	"	75'	"	ore.
"	652	"	540'	"	65'	"	ore.

In December #3 crosscut West was extended 60' to the Southwest, while #5 crosscut West was extended 58' to the Southwest. Raise #650 and #651 holed to the 540' sub level. Raise #652 has just been started.

SEVENTH LEVEL.

In January the two shaft raises from the eighth level had reached the seventh level elevation. These raises were connected and the main crosscut to the South extended 120'. From this point a connection was made to the cage compartment of the shaft. Nothing further has been done on this level.

SUBS ABOVE THE EIGHTH LEVEL.

660' SUB LEVEL.

This sub level was under development in 1919. The only work during the present year was the continuing of the main Northeast crosscut 170', and the short crosscut to the Northwest 30'. The latter holed to #811 raise. No work has been done in this territory since February.

685' SUB LEVEL.

A year ago mining was in progress in this territory to the Northeast of the main eighth level crosscut between #820 and #840 crosscuts. The remaining

pillars were mined and the sub level completed in February.

695' SUB LEVEL.

This sub level was wholly to the Northwest of the main eighth level crosscut between #820 and #840 crosscuts. Mining here was completed in June.

710' SUB LEVEL.

This sub level between #820 and #840 crosscut on the Northwest side of the main eighth level crosscut was finished in August. All of these sub levels are cut off on the Northeast side by the limit of mining, on the Northwest side by dike, and on the Southwest side by jasper.

720' SUB LEVEL.

This sub level on the Northwest side of the main eighth level crosscut shows two separate ore bodies. One small section lying directly over #860 crosscut near the foot wall, the other being the main ore body which was mined from #820 and #840 crosscuts. This sub level was completed in November.

735' SUB LEVEL.

As on the 720, this sub level opened on the Northwest side of the main eighth level crosscut, is in two separate areas - the main ore body being between #840 and #820 crosscuts, being cut off to the Southwest by the jasper. A smaller area is at #861 and #862 raises on the top of the slate foot wall. Mining was still in progress in the larger ore body between #821 and #823 raises and also at #841, #842 and #843 raises. The ore remaining is to the West of #841 raise.

745' SUB LEVEL.

A small sub level was opened at this height in 1919 at #862 raise where development extended 200' to the East and West along the foot wall - the ore averaging about 30' in width and was cut off on the North side by jasper. During the latter part of the year this sub level was opened in the main ore body to the Northwest of the main eighth level crosscut and development is in progress there at present at #823, #843 and #844 raises. Eight contracts are engaged in this work. The area of the sub level is small and mining should be completed by the first of May.

760' SUB LEVEL.

This sub level was opened on the foot wall at #861 and #862 raises in 1919. Work was continued until March when the sub level was completed. This sub is somewhat larger than that above, it averaging 50' in width by 250' in length. A jasper dropper cut off the ore to the North.

770' SUB LEVEL.

In June this sub level was started at #861 raise. It extended along the foot connected with raise #862 and was cut off by the jasper opposite raise #863. Mining continued until November when the sub level was completed. The lense in this area averaged from 10 to 15' wider than on the 760' sub level - the length being about the same, namely 250'.

EIGHTH LEVEL.

No development work was done on this level during the year. Mining operations started in August near the Bunker Hill line to the West of #860 crosscut between the foot wall and jasper dropper. As a limit has been established between #840 and #860 crosscuts, it will permit the complete mining of the ore on the eighth level floor to the Southwest of this point. During the month of December four contracts were engaged in this area. In order to facilitate operations, the ore is handled through raises to the ninth level. This territory should be completely mined early the coming year.

Raises.

Raise #811 from #810 crosscut was put through from the 660' sub level to the sixth level in January. Raise #814 from the eighth level crosscut was started in February and holed to the height of the sixth level in May. Both of these raises are of two compartments and were put up to the Northeast. The object of these raises was to help in the development of the sixth level. This worked out nicely in the case of #811, but no development was done at the top of #814, as conditions there were so bad it was impossible to get men to work there when they could secure work elsewhere.

NINTH LEVEL.

Practically the only work on the ninth level was development. A new

main level drift to the West was started from #920 crosscut in November and has been extended 90' parallel to the North dike. This will be driven to within a few feet of the Bunker Hill line and raises put up on the South side of the drift to the hanging to get the ore under the eighth level.

Raises.

Five raises were started from the main shaft crosscut during the year, of which #914 and #920 from the South side of this drift are now in progress. Raise #916 also on the South side reached the eighth level in October. Raises #917 and #919 from the North side of this main drift reached the hanging jasper at 70'.

The ore from the sill floor eighth level is being transferred to the ninth at present at raises #916 and #918.

TENTH LEVEL.

There was no work on this level except a small amount of retimbering during the year..

UNDERGROUND IN GENERAL.

The development work during the past year was very satisfactory, most of the rock drifting being finished with the completion of the sixth level. This permitted the consentration of the development work to ore areas and although sub levels in a number of instances are small, as the mining progresses these will enlarge considerably, particularly above the sixth level, permitting the use of more contracts. At present the work is considerably scattered, extending from above the fourth level to areas under the eighth level. During the coming year it is hoped that working places can be provided for forty or fifty contracts on a single shift. This would permit the mining of 300,000 tons, which is the estimated product for the coming year, and should prepare the way for a larger tonnage for the following year. The mine is in excellent shape and the tonnage per man per day is as large as any mine in this district.

Following is a resume of the 1920 raising and main level drifting:-

Two compartment cribbed raises.

Above the fourth level	515 feet,
Above the sixth level	1,000 "

Above the eighth level	265 feet,	
Above the ninth level	290 "	
Total -		2,070 feet.

Main Level Drifting.

Level	Ore	Rock	Total
4th	425'	260'	685'
6th	1,795'	960'	2,755'
7th		260'	260'
9th	90'		90'
Total -	2,310'	1,480'	3,790'

WATER.

The water pumped for the year was 82,794,824 gallons or an average of 157 gallons per minute, which is 5 gallons per minute less than in 1919. The water from the drill hole through the dike to the North on the eighth level was permitted to run throughout the year. There seemed to be little change in the quantity of water from this source.

CORBIT LEASE.

The only work on the Corbit Lease was the development on the North and South foot walls to test the height of the ore and to find the limits of sulphur. On the South side this was on the 210' sub level from #411-1 raise, where a drift to the South found practically no ore. A raise from this sub level to the 170' sub found high sulphur ore 5' below that sub level.

On the North side the development on the 95' sub level from #410 raise found no merchantable ore. During the latter part of the year developments on the 170' sub level from this raise were started and are still in progress. Ore was cut but no high sulphur found. A raise will be extended in this ore to find the upper limits on the North foot.

MITCHELL LEASE.

During the year the sixth level development drifts crossed Mitchell Lots #8 and #9.

Mining is now in progress on Lot #11 on the South foot above the fourth level. The completion of these sub levels about the middle of the coming year will finish the work on the Mitchell Lease for some time to come. The only prospect of work here being the possible development of the seventh level.

TENTH LEVEL PUMPS.

A year ago I mentioned the trouble experienced by the cracking of crossheads on these pumps due to pressure. These crossheads were made of cast steel but due to the enormous strain developed cracks and had to be replaced. In January three crossheads on the new pump installed a year ago developed cracks. As the parts are interchangeable and an extra crosshead or two, are kept on hand, we do not anticipate any particular trouble from this source.

WATER COLUMN.

In May one of the tees in the water column broke at the Athens-Negaunee connecting drift. While this tee was being replaced, it was impossible to pump to surface. The water was permitted to run through the connecting drift to the Negaunee Mine until the new tee was installed.

SURFACE.

STOCKPILES.

A year ago extra stocking room was provided to the Southeast of the headframe. Early in the Spring a large portion of this area was covered with jasper which later in the season was rolled to provide stockpile sollar. The stocking ground now permits room for one double and one single stocking trestle.

STOCKING TRESTLE.

As all of the ore was not taken from the stockpile during the shipping season it was decided to swing the South end of the double stocking trestle farther to the East. This will permit loading tracks to reach both the Southwest and Northeast sides of the stockpile, facilitating the loading.

ACCIDENT TO EQUIPMENT.

Two overwinding accidents occurred during the year.

On September 7th the counterweight rope was cut off permitting the counterweight to go to the bottom of the shaft. The lash of the rope bent the steel pulley stands slightly.

On November 23rd the North skip was overwound which broke the head sheave.

These hoists are equipped with a control to prevent overwinding accidents,

however, they are not dependable on account of lack of headroom and a new device known as the Lilly overwinding device, which has recently been developed, has been ordered to replace those now in use.

SHIPMENTS.

All rail shipments were started last winter to the Pioneer and Gladstone Furnaces to take the place of Lake ore which had previously been supplied them.

The shipments from the stockpile for the year were as follows:-

Athens,	71,601 tons,
Mitchell Lease,	8,942 "
Corbit Lease,	3,973 "
Bunker Hill	284 "
Total -	84,800 tons.

The shipments from the pocket for the year were as follows:-

Athens,	88,849 tons,
Mitchell Lease,	14,688 "
TOTAL -	103,537 tons.

ESTIMATE OF ORE RESERVES IN ATHENS MINE DECEMBER 31, 1920.

Assumption 12 cu. ft. equals one ton.

10% deduction for rock.

10% deduction for Loss in Mining.

Percentage of Bessemer equals 0.

DEVELOPED ORE.

Fourth level and above - - - - -	1,310,969 tons,
Fourth level to 6th level, North side of dike - - - - - - - - - -	532,136 "
Sixth level to 660' sub level, North side of dike - - - - - - - - - -	457,954 "
660' sub level to 8th level - - - -	1,097,977 "
Eighth level to 9th level - - - -	652,303 "
Ninth level to 10th level - - - -	396,663 "
Below tenth level - - - - - -	52,185 "
Total developed ore - - - -	4,500,187 tons.

PROSPECTIVE ORE.

Fourth level to 6th level, South of dike	2,042,415 tons,
Sixth level to 660' sub level, South of dike - - - - - - - - - -	340,655 "
Total prospective ore - - - -	2,383,070 tons.

ESTIMATED ANALYSIS.

	IRON	PHOS.	SILICA.	ALUM.	MANG.	LIME.	MAG.	SUL.	IGNI.	MOIST.
Dried 212°	59.75	.134	8.00	2.80	.472	.550	.396	.010	1.70	
Natural	52.13	.117	6.98	2.44	.412	.480	.346	.009	1.48	12.75

PRODUCTION.

Month	Athens	Mitchell	Corbit	Bunker Hill	Total	Rock
January	13,684	768	324		14,776	3,244
February	13,739	28	28		13,795	2,368
March	15,813		428		16,241	3,660
April	12,667		576		13,243	2,424
May	11,739		324		12,063	2,800
June	13,570	379			13,949	1,292
July	12,849	2,076			14,925	856
August	12,209	2,620			14,829	556
September	14,152	3,560			17,712	44
October	15,751	4,760			20,511	
November	16,735	3,773			20,508	
December	21,889	2,620	296		24,805	
Total	174,797	20,584	1,976		197,357	17,244
Stockpile overrun		1,699		34	1,733	
Total	174,797	22,283	1,976	34	199,090	17,244

ANALYSIS OF PRODUCTION.

Production of	1920	199,090 tons,
"	1919	140,793 "
Increase	1920	58,297 tons.

Cost of production	1920	$480,474.45 - Cost per ton		$2.413
" " "	1919	385,280.39		$2.736
Increase	1920	$ 95,194.06	Decrease	$ .323

During the year 1920 the minerworked two eight-hour shifts for 302 days. The average number of men employed during the year was 169, for a total of 51,085 days. In 1919 an average of 149 men were employed for a total of 44,706 day. An increase in labor in 1920 of 20 men and 6,379 days.

The average tons per man underground in 1920 was 6.03 or an increase 1.59 tons per man over 1919, when the average tons per man was 4.44. The total tons per man in 1920 was 4.95 while in 1919 the total tons per man was 3.47; an increase of 1.48 tons per man.

There was an increase of 10% in wages effective February 1st, 1920.

The actual amount paid due to increase in wages this year over last is $30,202.07; which based on the production mined equals $.152 per ton.

GENERAL EXPENSE

No. 26 Insurance,	1920 Amount	$22.44 - Cost per ton	$.000
	1919	1,141.86	.008
	Decrease	1,119.42	.008

Decrease due to Riot Insurance in 1919.

No. 27 Engineering,	1920 Amount	$3,709.00 - Cost per ton	$.019
	1919	3,112.10	.022
	Increase	596.90	.003

No. 28 Analysis,

1920 Amount $3,989.49 - Cost per ton $.020

1919 2,939.33 .021

Increase 1,050.16 Decrease .001

The Athens samples are worked at the Negaunee Mine laboratory.

1920 18,236 determinations @ $.14295 per determ.

1919 14,850 " " .1277 " "

Incr. 3,386 " $.01525 " "

No. 30 Personal Injury Expense,

1920 Amount $2,020.18 - Cost per ton $.010

1919 6,275.28 .044

Decrease 4,255.10 .034

No fatal accidents in 1920, two in 1919.

No. 30-A Mine Office,

1920 Amount $9,624.75 - Cost per ton $.048

1919 8,713.57 .062

Increase 911.18 Decrease .014

	Sub Division Direct Charges	Central Office
1920	3,731.31	5,893.44
1919	3,242.84	5,470.73
Increase	488.47	422.71

In 1920 an adding machine at a cost of $175.00 was purchased for mine office.

Total General Expense,

1920 Amount $19,365.86 - Cost per ton $.097

1919 22,182.14 .157

Decrease 2,816.28 .060

Accounted for in 26, 27, 28 & 30.

MAINTENANCE.

No. 125 Tracks & Yards,

1920 Amount $2,995.04 - Cost per ton $.015

1919 2,289.53 .016

Increase 705.51 Decrease .001

Increase 1920 due to building road to storage yard, shrubbery and care of lawn.

No. 126 Docks, Trestles and Pockets,

1920 Amount	$1,293.08	Cost per ton $.006
1919	2,826.87	.020
Decrease	1,533.79	.014

Decrease 1920 due to grading stockpile grounds for more trestle room in 1919.

No. 127 Buildings,

1920 Amount	$769.30	Cost per ton $.004
1919	345.66	.002
Increase	423.64	.002

Increase 1920 due to building shed in storage yard, rewiring dry house and $167.74 repairs to coal dock.

No. 128 Shop Machinery,

1920 Amount	$323.17	Cost per ton $.002
1919	none	

Charges for 1920 include chain block for Blacksmith Shop $129.07; Pulleys and belting for Machine Shop $50.95; Grindstone $9.87, chain block $67.50 and Circular Saws $65.78 for Carpenter Shop.

No. 129 Boiler Plant,

1920 Amount	$141.69	Cost per ton $.001
1919	5.37	.000
Increase	136.32	.001

Increase due to repairing heating plant boiler and piping.

No. 130 Hoisting Machinery,

1920 Amount	$6,946.22	Cost per ton $.035
1919	3,150.77	.022
Increase 1920	3,795.45	.013

	Sub Division Wire Rope
1920	3,505.08
1919	627.04
Increase	2,878.04

In 1920 one 1 1/8" hoisting rope at a cost of $765.46 and two 1 3/8" hoisting ropes at a cost of $2739.62 were used, while in 1919 only one 1¼" rope at a cost of $627.04 was put in use.

	Machinery Repairs
1920	3,441.14
1919	2,523.73
Increase	917.41

During 1920 signals were installed on two new levels and the bells and ringers on old levels were overhauled. The cast iron sheaves on pulley stands were replaced with wood lined sheaves. On September 7th the cage was hoisted too high and counter balance rope broke at drum and wedged itself in counter balance pipe. The rope in going over pulley stand sheaves also lashed itself around pulley stands and twisted and bent them. It took considerable labor to straighten pulley stands and locate and remove old rope.

On November 24th the skip was hoisted too high and headsheave was broken. New head sheave cost $195.00. The clevis which fastened rope to skip was also broken and some of the angle irons in skip dump bent.

No. 131 Compressors & Power Drills,

1920 Amount $1,746.77 - Cost per ton		$.009
1919	410.27	.003
Increase	1,336.50	.006

	Sub Division Repairing Compressor
1920	216.77
1919	410.27
Increase	193.50

Decrease in 1920 due to new circulation box at a cost of $85.00 and valves and trip steels which cost $57.50 together with one more set of carbon brushes than in 1920 being charged in 1919.

	Power Drills
1920	1,530.00
1919	-----
Increase	1,530.00

In 1920 nine BBR #130 Ingersoll Rand air drills were purchased while in 1919 no drills were bought.

No. 132 Pumping Machinery,

1920 Amount	$2,244.32 - Cost per ton	$.011
1919	1,358.23	.010
Increase	886.09	.001

Increase due to increase in number of pot valves and seats used in 1920 over 1919.

No. 133 Top Tram Engines & Cars,

1920 Amount	$1,373.06 - Cost per ton	$.007
1919	1,839.81	.013
Decrease	466.75	.006

Decrease 1920 due to building new top tram car in 1919.

No. 134 Skips & Skip Roads,

1920 Amount	$2,389.63 - Cost per ton	$.012
1919	1,331.54	.009
Increase	1,058.09	.003

Increase due to increase in repairs to skips and replacing skip runners.

No. 135 Underground Tracks & Cars,

1920 Amount	$2,936.06 - Cost per ton	$.015
1919	2,095.95	.015
Increase	840.11	

Increase due to more 12# rail used and building sub level cars.

No. 136 Electric Tram Plant,

1920 Amount $19,397.65 - Cost per ton $.097

1919 11,775.99 .084

Increase 7,621.66 .013

Sub Division.

Generator & Dynamo 1920 $167.74

1919 309.32

Decrease $141.58

Decrease due to overhauling generator 1919.

Locomotives. 1920 $1,785.91

1919 1,078.20

Increase 707.71

Increase due to overhauling two of locomotives and increase in repairs account increase in product.

Wiring. 1920 $4,006.80

1919 607.45

Increase $3,399.35

Increase due to installing electric haulage on new levels.

Main Line Tracks. 1920 $10,002.68

1919 8,038.30

Increase 1,964.38

Increase due to installing tracks on new level.

Main Line Cars. 1920 $3,434.52

1919 1,742.72

Increase $1,691.80

Increase 1920 due to overhauling cars and changing three cars from brass bearing to roller bearing.

No. 137 Telephones & Safety Devices,

1920 Amount $901.50 - Cost per ton $.004
1919 1,322.74 .010
Decrease 421.24 .006

Decrease 1920 due to less charges to lighting for shaft and levels and safety devices for shop machinery.

Total Maintenance,

1920 Amount $43,457.49 - Cost per ton $.218
1919 28,752.73 .204
Increase 14,704.76 .014

MINING EXPENSE.

No. 150 Air Pipes,

1920 Amount $7,006.85 - Cost per ton $.035
1919 5,185.08 .037
Increase 1,821.77 Decrease .002

Increase in amount and decrease in cost per ton 1920 due to increase in product.

No. 151 Compressors,

1920 Amount $23,194.12 - Cost per ton $.116
1919 19,079.61 .135
Increase 4,114.51 Decrease .019

Cu. ft. air Compressed 1920;505,035,000 @ .046 per M cu. ft.

Cu. ft. air compressed 1919 - 402,261,000 @ .047 per M cu. ft; increase for 1920 of 102,774,000 cu. ft and a decrease of .001 per M cu. ft.

No. 152 Hoisting,

1920 Amount $26,185.00 - Cost per ton $.132
1919 22,166.45 .157
Increase 4,018.55 Decrease .025

Increase in amount and decrease in cost per ton due to increase in product. In 1920 the tons of ore and rock hoisted were 214,601 at an average depth of 2,133 ft. In 1919, 149,557 tons, average depth 2,137 ft.

No. 153 Pumping,

1920 Amount $16,003.45 - Cost per ton $.081

1919 16,365.46 .116

Decrease 362.01 .035

1920 - Gals. of Water pumped 82,794,824, gallons per minute 157.

1919 - Gals. of Water pumped 85,503,850, gallons per minute 163.

Decrease in 1920 of 2,709,026 gallons or 6 gallons per minute.

No. 154-B Sinking & Shaft Repairs,

1920 Amount $2,422.92 - Cost per ton $.012

1919 784.04 .006

Increase 1,638.88 .006

Increase due to repairs to underground pockets.

No. 155 Rock Drifting,

1920 Amount $35,543.15 - Cost per ton $.179

1919 30,581.63 .217

Increase 4,961.52 Decrease .038

	Sub Division			
	Drifting	Per ft.	Raising	Per ft.
1920	2,697'	8.44	255'	6.95
1919	1,718'	7.49	378	6.83
Incr.	979	.95	Decr. 123	.12

No. 156 Breaking Ore,

1920 Amount $183,835.16 - Cost per ton $.923

1919 137,137.87 .974

Increase 46,697.29 Decrease .051

	Explosives 1920	1919
Total lbs. Powder	81,250	59,500
Avg. price per lb.	.1788	.1773
Total Amount	14,526.38	10,549.25
Fuse, Caps, Etc.	3,525.47	2,359.98

	1920	1919
Grand Total	18,051.95	12,909.23
Lbs. powder per ton of ore	.4117	.423
Cost per ton for powder	.0736	.0749
" All Explosives	.0915	.0917

No. 157 Tramming,

1920 Amount $34,837.49 - Cost per ton $.175

1919 28,137.55 .200

Increase 6,699.94 Decrease .025

Sub Division

	1920	1919
Tramming	24,554.81	20,432.85
Skip Tender & Bellman	7,387.14	6,299.50
Cleaning Skip Pit	2,958.54	1,405.20

No. 159 Timbering,

1920 Amount $63,579.70 - Cost per ton $.319

1919 55,551.31 .395

Increase 8,028.39 Decrease .076

Detail cost of timber.

	1920	1919
Cost of stull timber	14,141.33	11,451.45
" " Lagging & Poles	8,480.82	7,975.41
Total Cost	22,622.15	19,426.86
Ft. timber per ton of ore	1.258	1.46
Cost per ton for Timber, Lagging & Poles	.1146	.1380

No. 160 Captain & Bosses,

1920 Amount $12,715.15 - Cost per ton $.064

1919 7,715.68 .055

Increase 4,999.47 .009

In 1920 there were four shift bosses all year.

In 1919 there were only two shift bosses to Dec. 10th when two more were added.

No. 161 Dry House,

1920 Amount $3,372.78 - Cost per ton $.017

1919 2,754.75 .020

Increase 618.03 Decrease .003

Heating charge to dry house 1920 was $1,950.65, while in 1919 it was only $1,688.48. In 1920 both ends of dry house were in use, while in 1919 only one end was in use, therefore more labor cleaning dry.

No. 162 Top Landing & Tramming,

1920 Amount	$5,985.29	- Cost per ton	$.030
1919	5,355.25		.038
Increase	630.04	Decrease	.008

In 1919 our two top tram engineers were paid top landers rate which is $.41 per day less than the top tram engineers rate. This year they received top tram engineers pay.

No. 163 Stocking Ore,

1920 Amount	$2,351.19	- Cost per ton	$.012
1919	2,651.63		.019
Decrease	300.44		.007

Decrease 1920 due to extending trestle in 1919, necessitating the charge for trestle legs and timber. This year the same amount of trestle was erected which did not have to stand any original cost of legs or timber.

No. 171 Ventilation,

1920 Amount	$618.85	- Cost per ton	$.003
1919	682.39		.005
Decrease	63.54		.002

In 1919 the fan and motor on 2400' level was transferred to 1800' level which necessitated the expense of additional wiring material. In 1920 the fan motors were overhauled at General Shops but the cost of overhauling them was less than transferring fan and motor from 2400' level to the 1800' level last year.

Total Mining Expense,

1920 Amount	$417,651.10	- Cost per ton	$2.098
1919	334,345.52		2.375
Increase	83,305.58	Decrease	.277

DELAYS - ELECTRICAL.

June 28th	One hour delay account of no current.
July 27th	Do.

DELAYS - NON ELECTRICAL.

March 17th	North skip pulled too high at 2:30 A.M.
July 27th	Two hours delay account of cable kicking through on hoist.
August 6th	Six hours delay account of eighth level main drift breaking down.
September 7th	Counter balance on skip hoist broke at 9:30 A.M.
November 9th	Delay from 8:40 P.M. to 2:40 A.M. account of bearing on compressor running hot.
November 23rd	Overwinding accident.
November 24th	Sixteen hours delay account of over winding accident, replacing broken top sheave.

ATHENS MINE

AVERAGE MINE ANALYSIS ON OUTPUT FOR YEAR 1920.

GRADE	IRON	PHOS.	SILICA
Athens,	59.83	.128	8.08
Mitchell Lease,	60.09	.147	7.76

AVERAGE ANALYSIS ON STRAIGHT CARGOES FOR YEAR 1920.

GRADE	Mine IRON	Mine PHOS.	Lake Erie IRON	Lake Erie MOIST.
Athens,	59.60	.136	59.40	13.54
Mitchell Lease,	(All mixed)			

ORE STATEMENT - DECEMBER 31ST, 1920.

	ATHENS	MITCHELL LEASE	CORBETT LEASE	BUNKER HILL	TOTAL	TOTAL LAST YR.
On hand Jan. 1st, 1920,	69,162	6,447	5,403	284	81,296	15,002
Output for year,	174,797	22,283	1,976	34	199,090	140,793
Total,	243,959	28,730	7,379	318	280,386	155,795
Shipments,	160,416	23,630	3,973	318	188,337	74,499
Balance on hand	83,543	5,100	3,406	0	92,049	81,296
Increase in output-41%					58,287	
Increase in ore on hand-13%					10,753	
1920 - 2-8 Hour Shifts for year						
1919 - 2-8 " " " "						

ATHENS MINE

SHIPMENTS FOR YEAR 1920.

GRADE	POCKET	STOCKPILE	TOTAL	TOTAL LAST YEAR
Athens,	88,849	71,567	160,416	66,376
Mitchell Lease,	14,688	8,942	23,630	2,409
Corbett Lease,		3,973	3,973	5,714
Total,	103,537	84,800	188,337	74,499
Last Year,			74,499	
Increase - 153%			113,838	

ATHENS MINE.

ATHENS MINE.

COMPARATIVE MINING COST FOR YEAR.

	1920.	1919.	INCREASE.	DECREASE.
PRODUCT	199,090	140,793	58,297	
General Expense	.097	.157		.060
Maintenance	.218	.204	.014	
Mining Expense	2.098	2.375		.277
Cost of Production	2.413	2.736		.323
Exploratory		.032		.032
DEPRECIATION.				
Construction (Opg)	.210	.210		
Total Depreciation	.210	.210		
Taxes	.194	.168	.026	
Central Office	.048	.054		.006
Supply Inventory	.012		.012	
Miscellaneous	.037	.138		,101
Cost on Stockpile	2.914	3.338		.424
Loading & Shipping	.073	.033	.040	
Administrative		.035		.035
Total Cost on Cars	2.987	3.406		.419
No.Days Operating	302	298	4	
No.Shifts & Hours	2-8hr	2-8hr		
Avg.Daily Product	659	472	187	
Cost of Production				
Labor	1.659	1.886		.227
Supplies	.754	.850		.096
Total	2.413	2.736		.323

THIS MINE STARTED ON AN OPERATING BASIS JANUARY 1,1919.

ATHENS MINE

COMPARATIVE WAGES AND PRODUCT

	1920	1919	INCREASE	DECREASE
PRODUCT	199,090	140,793	58,297	
No.Shifts and Hours	2-8hr	2-8hr		
AVERAGE NO.MEN WORKING				
Surface	35	37		2
Underground	134	112	22	
Total	169	149	20	
AVERAGE WAGES PER DAY				
Surface	5.59	5.00	.59-11.8%	
Underground	6.65	6.20	.45- 7.3%	
Total	6.43	5.90	.53- 9. %	
WAGES PER MONTH OF 25 DAYS				
Surface	139.75	125.00	14.75	
Underground	166.25	155.00	11.25	
Total	160.75	147.50	13.25	
PRODUCT PER MAN PER DAY				
Surface	18.77	12.56	6.21	
Underground	4.92	4.20	.72	
Total	3.90	3.15	.75	
LABOR COST PER TON				
Surface	.298	.398		.100
Underground	1.353	1.476		.123
Total	1.651	1.874		.223
AVG.PRODUCT BRK'G & TRM'G	7.15	6.25	.90	
" WAGES CONTRACT MINER	7.25	6.89	.36	
" " " TRAMMER				
" " " LABOR	7.25	6.89	.36	
TOTAL NUMBER OF DAYS				
Surface	10,608	11,205	403	
Underground	40,477	33,502	6,975	
Total	51,085	44,707	7,378	
AMOUNT FOR LABOR				
Surface	59259.69	56021.72	3237.97	
Underground	269337.09	207831.13	61505.96	
Total	328596.78	263,852.85	64743.93	

Mine started on operating basis Jan.1,1919.

Proportion Surface to,Underground Men;
1920 - 1 to 3.83
1919 - 1 to 3.

ATHENS MINE

TIMBER STATEMENT FOR THE YEAR ENDING DECEMBER 31, 1920.

KIND	LINEAL FEET	AVG. PRICE PER FOOT	AMOUNT 1 9 2 0	AMOUNT 1 9 1 9
4" to 6" Timber	18,411	.016	295.24	855.88
6" to 8 "	114,300	.0388	4431.61	3798.74
8" to 10 "	91,480	.0746	6820.56	3634.32
10 to 12 "	20,504	.1018	2086.32	2125.41
12 to 14 "	3,648	.139	507.60	1037.10
Total - 1920	248,343	.0569	14141.33	11451.45
	LINEAL FEET	PER 100'		
7' Lagging	755,573	1.0189	7698.66	7362.86
Poles	67,020	1.167	782.16	612.55
Total - 1920	822,593	1.031	8480.82	7975.41
Product			197,357	140,793
Feet timber per ton of ore			1.258	1.46
Feet lagging "			3.828	5.34
Feet lagging per foot of timber			3.042	3.65
Cost per ton for timber			.0717	.0813
" lagging			.039	.0523
" poles			.004	.0044
" timber, lagging & poles			.1146	.1380
Equivalent of still timber to board measure			352,041	307,749
Feet of board measure per ton of ore			1.784	2.186

Total cost for timber, lagging & Poles - 1920 22622.15
1919 19426.86

ATHENS MINE

STATEMENT OF EXPLOSIVES USED FOR BREAKING ORE

KIND	QUANTITY	AVERAGE PRICE	AMOUNT 1920	AMOUNT 1919
40% Powder - - - - - - -	70,600	.1731	12,222.57	7,604.52
60% " - - - - - - -	10,650	.2163	2,303.81	2,944.73
Total Powder - -	81,250	.1788	14,526.38	10,549.25
Fuse - - - - - - - - - - -	274,700	9.853	2,706.68	1,866.29
Caps - - - - - - - - - - -	52,000	15.289	795.03	476.29
Cap Crimpers - - - - - -	44	.455	20.00	17.40
Tamping Bags - - - - - -	2,000	1.88	3.76	
Total Fuse, Caps, Etc.			3,525.47	2,359.98
Total Explosives - -			18,051.85	12,909.23
Product - - - - - - - -			197,357	140,793
Pounds Powder per ton of ore			.4117	.423
Cost per Ton for Powder			.0736	.0749
" " " " Fuse, Caps, Etc.			.0179	.0168
" " " " All Explosives			.0915	.0917
Avg. Price per Lb. for Powder			.1788	.1773

SOUTH JACKSON MINE - 1920.

Mining started in the South Jackson Pit in May and continued throughout the summer, the Pit shutting down on October 1st. A product of 69,222 tons was mined of the South Jackson grade. Practically all of this came from the East end of the open pit which now extends over 200' onto the Lucy property. Cuts were taken on both the North and South sides of this pit and considerable difficulty was had in making the grade, at various times, on account of encountering old filling material that was placed there years ago. A small part of the product came from underground development at the tunnel level where drifts were driven to the West under the manganese pit and to the Southeast towards the Lucy line to provide drainage for that area.

OPEN PIT.

Steam shovel loading was employed throughout the year. Most of the ore was broken by blasting of churn drill holes which were drilled a year ago, however considerable block holing was required to break up the large chunks. Heretofore cars were spotted by gravity where possible or by means of an L. S. & I. spotting engine when the tail room was short. This method was very expensive as the Railroad Company made a charge of $7.50 per hour for engine service. Last summer a "dinky" engine was employed which handled the cars from the siding in front of the crusher, took them into the pit, supplied the shovel and placed the loaded cars back on the side track below the old crusher. This facilitated operations very much, although we did considerable work to expedite matters which should have been done by the Railroad Company. During the coming year, if there is a call for this ore, it is expected that most of the product will come from this section and will be mined by steam shovel if possible.

FUTURE DEVELOPMENT.

If the operations in this pit warrant it, I would recommend that a shovel of the "merry-go-round" type be used which could advance in a breast

cut. This would permit the extension of the present pit through the Lucy shaft to the East. As the pit is extended in this direction the ore could be loaded directly into Railroad cars without rehandling. It is possible, too, that an electric operated shovel with caterpillar traction which would require no tracks might be used to advantage in this pit, as the crew could be cut down to a minimum and practically no one would be required around the shovel except when it is being moved to a new position.

UNDERGROUND.

The development at the tunnel level which was started last year was continued during the year. The West drift was advanced 215' and stopped August 7th. Three crosscuts were put out from this drift each 20' in length; two to the North and one to the South. These crosscuts were located as follows:-

No. 1 crosscut to the North at diamond drill hole #98.

No. 1 crosscut to the South was 10' West of churn drill hole #97.

No. 2 crosscut to the North was 12' East of the breast.

The South drift to the West of the shaft advanced 10' around the turn when it was stopped.

The South drift to the East of the shaft advanced 128' to point of curve, 24' around the curve and then 100' on the tangent to the Southeast, making a total of 252' in all.

These drifts serve the double purpose of providing drainage for the pit above and can be used for milling purposes if that method of mining is ever necessary. The Southeast drift will be continued this summer towards the Lucy workings to drain the water above this elevation.

SURFACE.

NEW COMPRESSOR.

An Ingersoll-Rand Compressor with a capacity of 599 cubic feet of free air per minute was purchased in May. The foundation was installed during the month and the compressor started operating July 15th. This compressor is belt driven, and is equipped with a 104 horsepower motor, 2300 volts.

OLD COMPRESSOR.

The old Ingersoll-Rand compressor, capacity of 300 cubic feet per minute, was shipped to the Spies Mine July 28th and later sold to the Hill-Trumbull Mine.

REPAIRS TO DRAINAGE TUNNEL.

In May repairs were made to the drainage tunnel beneath the County Road. Lining sets were installed whereever necessary and the drift put in good repair.

ESTIMATE OF ORE RESERVES OF DECEMBER 31, 1920.

Above present pit available by present system of mining:

On Southwest side - - - - - - - - - - -	35,000 tons,
North of Lucy Pit - - - - - - - - - - -	10,000 "
South and Southwest of Lucy Pit - - - - - - -	10,000 "
Total -	55,000 tons.

Below present pit and above drainage tunnel available by milling:

West of Crusher -- - - - - - - - - - - -	186,000 tons,
Area below bottom present pit by churn drilling - -	160,000 "
Total -	346,000 tons.
GRAND TOTAL -	401,000 tons.

ANALYSIS

	IRON	PHOS.	SUL.	MANG.	MOIST.	SIL.
Natural	36.83	.066	.010	2.00	7.00	31.56

SOUTH JACKSON MINE

AVERAGE MINE ANALYSIS ON OUTPUT FOR YEAR 1920.

GRADE	IRON	PHOS.	SILICA	MANG.
South Jackson,	37.63	.038	35.76	2.64

AVERAGE ANALYSIS ON STRAIGHT CARGOES FOR YEAR 1920.

	Mine				Lake Erie		
GRADE	IRON	PHOS.	SILICA	MANG.	IRON	MOIST.	MANG.
South Jackson,	37.73	.039	35.68	2.65	37.85	7.57	2.81

ORE STATEMENT AND SHIPMENTS FOR YEAR 1920.

	YEAR	LAST YEAR
Output for year,	69,222	56,840
Shipments,	69,222	56,840
Balance on hand,	0	0

1920 - Idle Jan. 1st to May 3rd, 1920
1-10 Hour Shift May 3rd to Oct. 2nd, 1920
Idle Oct. 2nd to Dec. 31st, 1920
1919 - 1-10 Hour Shift May 28th to Nov. 13, 1919.

SOUTH JACKSON MINE.

SOUTH JACKSON MINE.

COMPARATIVE MINING COST FOR YEAR.

	1920.	1919.	INCREASE.	DECREASE.
PRODUCT	69,222	56,840	12,382	
General Expense	.026	.036		.010
Maintenance	.093	.007	.086	
Mining Expense	.400	.436		.036
Crushing	.150	.125	.025	
Stripping	.005	.018		.013
Cost of Production	.674	.622	.052	
DEPRECIATION.				
Original Purchase	.803	.803		
Total Depreciation	.803	.803		
Taxes	.034	.037		.003
Idle Expense	.013	.017		.004
Central Office	.013	.013		
Miscellaneous	.011	.008	.019	
Sundry Expense	.008	.007	.001	
Cost on Stockpile	1.556	1.491	.065	
Loading & Shipping	.001	.008		.007
Total Cost on Cars	1.557	1.499	.058	
No.Days Operating	124	100	24	
No.Shifts & Hours	1-10hr	1-10hr		
Avg.Daily Product	558	568		10
COST OF PRODUCTION.				
Labor	.296	.325		.029
Supplies	.378	.297	.081	
Total	.674	.622	.052	

SOUTH JACKSON MINE

COMPARATIVE WAGES AND PRODUCT

	1920	1918	INCREASE	DECREASE
PRODUCT	69,222	56,840	12,382	
No.Shifts and Hours	1-10hr	1-10hr		
AVERAGE NO. MEN WORKING				
Surface	7	7½		½
Underground	4	4½		½
Total	11	12		1
AVERAGE WAGES PER DAY				
Surface	5.74	5.32	.42-8%	
Underground	6.73	5.92	.81-13	
Total	6.09	5.51	.58-10.5	
WAGES PER MONTH OF 25 DAYS				
Surface	143.50	133.00	10.50	
Underground	168.25	148.00	20.25	
Total	152.25	137.75	14.50	
PRODUCT PER MAN PER DAY				
Surface	32.49	25.90	6.59	
Underground	59.92	53.38	6.54	
Total	21.07	17.44	3.63	
LABOR COST PER TON				
Surface	.177	.205		.028
Underground	.112	.111	.001	
Total	.289	.316		.027
TOTAL NUMBER OF DAYS				
Surface	2,130	2,194½		64½
Underground	1,155	1,065	90	
Total	3,285	3,259½	25½	
AMOUNT FOR LABOR				
Surface	12225.19	11676.19	549.00	
Underground	7778.63	6303.37	1475.26	
Total	20003.82	17979.56	2024.26	

Proportion Surface to Underground Men:

1920 - 1 to .56
1919 - 1 to .6
1918 - 1 to 1.75
1917 - 1 to 6.5
1915 - 1 to 5.

NORTH JACKSON MINE - 1920.

In March a small lathe was taken from the Jackson machine shop and sold to the Negaunee Mine.

CONSTABULARY BARRACKS.

A porch for this building which was authorized last year was built in May and June.

LUCY MINE - 1920.

The operations in the Jackson Pit last season extended onto the Lucy property. During the coming year, work will be continued at this point. If a different type of steam shovel is used, it is possible that the pit will be extended still farther East towards the Lucy shaft.

MORRIS LLOYD MINE.

GENERAL

These mines were worked to capacity as far as labor conditions would permit, all through the year. It was only during December, the last month of the year, that any where near a full compliment of men were available. We were able to increase our forces during December due to the curtailment at the Cliffs-Shaft Mine.

No new work has been undertaken on surface during the year and the work there consisted of caring for the production, shipping etc.

There have been few changes underground and conditions are about the same as last year. We have developed some additional tonnage in both the Morris and Lloyd Mines where we have followed existing ore bodies and found the areas increasing, this is particularly true of the first and second subs in Section Six shaft and below the third level in the Morris mine. We have also found some new ore on Chase Leases No. 24, 25 and 26, which is not yet fully developed.

The long drift West on the 6th level of the Morris mine has now crossed Chase Leases Nos. 9, 24, 25 and is now 445' on Lease No. 26. Ore is now being mined on all of the above four leases but, with the exception of No. 9, the production is small. During the year Leases No. 9 and 24 mined in excess of their yearly requirements. The figures are shown later on in this report.

New equipment bought during the year was confined to a new pump plant for the bottom of the Morris mine and one six ton Electric Locomotive for the new 7th level of the same mine.

LABOR

We started the year with 283 men but later, in May month, dropped to 228. A number of our men own small farms in the vicinity of the mines and work on same during the summer months and in the mines during the winter.

MORRIS LLOYD MINE.

LABOR

In December month we worked a total of nearly 300 men having been able to substantially increase our forces by taking on men laid off at the Cliffs-Shaft mine at Ishpeming. These men have to come out from their homes at distance of over four miles. Some of them have their own horses but a number have combined and have engaged a buss from the livery barn to convey them back and forth.

The following statement shows the number of men employed each month on surface and underground during the year and with previous years for comparison, - Viz:

MEN EMPLOYED.

	SURFACE					UNDERGROUND					TOTAL				
	1916	1917	1918	1919	1920	1916	1917	1918	1919	1920	1916	1917	1918	1919	1920
JAN.	64	49	50	49	51	242	240	208	206	232	306	289	258	256	283
FEB.	59	47	47	46	50	245	230	194	206	214	304	277	241	252	264
MAR.	62	51	46	46	45	253	230	201	217	210	315	281	247	263	255
APR.	62	46	40	46	43	247	229	184	213	198	309	275	224	259	241
MAY.	61	44	48	53	54	240	220	198	214	174	301	264	246	267	228
JUN.	60	44	39	50	47	237	216	202	232	186	297	260	241	281	233
JUL.	65	43	41	52	48	232	207	201	214	189	297	250	242	266	237
AUG.	61	42	45	50	46	225	187	195	216	186	286	229	240	266	232
SEP.	59	46	44	49	44	210	177	186	201	190	269	223	230	250	234
OCT.	55	45	48	50	47	219	181	182	205	193	274	226	230	255	240
NOV.	53	48	47	48	46	216	174	164	201	199	269	217	212	249	245
DEC.	48	41	48	51	45	222	176	174	212	246	270	217	222	263	292
AVG.	59	45	45	49	47	232	206	191	214	201	291	251	236	263	248

It will be noted that we worked an average of 15 men less than last year. It looks, however, as though under present conditions we will have sufficient men during the coming year.

Our labor cost per ton shows an increase of 9-1/3% over last year and this is accounted for by the raise of 10% in wages which went into effect in February month 1920. The costs per ton for labor are shown on the following statement with figures for previous years for comparison, - Viz:

MORRIS LLOYD MINE.

COST PER TON FOR LABOR

	SURFACE					UNDERGROUND					TOTAL				
	1916	1917	1918	1919	1920	1916	1917	1918	1919	1920	1916	1917	1918	1919	1920
JAN.	.228	.180	.225	.294	.275	1.043	.946	1.036	1.363	1.389	1.271	1.126	1.261	1.657	1.664
FEB.	.219	.178	.237	.279	.319	1.072	.888	1.017	1.347	1.514	1.291	1.066	1.254	1.626	1.833
MAR.	.175	.173	.193	.267	.284	.831	.853	.952	1.394	1.465	1.006	1.026	1.145	1.661	1.749
APR.	.189	.172	.205	.310	.346	.836	.876	.985	1.545	1.589	1.025	1.048	1.190	1.855	1.935
MAY.	.180	.159	.202	.290	.397	.757	.897	.927	1.320	1.499	.937	1.056	1.129	1.610	1.896
JUN.	.161	.176	.166	.251	.327	.702	.960	.907	1.320	1.505	.863	1.136	1.073	1.571	1.832
JUL.	.180	.166	.181	.293	.333	.722	.907	.904	1.374	1.554	.902	1.073	1.085	1.667	1.887
AUG.	.161	.170	.212	.276	.288	.671	.851	.992	1.374	1.420	.832	1.021	1.204	1.650	1.708
SEP.	.182	.198	.212	.280	.287	.700	.869	.985	1.267	1.406	.882	1.067	1.197	1.547	1.693
OCT.	.174	.229	.213	.258	.281	.735	.954	.980	1.217	1.376	.909	1.183	1.193	1.475	1.657
NOV.	.187	.232	.354	.307	.338	.798	.977	1.335	1.389	1.538	.985	1.209	1.689	1.696	1.876
DEC.	.173	.254	.333	.300	.271	.840	1.077	1.311	1.333	1.586	1.013	1.331	1.644	1.636	1.857
AVG.	.184	.186	.229	.284	.309	.809	.908	1.027	1.354	1.482	.993	1.094	1.256	1.638	1.791

There was one increase of 10% in wages during the year but our average rate as shown by the following statement shows a net increase for the year of 7%. Viz:

AVERAGE WAGE RATE.

	SURFACE					UNDERGROUND					TOTAL				
YEAR	1916	1917	1918	1919	1920	1916	1917	1918	1919	1920	1916	1917	1918	1919	1920
JAN.	2.48	3.19	3.86	5.15	5.10	2.99	3.51	4.36	5.83	5.82	2.89	3.45	4.26	5.70	5.69
FEB.	2.69	2.96	3.89	5.20	5.60	3.15	3.52	4.36	5.95	6.42	3.06	3.46	4.26	5.81	6.24
MAR.	2.70	3.16	3.85	5.23	5.55	3.12	3.53	4.41	6.01	6.49	3.03	3.47	4.30	5.87	6.31
APR.	2.74	3.10	4.02	5.16	5.60	3.05	3.53	4.64	6.01	6.40	2.98	3.44	4.52	5.85	6.24
MAY.	2.91	3.40	4.22	5.19	5.55	3.16	3.88	4.86	6.02	6.57	3.12	3.80	4.74	5.84	6.33
JUN.	2.91	3.42	4.21	5.16	5.47	3.20	3.90	4.91	6.13	6.62	3.12	3.81	4.78	5.94	6.38
JUL.	2.90	3.39	4.23	5.21	5.32	3.17	3.98	4.98	6.17	6.46	3.09	3.87	4.89	5.97	6.23
AUG.	2.89	3.43	4.70	5.17	5.50	3.18	4.05	5.52	6.03	6.64	3.11	3.93	5.36	5.86	6.38
SEP.	2.88	3.44	4.82	5.20	5.61	3.17	4.16	5.53	6.10	6.47	3.12	4.00	5.39	5.92	6.28
OCT.	2.91	3.86	5.32	5.19	5.65	3.19	4.42	6.11	6.00	6.71	3.14	4.29	5.97	5.85	6.46
NOV.	2.91	3.83	5.38	5.21	5.70	3.23	4.37	6.04	5.86	6.36	3.16	4.28	5.89	5.70	6.20
DEC.	3.04	3.88	5.23	5.18	5.69	3.37	4.34	5.94	5.83	6.26	3.31	4.25	5.79	5.70	6.14
AVG.	2.83	3.44	4.48	5.18	5.46	3.17	3.93	5.14	6.00	6.42	3.10	3.84	5.01	5.84	6.23

The following statement shows the number of men of the different nationalities at work at this mine in December month and for the same month during the previous four years, - Viz:

	1920	1919	1918	1917	1916
Americans,	80	69	60	57	65
English,	14	14	10	13	12
Swedish,	9	9	9	10	13
French,	20	23	10	11	22
Finnish,	114	96	87	83	118
Italian,	60	53	45	51	45
Greeks,	0	0	2	1	3
Slavish,	2	3	1	0	0
TOTAL,	299	267	224	226	278

MORRIS LLOYD MINE.

PRODUCTION

During the year we produced a total of 261,772 tons as compared with 282,483 tons last year.

The production was made up of the following grades, - Viz:

MINE	BESSEMER	MORRIS	SILICA	LLOYD	LLOYDDALE	TOTAL
Morris	929	46,643	31,474			79,046
Lloyd			32,399	105,327	45,000	182,726
TOTAL, 1920	929	46,643	63,873	105,327	45,000	261,772
" 1919	14,674	23,142	78,755	121,623	44,289	282,483
" 1918	30,709	16,320	41,922	141,144	59,405	289,500
" 1917	55,772	9,530	52,848	138,235	27,615	284,000
" 1916	75,024	2,630	76,350	112,119	41,562	307,685

Ore was hoisted on 300 days at the rate of 873 tons per day.

We kept more men at work during the year developing the Chase Leases, some ore was mined on the west leases but the ore bodies so far found are so small that the production per man is low and the costs consequently high.

The following statement shows the tons per man per day for each month of 1920 and the four previous years for comparison, - Viz:

TONS PER MAN PER DAY.

	SURFACE					UNDERGROUND					TOTAL				
	1916	1917	1918	1919	1920	1916	1917	1918	1919	1920	1916	1917	1918	1919	1920
JAN.	10.86	17.75	17.09	17.66	18.53	2.87	3.71	4.20	4.28	4.19	2.27	3.07	3.37	3.44	3.42
FEB.	12.29	18.04	16.36	18.65	17.54	2.94	3.96	4.29	4.42	4.22	2.37	3.25	3.40	3.57	3.40
MAR.	15.38	18.37	19.80	19.61	19.58	3.75	4.14	4.63	4.31	4.43	3.02	3.38	3.75	3.54	3.61
APR.	14.50	17.88	19.60	16.65	15.85	3.64	4.02	4.71	3.89	4.03	2.91	3.28	3.80	3.16	3.22
MAY.	16.50	21.43	20.84	17.68	13.98	4.17	4.33	5.25	4.57	4.39	3.33	3.60	4.20	3.63	3.34
JUN.	17.68	19.28	25.18	20.40	16.71	4.56	4.06	5.42	4.64	4.40	3.63	3.36	4.46	3.78	3.48
JUL.	15.64	20.25	24.80	17.69	15.98	4.39	4.39	5.50	4.49	4.16	3.43	3.61	4.50	3.58	3.30
AUG.	17.64	20.09	22.37	18.63	18.54	4.74	4.75	5.56	4.39	4.77	3.73	3.84	4.45	3.55	3.73
SEP.	16.04	17.36	22.96	18.70	19.09	4.53	4.79	5.61	4.81	4.61	3.53	3.75	4.51	3.83	3.71
OCT.	17.00	16.76	25.35	20.31	19.45	4.33	4.63	6.23	4.93	4.88	3.45	3.63	5.00	3.97	3.90
NOV.	15.56	16.92	15.31	16.68	16.51	4.04	4.47	4.52	4.22	4.13	3.21	3.54	3.49	3.36	3.31
DEC.	17.57	15.28	15.81	17.29	20.27	4.01	4.04	4.53	4.38	3.95	3.26	3.20	3.52	3.49	3.30
AVG.	15.57	18.51	20.45	18.33	17.67	4.00	4.29	5.04	4.44	4.33	3.18	3.48	4.04	3.57	3.48

MORRIS LLOYD MINE.

SHIPMENTS.

Our shipments during the year were agin very low and amounted to but 200,388 tons.

We continued all the year, both winter and summer, to make shipments to Charcoal Furnaces but our shipments to lower lake ports were curtailed.

The following statement shows the shipments by grades for the past five years, - Viz:

SHIPMENTS.

	1916 TONS	1917 TONS	1918 TONS	1919 TONS	1920 TONS
Morris Bessemer,	52,275	59,620	23,785	5,000	7,789
Lloyd Bessemer,	3,777	26,809	2,679		
TOTAL BESSEMER,	56,052	86,429	26,464	5,000	7,789
Morris Ore,	5,433	14,050	13,576	3,613	37,402
Lloyd Ore,	134,928	126,753	155,166	121,198	111,922
Lloyddale Ore,	31,786	19,280	60,087	27,699	11,438
TOTAL NON BESSEMER,	172,050	160,083	228,829	152,510	160,762
Morrisville,	389	10,930	11,878	8,506	256
North Lake Silica,	111,107	45,813	48,369	24,541	31,581
TOTAL SILICA,	111,496	56,743	60,247	33,047	31,837
GRAND TOTAL,	339,598	303,255	315,540	190,557	200,388

Of the total shipments for 1920, 64,725 tons were shipped from stockpile and 135,663 tons from pockets.

ORE IN STOCK

We are carrying the largest stockpile balances at the close of this year than for any year in the history of the property.

It will be noticed that we have an unusually large tonnage of Silica ore on hand as very little was shipped from stockpile during the past year. We hope these piles will be moved during the coming year.

Our balances as of December 31st are as follows, - Viz:

BALANCES IN STOCKPILES DECEMBER 31ST, 1920.

	BESSEMER	MORRIS	SILICA	LLOYD	LLOYDDALE	TOTAL
Morris,		26,917	52,514			79,431
Lloyd,			39,077	33,840	73,821	146,738
TOTAL, 1920		26,917	91,591	33,840	73,821	226,169
" 1919	10,414	31,975	60,052	22,085	40,259	164,785
" 1918	2,669	10,571	14,203	21,992	23,424	72,859
" 1917	7,261	3,769	32,903	31,006	23,960	98,899
" 1916	61,251	333	37,077	3,866	15,526	118,152

MORRIS LLOYD MINE.

COSTS OF PRODUCTION

Our Cost of Production shows an increase over last year which is due in part, to a higher wage level and also to development work on Chase Leases where the costs are high due to the small ore bodies.

The following table shows -

PRODUCT MONTHLY, PER MAN PER DAY AND COSTS, FOR EACH MONTH DURING THE PAST YEAR, WITH COMPARISONS FOR PREVIOUS YEARS, AS PER FIGURES TAKEN FROM COST SHEETS.

1920	PRODUCT	TONS PER MAN	TOTAL COST OF PRODUCTION			COST PER TON		
	TONS	PER DAY	LABOR	SUPPLIES	TOTAL	LABOR	SUPP.	TOTAL
JAN.	25,371	3.42	40,287.97	15,522.90	55,810.87	1.588	.612	2.200
FEB.	21,963	3.40	38,524.84	16,343.60	54,868.44	1.754	.744	2.498
MAR.	24,500	3.61	40,870.72	16,465.25	57,335.97	1.668	.672	2.340
APR.	17,849	3.22	32,450.96	16,820.94	49,271.90	1.818	.942	2.760
MAY.	19,036	3.34	33,572.70	13,856.80	47,429.50	1.764	.727	2.491
JUN.	20,474	3.48	35,820.22	13,774.22	49,594.44	1.750	.672	2.422
JUL.	20,362	3.30	38,006.10	15,230.73	53,236.83	1.866	.748	2.614
AUG.	21,812	3.73	36,879.24	16,169.36	53,048.60	1.692	.740	2.432
SEP.	22,066	3.71	36,918.82	14,817.00	51,735.82	1.673	.671	2.344
OCT.	24,484	3.90	41,958.82	16,823.64	58,782.46	1.713	.687	2.400
NOV.	19,741	3.31	37,253.44	14,826.38	52,079.82	1.887	.751	2.638
DEC.	24,440	3.30	45,702.13	21,513.47	67,215.60	1.870	.880	2.750
ADJUSTMENT	326							
TOTAL-1920	261,772	3.48	458,245.96	192,164.29	650,410.25	1.751	.734	2.485
TOTAL-1919	282,483	3.57	438,614.70	173,261.44	611,876.14	1.553	.613	2.166
TOTAL-1918	289,500	4.04	358,003.72	174,378.33	532,382.05	1.237	.602	1.839
TOTAL-1917	284,000	*1-3.48	297,870.77	125,041.62	422,912.39	1.113	.467	1.580
TOTAL-1916	307,685	*2-3.18	257,025.03	139,995.37	397,020.40	.911	.501	1.412
TOTAL-1915	221,585	2.76	178,145.41	97,464.12	275,609.53	.804	.440	1.244
TOTAL-1914	192,145	2.53	193,822.98	103,064.08	296,887.06	1.010	.535	1.545

*1 - 1917 Cost of Production and tons per man per day does not include 16,213 tons mined from open pit by Steam Shovel method.

*2 - 1916 Cost of Production and tons per man per day does not include 25,852 tons taken from open pit by Steam Shovel method.

MORRIS LLOYD MINE.

ESTIMATE OF PRODUCTION

Our Estimate of Production for the coming year, based on our present force is :-

300 days at 1150 tons per day 345,000 tons

The following statement shows the result of development and production during the past and previous years, Viz:

Estimated Ore	1913	1914	1915	1916	1917
In mine Jan. 1st, Tons	2,861,000	3,218,750	3,089,200	2,081,600	2,575,577
Product, "	176,080	192,145	221,585	307,685	284,000
Balance, "	2,684,920	3,026,625	2,867,615	1,773,915	2,291,577
In mine Dec.31st, "	*3,218,750	3,089,200	2,081,600	2,575,577	2,267,116
Developed Fiscal Year"	533,830	62,575	** 786,015	801,662	** 24,461

Estimated Ore	1918	1919	1920
In mine Jan. 1st, Tons	2,267,116	2,185,771	2,189,763
Product, "	289,500	282,483	261,772
Balance, "	1,977,616	1,903,288	1,927,991
In mine Dec.31st, "	2,185,771	2,189,763	2,260,449
Developed Fiscal Year"	208,155	286,475	332,458

** Shows a loss.
* 700,750 tons estimated for Morris Mine.
** Section 6 ore body reduced 603,200 tons.

MINE BUILDINGS

All of our mine buildings are in good repair. During the past year the interior of our laboratory building was ceiled with wood in place of plaster and a wainscoting added.

We also installed a new hot water heater in our Morris change house.

DWELLINGS

The fences were placed and the streets graded around the twelve double houses which were completed last year.

A great many of our older houses will require painting very soon and considerable repairs will be necessary to sills and underpinning as they are rapidly decaying.

We have five vacant dwellings at the close of the year compared with eight at the end of last year.

MORRIS LLOYD MINE.

STORE BUILDING

This business building has been occupied all the year by Mr. J. B. Casper who has been in it ever since it was erected in January 1918.

Owing to the fall in prices during the past few months it is doubtful if our tenant has made any profit during the current year.

WELFARE WORK

We continue the practice of giving prizes for Best Kept Premises etc. etc.

A great many of our people make every effort to keep their places neat and clean. We furnished land, in addition to the lots around the houses, for our men to plant potatoes and other vegetables.

The Club House has been open all the year and is freely used by our people. Moving pictures are shown on Mondays, Wednesdays and Saturdays of each week. Bowling, Basket Ball etc. are indulged in during the winter months and Base Ball is also played during the summer. A Base Ball ground was cleared and fitted up this past year.

During the past twelve months a total of 21,768 paid admissions were taken in for moving pictures at this Club House as compared with 23,822 last year.

It has been difficult to find the proper man for manager of this Club House and we have had to make frequent changes.

DOCKS, TRESTLES AND POCKETS

During the year the rock trestle at the Morris mine was extended 120 feet. Only the regular upkeep and repairs to permanent trestles have been necessary and no new construction was done on this work during the year. The cost of maintenance is less than last year.

On account of the small shipments from stockpile this past season we found it necessary to add additional stocking trestles to care for the winters production. These have all been erected and are in use.

MORRIS LLOYD MINE.

TOP TRAM ENGINES AND CARS

We have rebuilt two of our top tram cars, for use in stocking ore, during the year, but outside of these the expense was for regular repairs renewal of haulage ropes etc. and the total maintenance will be found to be much lower than last year.

TRACKS AND YARDS

No new work has been done here during the year and only the regular work of ditching, clearing snow etc. has been underway.

HOISTING MACHINERY

We have had some heavy repairs to our hoists during this year. Two new gears and pinions were placed and new signal cables were put in all three shafts.

One 1950 foot hoisting rope was put on the skip hoist at the Morris shaft.

PUMPS

The maintenance charges on our mine pumps have been exceptionally heavy during the past year. The two 1000 gallon main pumps on the fourth level have been changed and partially rebuilt. The gear ends were spread a-part and gears enclosed in an oil tight box and now operate in an oil bath.

A new pumping plant consisting of a 500 gallon Aldrich Pump and a 500 gallon Centrifugal Pump have been received for the new 7th level and will be installed during the next few months. The pump house has been cut and the excavating of the sump is now underway. This plant will care for all water being made below the 4th level and will elevate the water to the main pumping station on the 4th level.

MINE VENTILATION

The only place in the mine where forced ventilation is necessary is in the long drift going west across the Chase Leases on the 6th level of the Morris mine. The balance of the workings are kept very clear with natural ventilation.

MORRIS LLOYD MINE.

ELECTRIC TRAM PLANT

We have added one new six ton electric locomotive on the 7th level of the Morris shaft during the year. This gives us six locomotives now in work. The maintenance of these locomotives is very heavy on account of our long trams, some of our tramming lengths being up to 1¼ miles long.

We are using 65 cu. foot saddle back tram cars and these require constant repairs, renewals of wheels, bearings, etc. etc. The expense of cleaning and maintaining tracks is also a heavy charge to this department.

CRUSHING PLANT

The crusher at the Lloyd shaft has been operated all the year and very little expense for repairs has been necessary.

During the year we crushed 95,392 tons at this plant.

WATER SUPPLY

We continue to take our water supply from the small creek which empties into the carp river west of the Morris mine. Only the regular attendance and repairs to pump have been necessary here during the year.

MINE TIMBER AND LAGGING

We have had a sufficient supply of this material during the year but at greatly increased prices.

The timber we own on the surface of the Chase Leases is now being logged for us by a jobber, Edward Lafave, and we expect to get a good part of our lagging and some mine timber from here during the winter. We will also ship some spruce and balsam pulpwood from this land at a good margin over the price we paid for the stumpage.

PERSONAL INJURIES

We are glad to again be able to report that during the year we have had no fatal accidents. We had but one serious accident, and this occurred on March 12th when Toivo Rintala was caught between a motor car and the drift timber in Contract No. 29 on the main 6th level of the Morris mine and suffered a broken pelvis. He was laid up for the balance of the year but is now nearly ready to go back to work.

MORRIS LLOYD MINE.

ACCIDENTS TO EQUIPMENT

We have had few accidents to equipment which have entailed loss of time during the year. We have had a number of breakages to our Nordberg Compressor. On February 27th the main bearing on this machine burnt out and ten and one-half hours were taken to put in a new bearing.

On April 26th our motor generator set burnt out and twenty-three hours were necessary to get in another machine and get operating again.

STEAM SHOVEL LOADING

The movement of ore from stock was small during the year, only 64,725 tons were loaded at a cost of .082 per ton.

Small quantities of ore would be loaded at a time and frequent movement of the shovel from pile to pile for small tonnages accounts for the heavy cost per ton.

ROCK DRIFTING

We drifted a total of 3062 feet in rock during the year as compared with 3043 feet last year.

At the close of the year we are driving the main 6th level Morris mine west across Chase Lease No. 26 and are also driving the cross-cut on the 7th level south towards the ore measures.

MINE DAMS

A concrete dam has been built in the long rock drift going west across the Chase Leases. This drift is out under the south side of North Lake and in case we encounter more water than our pump can handle we will need this dam to shut off this territory.

MORRIS LLOYD MINE.

TAXES

The valuation assessed against the Morris mine was approximately, $100,000.00 larger than for 1919. The assessed valuation of the Lloyd and Section Six was the same as last year.

The amount of taxes raised is the largest this year than for any year since these mines have been operating. These are shown on the following statement together with the cost per ton on ore produced and shipped during the present year and the past three years for comparison, - Viz:

	1917		1918		1919		1920	
	VALUATION	AMOUNT	VALUATION	AMOUNT	VALUATION	AMOUNT	VALUATION	AMOUNT
LLOYD MINE.								
Realty	328613.00	9697.01	1139776.00	25032.19	1051450.00	28269.98	877064.00	29882.69
Personal	289291.00	8379.87	291639.00	6406.04	250524.00	6760.60	424884.00	14425.56
Section 6								
TOTAL LLOYD	617904.00	18076.88	1431415.00	31438.23	1301974.00	35030.58	1301948.00	44308.25
MORRIS MINE								
Realty	190810.00	3108.54	327361.00	6146.86	287540.00	6736.32	223590.00	5667.30
Personal	229021.00	3731.05	119322.00	2240.02	118321.00	2777.50	276410.00	6999.24
TOTAL MORRIS	419831.00	6839.59	446683.00	8386.88	405861.00	9513.82	500000.00	12666.54
GRAND TOTAL,	1037735.00	24916.47	1878098.00	39825.11	1707835.00	44544.40	1801948.00	56974.79
PRODUCT TONS		284,000		289,500		282,483		261,772
TAXES PER TON PRODUCED		.0877		.1376		.1577		.2177
SHPMTS TONS		303,253		315,540		190,557		200,388
TAXES PER TON SHIPPED		.0822		.1262		.2338		.2845

UNDERGROUND
MORRIS MINE

THIRD LEVEL:

The mine timber, supplies etc. are taken in on this level and dropped down to the workings underneath this elevation. All of the ore on and above this level has been mined.

FOURTH LEVEL:

Work has been underway all the year in both the east and west ore lenses above this level. We have now worked the east lens down to the 830' sub where we find it has widened to some extent which gives us more tonnage than at first figured.

The west lens has been worked down to where it has narrowed up to a small area. This ore body has now been developed by a shrinkage stope from the main level and is being worked in that way at the close of the year.

SIXTH LEVEL:

Considerable development work has been done on this level during the year. The rock drift west has been pushed across Chase Leases 24 and 25 and is now 445 feet west of the east line of Lease No. 26. Three small ore bodies have been located from this rock drift - one on Lease No. 24, one on Lease No. 25 and one on Lease No. 26.

On lease No. 24 we drifted to develop the ore shown in Diamond Drill Holes Nos. 57, 58 and 59 but this ore did not prove to be of any size, we, therefore, drifted southwest and found a nice lens of ore which is about 30 feet wide and a raise is now up in same a distance of 40 feet - all good ore. This is being followed.

On Lease No. 25 we crosscutted to the ore shown in Diamond Drill Hole No. 62 and find it to be about 15 feet wide on this elevation and eighty feet long. We have followed this up a distance of 150 feet with a raise and find the ore body widening slowly as we go up. This is looking very good at the end of the year.

UNDERGROUND
MORRIS MINE

SIXTH LEVEL:
CONTINUED

We have also encountered a small body of ore in this main level on Lease No. 26. The drift was turned south to follow this lead of ore and it was found to be but a small one and has now cut out to the west. A raise will be started to ascertain if the ore makes up.

The main level is now going ahead and is in jasper at the close of the year.

We continue slicing and caving in the small ore body on Lease No. 24 near Diamond Drill Hole No. 96 and a fair product is being secured.

Four contracts are at work in the ore underneath the hanging on Chase Lease No. 9. This main ore body runs through to the fourth level but as it is being worked down from above that level not much can be done at this lower elevation but we have set a limit of mining and have these contracts at work to the west of this line in order to increase production of lease ore.

A drift was driven southwest on line of Diamond Drill Hole No. 56 during the year and some ore shown up, but not nearly as large an area as we had supposed would be encountered. We have followed this ore east and west and have a raise going up in same to cut the ore body shown on the 5th level elevation above.

SEVENTH LEVEL:

At the close of last year the Morris shaft had been brought to this elevation. During the year the plat and pocket have been cut and the pocket installed. The counter-weight pipe placed in the shaft and the skips and cage sent to this level.

The cross-cut south to the ore measures is now being driven.

UNDERGROUND
MORRIS MINE
(CONTINUED)

PUMP HOUSE AND SUMP

The pump house on the 7th level has been cut and is now ready to receive the pumping machinery.

This machinery is on hand and will be installed.

The large sump for water storage is now being excavated and will be completed by the time the pumps are ready to operate.

DIAMOND DRILLING

Horizontal Hole No. 62 was drilled south from the main rock drift on the sixth level Morris mine on Lease No. 25 and encountered fifteen feet of ore thirty feet from the collar of the hole. This ore is now being developed. The hole was continued and bottomed at 335 feet without finding additional ore.

Hole No. 63 was drilled south horizontally from the same sixth level, 380 feet west of Hole No. 62, on Lease No. 25, but no ore was found.

Hole No. 64 is now being drilled to test the territory on the third level between the Lloyd and Section Six shafts.

LLOYD MINE

THIRD LEVEL:

The work of slicing in this central ore body has gone on all the year and 69,032 tons have been taken from this territory.

The ore body here is dry and no difficulty has been experienced in keeping men at work in the contracts in this part of the mine.

No new ore has been developed in this area during the year and our estimate of ore in sight for this territory is necessarily smaller than last year.

FOURTH LEVEL:

Nothing has been done on this elevation during the past year.

MORRIS LLOYD MINE.

SECTION SIX
(LLOYD EAST)

FIRST SUB (1455')

The area underneath the open pit has been worked down below this elevation but the contracts underneath the hanging to the west are still above this main sub level. We find the ore continuing west on the level and also up to the sand on the west end.

All of the ore on and above this main sub is being trammed to the main raises No. 51, 52 and 53, but No. 17 is now bringing up a raise from the main third level which will permit us to take part of the product through it and save the long tram. It will also permit us to set a limit of mining and work more contracts on the east end of this sub towards the line of main raises.

A cross-cut has been driven south from the shaft to hole to this main sub coming west in order to shorten the distance necessary to reach the workings with men, timber and other supplies.

We have increased our estimate of ore reserves on and above this level as compared with last year.

SECOND SUB (1305')

This sub has been extended and holed into raise No. 17 coming up from the main level.

Ore is also being mined in the open stope on the west end of this level. No. 12 holed into this tope from the 1st level and this entry is being used for men and supplies.

FOURTH SUB:

Very little work has been done in this area during the year. One contract has been at work taking the ore remaining underneath old workings. No. 42 contract worked their ore body down to the main level and nothing remains there.

* * *

Our largest tonnage was mined from this Section Six territory during the year and a total of 113,694 tons were produced. Our largest ore bodies are in this part of the mine and a good product is assured from here for years to come.

MORRIS LLOYD MINE.

ORE IN SIGHT DECEMBER 31st, 1920

Following is an estimate of ore in sight as of December 31st, 1920, calculating a deduction of 20% for rock and loss in mining, - Viz:

MORRIS MINE

LOCATION OF ORE	MORRIS ORE	TOTAL TONS	
Above 4th Lev. (Chase Lease #9)	62,493	62,493	
" " " (C.C.I.Co. Land)	119,666	119,666	
" 6th " (Chase Lease #9)	213,592	213,592	
" " " (Chase Lease #24)	9,043	9,043	289,462
" " " (Chase Lease #25)	3,334	3,334	
" " " (C.C.I.Co. Land)	105,938	105,938	
PROSPECTIVE ORE			
Above 4th Lev. (C.C.I.Co. Land)	2,083	2,083	
Below 6th Lev. (Chase Lease #9)	30,501	30,501	90,072
" " " (Chase Lease No.24)	59,016	59,016	
" " " (Chase Lease #25)	555	555	
" " " (C.C.I.Co. Land)	101,068	101,068	
TOTAL ORE, MORRIS MINE.	707,289	707,289	

LLOYD MINE

LOCATION OF ORE	LLOYD ORE	LLOYDDALE	TOTAL TONS	
Above 3rd Level,	96,161	77,457	173,618	
PROSPECTIVE ORE				
Below 3rd Level,		6,111	6,111	
TOTAL ORE, LLOYD MINE.	96,161	83,568	179,729	

ORE IN SIGHT DECEMBER 31st, 1920
(CONTINUED)

LLOYD EAST

LOCATION OF ORE	LLOYD ORE	LLOYDDALE	TOTAL TONS
Above 1455' Sub Level	24,103	8,033	32,136
" 1305' " "		273,094	273,094
" 1155' " "	43,263	209,788	253,051
" 1055' " "	10,755	92,630	103,385
" 3rd Level	28,694	119,331	148,025
" 4th "	111,486	329,354	440,840
PROSPECTIVE ORE			
Above 1455' Sub Level	903	2,708	3,611
" 1305' " "	903	2,708	3,611
" 1155' " "	1,032	1,032	2,064
" 1055' " "	1,500	3,500	5,000
" 4th Level	2,335	5,445	7,780
Below 4th "		100,834	100,834
TOTAL LLOYD EAST,	224,974	1,148,457	1,373,431

SUMMARY OF TOTAL ORE

MINE	LLOYD & MORRIS	LLOYDDALE	TOTAL TONS
Morris,	707,289		707,289
Lloyd,	96,161	83,568	179,729
Lloyd East,	224,974	1,148,457	1,373,431
GRAND TOTAL	1,028,424	1,232,025	2,260,449

	MORRIS MINE	LLOYD MINE			GRAND
	MORRIS ORE	LLOYD ORE	LLOYDDALE	TOTAL LLOYD MINE	TOTAL TONS
Total ore developed	514,066	314,462	1,109,687	1,424,149	1,938,215
" Prospective ore	193,223	6,673	122,338	129,011	322,234
TOTAL,	707,289	321,135	1,232,025	1,553,160	2,260,449

Total ore on Chase Lease No. 9	306,586	Tons
" " " " " No.24	68,059	"
" " " " " No.25	3,889	"
Total ore on all Chase Leases	378,534	"
Total ore on Company Lands,	1,881,915	"
GRAND TOTAL,	2,260,449	Tons

NORTH LAKE DISTRICT

TONNAGES MINED AND TONNAGES ACCRUED ON LEASES.

The following statement shows the condition of our Royalties on the different leases now in force in the North Lake District, - Viz:

	LEASE NO. 9			LEASE NO. 24			LEASE NO. 25		
YEAR	ACCRUED	MINED	BALANCE	ACCRUED	MINED	BALANCE	ACCRUED	MINED	BALANCE
1908	2,283								
1909	10,000			1,088			1,088		
1910	10,000			15,000			15,000		
1911	10,000			15,000			15,000		
1912	10,000	968		15,000			15,000		
1913	10,000	15,345		15,000			15,000		
1914	10,000	36,267		15,000			15,000		
1915	10,000	67,740		15,000			15,000		
1916	10,000	68,524		15,000			15,000		
1917	10,000	34,514		15,000	2,569		15,000		
1918	10,000	24,002	145,077	15,000	288	133,231	15,000		136,088
1919	10,000	32,176	167,253	15,000	4,465	143,766	15,000		151,088
1920	10,000	32,907	190,160	15,000	18,707	140,059	15,000	1,481	164,607

	LEASE NO. 26			LEASE NO. 27			LEASE NO. 28		
YEAR	ACCRUED	MINED	BALANCE	ACCRUED	MINED	BALANCE	ACCRUED	MINED	BALANCE
1909	1,088			1,088			545		
1910	15,000			15,000			7,500		
1911	15,000			15,000			7,500		
1912	15,000			15,000			7,500		
1913	15,000			15,000			7,500		
1914	15,000			15,000			7,500		
1915	15,000			3,750			1,875		
1916	15,000			3,750			1,875		
1917	15,000			15,000			7,500		
1918	7,500		128,588	7,500		106,088	3,750		53,045
1919	13,125		141,713	13,125		119,213	6,563		59,608
1920	15,000	1,292	155,421	15,000		134,213	7,500		67,108

	LEASE NO. 31			GRAND TOTAL		
YEAR	ACCRUED	MINED	BALANCE	ACCRUED	MINED	BALANCE
1909	70,000					
1910						
1911	70,000					
1912	70,000					
1913	70,000					
1914	70,000					
1915	17,500					
1916	17,500					
1917	70,000					
1918	35,000		420,000	1,082,180	250,217	831,963
1919	70,000		490,000	1,224,993	286,858	938,135
1920	70,000		560,000	1,372,493	341,245	1,031,248

TONNAGES MINED AND TONNAGES ACCRUED ON LEASES (CONTINUED)

It will be noted that our total yearly minimums from Chase-Moore Leases is 77,500 tons. During the past year we mined 54,387 tons. This very nearly takes care of the minimums on Chase Leases on which we have openings. During the coming year we estimate we can mine a sufficient tonnage to care for all the Chase Leases and have something to apply on accrued tonnage.

The yearly minimum on the Barnes-Hecker Lease No. 31 is 70,000. No ore has been mined from this lease during the year. On account of water difficulties it is difficult to say at this writing just how much ore will be mined from this lease during the coming year.

As of December 31st, 1920 back Royalties have accrued on 560,000 tons on Barnes-Hecker Lease No. 31 and 471,248 tons on the Chase Leases which makes a total of 1,031,248 tons.

BARNES HECKER MINE.

MINE BUILDINGS

These buildings being new, are all in good condition. During the year we painted the floor and interior of the engine house.

COAL DOCK

A coal dock was constructed in the tail track of the L. S. & I. Railway which permits us to dump our coal without shoveling.

RAILWAY TRACKS

During the summer the L. S. & I. Railway completed their tracks to serve this property and they are now ready to handle the production from this mine.

STOCKING TRESTLES

Rock from our drifts underground was dumped on the stockpile area underneath the permanent "one leg" trestle erected last year and this was spread with our small revolving shovel during the summer months at a cost of $2100.00 or approximately 3¼ cents per square foot. This is a large saving over plank which is generally used for this work. After the rock had been spread the area was rolled with a ten ton roller. This ground is now ready to receive ore. The ore can be loaded out with shovel without dismantling the trestle.

DRIFTING

Drifting has been underway on all three levels.

FIRST LEVEL:

This opening has reached a distance of 1629 feet from the shaft and is now in the ore formation. Rich jasper has been encountered and we hope to find ore on this level very soon.

Two horizontal Diamond Drill Holes were put in from this drift. Drilling was slow and expensive due to the broken up character of the ground and the large amount of water encountered. A pressure of 250# was noted on Drill Hole No. 1.

DRIFTING
(CONTINUED)

SECOND LEVEL:

This level is in a distance of 1856 feet from the shaft. On September 9th, just as we apparantly hit the ore contact a tremendous flow of water was encountered and we were compelled to dam off this level as no progress could be made. No work has been done since on this elevation.

THIRD LEVEL:

This opening is in a total of 2038 feet from the shaft and some ore has shown up on one side of the drift. We have encountered a heavy flow of water on this level also and slow progress is being made at this writing. We are nearing the point at which we should encounter the ore as shown by Diamond Drilling.

* * * *

During the first few months of the year remarkable progress was made in drifting. During January month the second level was driven a total of 511 feet and during March month the first level was driven a distance of 539 feet. This could not be kept up as most of our best men left us and it has been difficult to keep good men at this work ever since, especially since we struck the heavy flows of water on each level.

MINE DAMS

We have placed concrete mine dams in all three drifts to be in position to shut off the water in case of accidents to our pumps.

PUMPS

During the early part of the year the excavation for pump house and sump on the bottom level were completed. The sump has a capacity of 350,000 gallons. The pump house opening has been shut off with a concrete dam provided with a seven foot "Boiler Head" with man hole opening and a raise has been put up from the pump house to the second level to provide a traveling way in and out of the pump house. This permits us to shut off our pump house completely on the 3rd level and protects our pumps to the extent of flooding our 3rd level.

PUMPS
(CONTINUED)

A 1000 G. P. M. plunger and a 1000 G. P. M. centrifugal pump have been installed in the pump house on the bottom level. After striking the large flow of water another 1000 G. P. M. centrifugal pump was placed on the second level.

The sump underneath the pump house is provided with a clean cut raise and all sediment carried in with the water will be taken out through this raise with but little expense.

ACCIDENTS

We are glad to be able to report that we have gone through the year without any fatal or serious accidents at this property.

GENERAL

The water problem at this property is proving a serious one. Heavy flows are encountered on all three levels. One level is idle due to the damming off of the water and very slow progress is being made onthe other two levels.

We are planning a diversion ditch to carry the water we are pumping, together with the natural drainage in this territory, around the North Lake Basin into Carp River and it is possible we may have to unwater the lake before much work of mining can be done.

ANALYSIS OF COST SHEETS, EXPLAINING INCREASE OR DECREASE IN VARIOUS ACCOUNTS BETWEEN YEARS 1920 - 1919.

GENERAL EXPENSE

Insurance, Acct. 26,	Year 1920,	$ 203.24	Cost per Ton	.001
	Year 1919,	1403.65	" " "	.005
	Decrease 1920,	1200.41	" " "	.004

The high cost for 1919 was due to risk insurance paid during the year - the cost this year covering the regular fire insurance.

Engineering, Acct. 27,	Year 1920,	$2967.41	Cost per Ton	.011
	Year 1919,	1999.62	" " "	.007
	Increase 1920,	$ 967.79	" " "	.004

The increase in this account is due to increase in salaries and additional engineering in opening new level at the Morris shaft.

Analysis, Acct. 28,	Year 1920,	$8566.31	Cost per Ton	.033
	Year 1919,	7606.52	" " "	.027
	Increase 1920,	$ 959.79	" " "	.006

The increase in this account is due to increase in wages and increased number of determinations. In 1920 there were 34022 determinations as compared with 31560 in 1919.

Personal Injuries, Acct. 30,	Year 1920,	$8418.96	Cost per Ton	.032
	Year 1919,	6386.46	" " "	.023
	Increase 1920,	$2032.50	" " "	.009

The increase in this account is due to the loss on the Ishpeming Hospital being larger in 1920 than in 1919.

Mine Office, Acct. a&b,	Year 1920,	$22754.62	Cost per Ton	.087
	Year 1919,	15994.87	" " "	.056
	Increase 1920,	$ 6759.85	" " "	.031

The increase in this account is due to the increase in wages in 1920.

MAINTENANCE

Tracks & Yards, Acct. 125,	Year 1920,	$2131.88	Cost per Ton	.008
	Year 1919,	2783.19	" " "	.010
	Decrease 1920,	$ 651.31	" " "	.002

During 1919 the course of the Carp River was changed; the cost this year representing only the usual cleaning and maintaining of the mine grounds etc.

MAINTENANCE
(CONTINUED)

Docks, Trestles and Pockets,
Acct. 126,

Year 1920,	$ 886.25	Cost per Ton	.003
Year 1919,	1320.57	" " "	.005
Decrease 1920,	$ 434.32	" " "	.002

During 1919 more work was necessary on Rock trestles which accounts for the decrease between the two years. The cost this year being only for regular maintenance repairs to permanent trestles and the addition of two bents to the Morris rock trestle.

Buildings,
Acct. 127,

Year 1920,	$1276.82	Cost per Ton	.005
Year 1919,	512.57	" " "	.002
Increase 1920,	$ 764.25	" " "	.003

This increase is due to putting in new hot water tank in main change house and enclosing Lloyd and Morris shaft houses at collar of shaft.

Shop Machinery,
Acct. 128,

Year 1920,	$1435.93	Cost per Ton	.006
Year 1919,	2217.84	" " "	.008
Decrease 1920,	$ 781.91	" " "	.002

A new pipe machine installed in shop in 1919 accounts for the decrease in this account. Two 2 tons and 2 - 3 ton chain blocks and four 10 ton jacks were purchased will account for the cost this year.

Boiler Plant,
Acct. 129,

Year 1920,	$ 317.05	Cost per Ton	.001
Year 1919,	277.31	" " "	.001
Increase 1920,	$ 39.74	" " "	.000

No material increase or decrease appears in this account, the cost being about the normal upkeep of the heating systems.

Hoisting Machinery,
Acct. 130,

Year 1920,	$8165.15	Cost per Ton	.031
Year 1919,	6326.02	" " "	.022
Increase 1920,	$1839.13	" " "	.009

The increase in this account is due to installing new signal cables in the Morris shaft and two new pinions on hoists.

Compressors & Power Drills,
Acct. 131,

Year 1920,	$2180.48	Cost per Ton	.008
Year 1919,	2348.06	" " "	.008
Decrease 1920,	$ 157.58	" " "	.000

During 1920 - 3 - #248 Leyner drill machines were purchased and the bearings on the Nordberg compressor were burned out and had to be renewed. This accounts for the cost being nearly as large as 1919.

MAINTENANCE
(CONTINUED)

Pumping Machinery,
Acct. 132,

Year 1920,	$8575.14	Cost per Ton	.033
Year 1919,	2189.94	" " "	.008
Increase 1920,	$6385.20	" " "	.025

During this year both of the large Prescott pumps in the Morris shaft were practically rebuilt. New oil guards were placed around the gears of both pumps. These will account for the major portion of the increase.

Top Tram Eng.
and Cars,
Acct. 133,

Year 1920,	$3009.94	Cost per Ton	.012
Year 1919,	4335.03	" " "	.015
Decrease 1920,	$1325.09	" " "	.003

A 50 HP motor charged in 1919 accounts for the increase that year over this. The regular maintenance of equipment being about the same as last year.

Skips and
Skip Roads,
Acct. 134,

Year 1920,	$1034.97	Cost per Ton	.004
Year 1919,	1710.61	" " "	.006
Decrease 1920,	$ 675.64	" " "	.002

The general maintenance of this equipment was less this year than last.

Undg. Tracks
and Cars,
Acct. 135,

Year 1920,	$2047.22	Cost per Ton	.008
Year 1919,	2132.30	" " "	.007
Decrease 1920,	$ 85.08	" Increase	.001

No appreciable decrease was made in this account this year, the cost of upkeep being about the same as last year.

Electric Tram Plant,
Acct. 136,

Year 1920,	$24959.45	Cost per Ton	.095
Year 1919,	16134.10	" " "	.057
Increase 1920,	$ 8825.35	" " "	.038

The increase in this account is due to extension of tracks on the 6th level Morris shaft, cleaning tracks, and repairing the tram cars. Increase in wages also takes care of a large part of this increase. There were also heavy repairs to Undg. Locomotives and one man has been added to the repair gang in order to keep this plant in shape.

Tel. & Safety
Devices,
Acct. 137,

Year 1920,	$1195.13	Cost per Ton	.005
Year 1919,	757.83	" " "	.003
Increase 1920,	$ 437.30	" " "	.002

The purchase of new telephones and installing same together with the increase in wages accounts for this increase.

MAINTENANCE
(CONTINUED)

Crushing & Screening,
Acct. 138,

Year 1920,	$ 539.24	Cost per Ton	.002
Year 1919,	0	" " "	0

This account was carried under "Loading and Shipping" Acct. 183 in 1919. The cost this year is only for ordinary repairs to the crushing machinery.

MINING EXPENSE

Air Pipes,
Acct. 150,

Year 1920,	$3971.54	Cost per Ton	.015
Year 1919,	3858.87	" " "	.014
Increase 1920,	$ 112.67	" " "	.001

The increase in wages will account for the increase in this account, the work of extending and maintaining the air pipes in the mine being about the same as last year.

Compressors,
Acct. 151,

Year 1920,	$30143.62	Cost per Ton	.115
Year 1919,	26338.80	" " "	.093
Increase 1920,	$ 3804.82	" " "	.022

Increase in wage rate and additional air consumption due to increased development in both rock and ore accounts for this increase.

Hoisting,
Acct. 152,

Year 1920,	$24036.55	Cost per Ton	.092
Year 1919,	22953.74	" " "	.081
Increase 1920,	$ 1082.81	" " "	.011

Increase in wage rate accounts for this increase.

Pumping,
Acct. 153,

Year 1920,	$20546.42	Cost per Ton	.078
Year 1919,	21121.06	" " "	.075
Decrease 1920,	$ 574.54	"Increase"	.003

This year there is a decrease of 56 gallons of water per minute in the amount of water pumped. This more than offsets the wage increase during the year and will account for the decrease.

Shaft Repairs,
Acct. 154-b,

Year 1920,	$ 3869.77		
Year 1919,	29261.92	Cost per Ton	.104

The cost this year represents only repairs to shaft, sinking the Morris shaft being in progress in 1919 accounting for the heavy charges for that year.

MINING EXPENSE
(CONTINUED)

Rock Drifting,
Acct. 155,

Year 1920,	$24208.92	Cost per Ton	.092
Year 1919,	16953.77	" " "	.060
Increase 1920,	$ 7255.15	" " "	.032

Increase in both wages and number of feet of rock development will account for this increase.

Breaking Ore,
Acct. 156,

Year 1920,	$235493.29	Cost per Ton	.90
Year 1919,	228267.10	" " "	.808
Increase 1920,	$ 7226.19	" " "	.092

Increase in wages will account for this increase.
Our breaking ore cost is high due to the large amount of development work we have been doing following small lenses of ore.

Tramming,
Acct. 157,

Year 1920,	$65943.43	Cost per Ton	.252
Year 1919,	59607.93	" " "	.211
Increase 1920,	$ 6335.50	" " "	.041

Increase in wages will account for this increase.

Timbering,
Acct. 159,

Year 1920,	$89135.08	Cost per Ton	.341
Year 1919,	81988.32	" " "	.29
Increase 1920,	$ 7146.76	" " "	.051

Increase in this account is due to the increase in wages together with the increased cost of timber. We are under heavy expense repairing the long raises in Section Six territory.

Mine Captains
and Bosses,
Acct. 160,

Year 1920,	$22241.13	Cost per Ton	.085
Year 1919,	20367.92	" " "	.072
Increase 1920,	$ 1873.21	" " "	.013

Increase in this account is due to the increase in wages.

Dry House,
Acct. 161,

Year 1920,	$10361.38	Cost per Ton	.040
Year 1919,	9999.41	" " "	.036
Increase 1920,	$ 361.97	" " "	.004

Increase in this account is due to the increase in wages.

MINING EXPENSE
(CONTINUED)

Top Landing & Tramming,
Acct. 162,

Year 1920,	$10320.68	Cost per Ton	.039
Year 1919,	10138.87	" " "	.036
Increase 1920,	$ 181.81	" " "	.003

Increase in this account is due to the increase in wages.

Stocking Ore,
Acct. 163,

Year 1920,	$6656.24	Cost per Ton	.025
Year 1919,	1503.14	" " "	.005
Increase 1920,	$5153.10	" " "	.020

Increase in this account is due to additional stocking trestles, replacing old trestles and increase in wages. The north trestle at Lloyd mine was extended to care for ore stocked this season as small shipments were made from stock during last summer.

Crushing & Screening,
Acct. 168,

Year 1920,	$2501.08	Cost per Ton	.010
Year 1919,	0	" " "	0

This account was carried under "Loading and Shipping" Acct. 183 in 1919. The cost is about the same as the previous year plus the increase in wages, and is the regular expense of crushing ore at the mine crusher at the Lloyd mine. During the year we crushed 95392 tons at this plant.

Ventilation,
Acct. 171,

Year 1920,	$ 291.88	Cost per Ton	.001
Year 1919,	0	" " "	0
Increase 1920,	$ 291.88	" " "	.001

There was no charge to this account in 1919, the cost for ventilating the 6th level in Morris mine being carried in Account 177, Extraordinary Drifting. The charge this year is for ventilating in developing the ore body in the extreme west end of the Morris mine.

LLOYD MINE

AVERAGE MINE ANALYSIS ON OUTPUT FOR YEAR 1920.

GRADE	IRON	PHOS.	SILICA
Lloyd,	58.68	.100	6.64
Lloyddale,	58.57	.146	6.15
North Lake Silica,	51.82	.079	16.22

AVERAGE ANALYSIS ON STRAIGHT CARGOES FOR YEAR 1920.

GRADE	IRON	PHOS.	SILICA	
Lloyd,	58.57	.098		(All Boyne City)
Lloyddale,	(All Mixed)			
North Lake Silica,	49.89	.072	19.24	(Boyne City)

ORE STATEMENT - DECEMBER 31ST, 1920.

	LLOYD	LLOYD SILICA	LLOYDDALE	TOTAL	TOTAL LAST YEAR
On hand Jan. 1st, 1920,	22085	32210	40259	94554	49173
Output for year,	105327	32399	45000	182726	218819
Transferred to or from,	431	431			
Total,	127843	64178	85259	277280	267992
Shipments,	94003	25101	11438	130542	173438
Balance on hand,	33840	39077	73821	146738	94554
Decrease in output-17%				36093	
Increase in ore on hand-55%				52184	
1920 - 2-8 Hour Shifts for year					
1919 - 2-8 " " " "					

LLOYD MINE.

LLOYD MINE

SHIPMENTS FOR YEAR 1920.

GRADE	POCKET	STOCKPILE	TOTAL	TOTAL LAST YEAR
Lloyd,	73,144	20,859	94,003	121,198
Lloyd Silica,	20,560	4,521	25,101	24,541
Lloyddale,	10,163	1,275	11,438	27,699
Total,	103,887	26,655	130,542	173,438
Total last year,			173,438	
Decrease - 25%			42,896	

LLOYD MINE.

MORRIS MINE

AVERAGE MINE ANALYSIS ON OUTPUT FOR YEAR 1920.

GRADE	IRON	PHOS.	SILICA
Morris Bessemer,	61.08	.052	5.73
Morris,	58.55	.078	7.76
Morris Silica,	51.36	.078	17.99

AVERAGE ANALYSIS ON STRAIGHT CARGOES FOR YEAR 1920.

GRADE	Mine IRON	Mine PHOS.	Lake Erie IRON	Lake Erie MOIST.
Morris Bessemer,	(All mixed)			
Morris,	59.21	.077	59.52	12.32
Morrisville,	(All mixed)			

ORE STATEMENT - DECEMBER 31ST, 1920.

	MORRIS BESSEMER	MORRIS	MORRISVILLE	TOTAL	TOTAL LAST YR.
On hand Jan. 1st,1920,	10,414	31,975	27,842	70,231	23,686
Output for year,	1,255	46,643	31,474	79,372	63,664
Transferred,	3,554	3,619	65		
Stockpile shortage or overrun,	326				
Total,	7,789	82,237	59,251	149,277	87,350
Shipments,	7,789	55,320	6,737	69,846	17,119
Balance on hand,	0	26,917	52,514	79,431	70,231
Increase in output-25%				15,708	
Increase in ore on hand-14%				9,200	
1920 - 2-8 Hour Shifts for year					
1919,- 2-8 " " " "					

MORRIS MINE.

MORRIS MINE

SHIPMENTS FOR YEAR --- 1920.

GRADE	POCKET	STOCKPILE	TOTAL	TOTAL LAST YEAR
Morris Bessemer,		7,789	7,789	5,000
Morris,	25,039	30,281	55,320	3,613
Morrisville,	6,737		6,737	8,506
Total,	31,776	38,070	69,846	17,119
Total last year,			17,119	
Increase - 308%			52,727	

MORRIS-LLOYD MINE.

COMPARATIVE MINING COST FOR YEAR.

	1920.	1919.	INCREASE.	DECREASE.
PRODUCT	261,772	282,483		20,711
General Expense	.164	.129	.035	
Maintenance	.221	.152	.069	
Mining Expense	2.100	1.885	.215	
Cost of Production	2.485	2.166	.319	
Exploratory	.092	.149		.057
DEPRECIATION.				
Original Purchase	.048	.053		.005
Plant Account	.261	.260	.001	
Total Depreciation	.309	.313		.004
Taxes	.218	.158	.060	
Central Office	.084	.069	.015	
Supply Inventory		.001		.001
Miscallaneous	.022	.014	.008	
Sundry Expense	.034	.007	.027	
Cost on Stockpile	3.244	2.877	.367	
Loading and Shipping	.059	.049	.010	
Total Cost on Cars	3.303	2.926	.377	
No.Days Operating	300	299	1	
No.Shifts and Hours	2-8hr	2-8hr		
Avg. Daily Product	873	945		72
COST OF PRODUCTION.				
Labor	1.751	1.553	.198	
Supplies	.734	.613	.121	
Total	2.485	2.166	.319	

MORRIS-LLOYD MINE

COMPARATIVE WAGES AND PRODUCT

	1920	1919	INCREASE	DECREASE
PRODUCT	261,772	282,883		20,711
No.Shifts and Hours	2-8hr	2-8hr		
AVERAGE NO. MEN WORKING				
Surface	47	48		1
Underground	201	212		11
Total	248	260		12
AVERAGE WAGES PER DAY				
Surface	5.46	5.18	.28-5.4%	
Underground	6.42	6.00	.42-7 %	
Total	6.23	5.84	.39-6.6%	
WAGES PER MONTH OF 25 DAYS				
Surface	136.50	129.50	7.00	
Underground	160.50	150.00	10.50	
Total	155.75	146.00	9.75	
PRODUCT PER MAN PER DAY				
Surface	17.65	18.30		.65
Underground	4.32	4.45		.13
Total	3.47	3.58		.11
LABOR COST PER TON				
Surface	.309	.283	.026	
Underground	1.484	1.349	.135	
Total	1.793	1.632	.161	
AVG. PRODUCT BRK'G & TRM'G	6.91	6.82	.09	
" WAGES CONTRACT MINERS	6.84	6.52	.32	
" " " TRAMMERS				
" " " LABOR	6.84	6.52	.32	
TOTAL NUMBER OF DAYS				
Surface	14,831½	15,439½		608
Underground	60,558¼	63,544¼		2,986
Total	75,389¾	78,983¾		3,594
AMOUNT FOR LABOR				
Surface	90964.63	79955.37	1009.26	
Underground	388517.51	381026.08	7491.43	
Total	469482.14	460981.45	8500.69	

Proportion Surface to Underground Men;

1920 - 1 to 4.4
1919 - 1 to 4.4
1918 - 1 to 4,24
1917 - 1 to 4.57
1916 - 1 to 3.93

MORRIS-LLOYD

TIMBER STATEMENT FOR THE YEAR ENDING DECEMBER 31, 1920.

KIND	LINEAL FEET	AVG. PRICE PER FOOT	AMOUNT 1920	AMOUNT 1919
6" to 8" Timber	60,188	.039	2348.24	2435.88
8 to 10 "	59,213	.092	5441.19	4501.94
10 to 12 "	22,718	.138	3140.71	2062.84
12 to 14 "	2,040	.119	242.40	183.12
Total - 1920	144,159	.078	11172.54	
Total - 1912	151,793	.061		9183.78
	LINEAL FEET	PER 100'		
5' Lagging	321,600	1.163	3742.32	4171.17
8' "	387,560	.899	3471.68	3253.65
Total Lagging	709,160	1.017	7214.00	7424.82
Poles	66,460	1.19	791.03	619.33
Total - 1920	775,620	1.03	8005.03	
Total - 1919	1109,294	.725		8044.15

Product	261,772	282,483
Feet timber per ton of ore	.551	.535
Feet lagging "	2.71	3.75
Feet lagging per foot of timber	4.92	6.98
Cost per ton for timber	.0426	.0325
" lagging	.0276	.0263
" poles	.003	.002
" timber, lagging & poles	.0732	.0608
Equivalent of stull timber in board measure	211,946	214,880
Feet board measure per ton of ore	.81	.76

Total Cost for timber, lagging & poles - 1920	19177.57
1919	17227.93
1918	15676.42
1917	19623.30
1916	20682.74

MORRIS-LLOYD MINE

STATEMENT OF EXPLOSIVES USED FOR BREAKING ORE

KIND	QUANTITY	AVERAGE PRICE	AMOUNT 1920	AMOUNT 1919
40% Powder - - - - - -	137,915	.1688	23,281.12	24,666.79
60% " - - - - - -	10,900	.2152	2,345.26	326.85
Total Powder -	148,815	.1722	25,626.38	24,993.64
Fuse - - - - - - - - -	426,800	9.16	3,911.44	3,372.33
Caps - - - - - - - - -	86,835	14.65	1,271.85	1,192.72
Cap Crimpers - - - - -	24	.45½	10.93	8.30
Tamping Bags - - - - -	30,000	1.89	56.80	41.70
Total Fuse, Etc.-			5,251.02	4,615.05
Total Explosives -			30,877.40	29,608.69
Product - - - - - - -			261,772	282,483
Pounds Powder per ton of Ore			.57	.53
Cost per ton for Powder			.0979	.0885
" " " " Fuse, Caps, Etc.			.0200½	.0163
" " " " All Explosives			.1180	.1048
Avg. Price per Lb. for Powder			.1722	.1669

MORRIS-LLOYD MINE

Mr. M. M. Duncan, Vice-Pres. & Gen. Mgr.,

Ishpeming, Michigan.

Dear Sir:

I beg to submit the following report of the work done in the Gwinn District for the year ending December 31st, 1920.

The various subjects have been taken up under the following heads:

GENERAL REMARKS

AUSTIN MINE

STEPHENSON MINE

PRINCETON MINE

GWINN MINE

JOPLING MINE

FRANCIS MINE

GARDNER AND MACKINAW MINES

GENERAL SURFACE

ANALYSIS OF COST SHEETS

- - - - -

GENERAL REMARKS

The product of the Gwinn District Mines for the years 1920-1919 was as follows:

	1920	1919	INCREASE	DECREASE
Stephenson Mine,	174,782	2,402	172,380	
Princeton Mine,	156,746	193,228		36,482
Gwinn Mine,	96,595	137,847		41,252
Francis Mine,	80,056	80,528		472
Mackinaw Mine,	72,990	50,168	22,822	
Gardner Mine,	57,398	19,158	38,240	
Austin Mine,	0	14,896		14,896
TOTAL,	638,567	498,227		
INCREASE 1920,			140,340	

The Stephenson and Princeton Mines produced 52% of the ore mined in 1920. The product from the Stephenson Mine shows a large increase over 1919. This, however, was to be expected, as the mine was unwatered in November, 1919, and gotten into condition for production by the first of March, 1920.

The Princeton Mine shows a decrease from the previous year due to putting the mine on single shift on March 1st, and reducing the number of men employed underground, to provide men for operating the Stephenson.

The Gwinn also shows a decrease from the previous year, first and mainly to the shortage of labor, and later, for a short time, to the lack of available working places in ore.

The Francis product is practically the same as the previous year, due to the fact that there was not sufficient labor available to permit of increasing the product, until in December.

Both the Gardner and Mackinaw Mines shows increases over the previous year. This increase would have been greater if the property had not closed down on November 30th.

The Austin Mine was not operated during 1919-1920.

During January and February, diamond drilling was done on the Jopling property, but no ore was found. The lease on this property was then surrendered, and after moving the equipment from the property, a dam was installed on the Gwinn Mine property near the boundary line to seal off the Jopling water.

There was a shortage of labor in the Gwinn District until December 1st, when, owing to the closing down the Gardner-Mackinaw Mine, and the curtailing of operations in other districts, the labor supply became abundant. The labor shortage during the year decreased the output and increased the cost of production at all the mines in the district. It also made it necessary to postpone considerable surface work.

On January 1st, 1920, there were 739 men employed in the district; on December 31st, there were 709, the decrease for the year being 30.

The company did not build any houses during 1920 at any of the locations. However, in Gwinn there was one new house erected on a lot which had been sold, and the new store building, which was started in 1919, was completed at a cost in excess of $10,000.00.

There was a comparatively short re-occurrence of the influenza epidemic in February. Fortunately, the malignant form only appeared at one boarding house, where there were two deaths; the balance of cases were milder than in the previous year.

All the company houses in the district were occupied at the end of the year. There is at the present time, however, no housing difficulties, due to the fact that the Gardner and Mackinaw locations are available as homes for the men working at Gwinn and Francis Mines.

During the past year sinking has been completed at the Gwinn and Francis Mines, which finishes the greater part of all expenditures for development work at these properties. This will have a marked influence on the future cost of ore at these mines.

AUSTIN MINE

The Austin Mine was not operated in 1920. All Bessemer ore in stock was shipped during the year.

The ore statement for the year 1920 is as follows:

	AUSTIN BESSEMER	AUSTIN	AUSTINPORT	TOTAL
On hand Jan. 1st, 1920	3,592	0	8,970	12,562
Output for year,	0	0	0	0
Transfer,	434	434		
Overrun,	73			73
TOTAL,	3,231	434	8,970	12,635
Shipments,	3,231	434	0	3,665
In stock Jan. 1st, 1921	0	0	8,970	8,970

The ore in sight at the Austin Mine on December 31st, 1920 is as follows:

	AUSTIN BESSEMER	AUSTIN	AUSTINPORT	TOTAL
Above 1st Level,	12,000	3,000	9,416	24,416
" 2nd "	36,800	5,251	20,700	62,751
" 3rd "	28,600	4,100	16,326	49,026
" 4th "	9,600	1,623	5,550	16,773
" 5th "	3,180	562	1,860	5,602
TOTAL TONS,	90,180	14,536	53,852	158,568

This is the same estimate as was submitted in last years report; there has been no changes, due to the fact that the mine was not operated during 1920.

Estimated tonnage in the mine, sub-divided as required by the Tax Commission:

	AUSTIN BESSEMER	AUSTIN	AUSTINPORT	TOTAL
Bessemer Ore:				
1. Developed,	90,180			
2. Prospective				
Non-Bessemer Ore:				
1. Developed,		14,536		
2.			53,852	
1. Prospective				
2.				
TOTAL,				158,568

AUSTIN SURFACE

Owing to the shortage of mine timber at the Princeton and Stephenson Mines during the past several months it has been necessary to cut up the greater part of the timber in stock at the Austin Mine. This, however, was advisable from the fact that it was not at all certain that the property would operate during the coming year, and unless the timber was used it would undoubtedly, within another year, deteriorate very materially.

It was necessary to dismantle the Bessemer ore trestle in order to permit of shipping out the ore. The trestle was not re-erected, as it is not probable that this property will operate again in the winter.

Some repairs have been made to the old Austin boiler house, to enable it to be used as a storehouse.

The land occupied by the Austin Location, the Assistant Superintendent's residence and the several location boarding houses was purchased by The Cleveland-Cliffs Iron Company in 1920, from the Escanaba River Land & Iron Company. This will permit of several needed improvements being made which were not justified as long as there was a question of moving or abandoning the location on the completion of mining operations at the Austin Mine.

AUSTIN MINE

ORE STATEMENT DECEMBER 31, 1920.

	AUSTINPORT	AUSTIN BESSEMER	AUSTIN	TOTAL	TOTAL LAST YEAR
On hand Jan. 1, 1920,	8,970	3,592	0	12,562	
Output for year,	0	0	0	0	14,896
Transferred,		434	434		
Overrun,		73		73	
Total,	8,970	3,231	434	12,635	14,896
Shipments,	0	3,231	434	3,665	2,334
Balance on hand,	8,970	0	0	8,970	12,562
Decrease in output-100%				14,896	
Decrease in ore on hand				3,592	

1920 - Idle during year

1919 - 1-8 Hour Shift Sept. 1st to Dec. 20, 1919.

SHIPMENTS FOR YEAR 1920.

GRADE	STOCKPILE	TOTAL	TOTAL LAST YEAR
Austin Bessemer,	3,231	3,231	
Austin,	434	434	39
Austinport,			2,295
Total,	3,665	3,665	2,334
Total last year,		2,334	
Increase - 57%		1,331	

AUSTIN MINE.

AUSTIN MINE.

COMPARATIVE MINING COST FOR YEAR.

	1 9 2 0.	1 9 1 9.	INCREASE.	DECREASE.
PRODUCT	73	14,869		
General Expense		.368		
Maintenance		.464		
Mining Expense		2.578		
Cost of Production		3.410		
DEPRECIATION.		-		
Taxes		.146		
Central Office		.085		
Miscellaneous		.004		
Sundry Expense		.011		
Cost on Stockpile		3.656		
Loading & Shipping		.032		
Total Cost on Cars		3.656		
COST OF PRODUCTION.				
Labor		2.492		
Supplies		.918		
Total		3.410		
No.Days Operating		112		
No.Shifts & Hours		1-8hr		
Avg.Daily Product		133		

Mine closed account of flood in 1918; started production again August,1919. Production ceased December 31, 1919, for balance of winter. Did not operate during 1920; shipped 3665 tons from stockpile.

AUSTIN MINE

COMPARATIVE WAGES AND PRODUCT

	1920	1919	INCREASE	DECREASE
PRODUCT	73	14,869		
No.Shifts and Hours		1-8hr		
AVERAGE NO.MEN WORKING				
Surface	2	7		
Underground		15		
Total	2	22		
AVERAGE WAGES PER DAY				
Surface	5.27	4.88		
Underground		5.90		
Total	5.27	5.58		
WAGES PER MONTH OF 25 DAYS				
Surface		122.00		
Underground		147.50		
Total		139.50		
PRODUCT PER MAN PER DAY				
Surface		7.25		
Underground		3.34		
Total		3.29		
LABOR COST PER TON				
Surface		.673		
Underground		1.767		
Total		2.440		
AVG. PRODUCT BRK'G & TRM'G		6.29		
" WAGES CONTRACT MINERS		5.90		
" " " TRAMMERS		5.04		
" " " LABOR		6.13		
TOTAL NUMBER OF DAYS				
Surface	506½	2,056¼		
Underground		4,461½		
Total	506½	6,517¾		
AMOUNT FOR LABOR				
Surface	2670.16	10,034.05		
Underground		26,319.37		
Total	2670.16	36,353.42		

Proportion Surface to Underground Men:
1919 - 1 to 2.1
1918 - 1 to 3.2

Not producing in 1918 on account of flood. Started production on small scale again in August, 1919. Closed again Dec.31, 1919. Not operated during 1920.

STEPHENSON MINE

The Stephenson Mine was operated on one 8-hr. shift during the past year. As soon as the repair work incidental to re-opening the mine was completed and it was possible to work more men, ore was hoisted on both day and night shift. The product by months for the year was as follows: (This includes the ore hoisted from both the Stephenson property and C. & N. W. Ry. Co., Lease, Section 29):

January,	6,115 tons	July,	13,488
February,	9,206	August,	16,409
March,	14,783	September,	19,574
April,	14,601	October	20,369
May,	14,784	November,	14,551
June,	13,013	December,	17,889

Total Ore, ...	174,782 tons
Rock,.....	29,077 "
TOTAL PRODUCT.....	203,859 "

The above table shows that the product was low in January; increased in February and March, by which time the mine was in condition to operate, and from that time on, until August, there was practically no change in the output. This was due to the shortage of labor, as there were many available working places. From August on, a few additional men were hired, and the product showed an increase, rising to 20,000 tons in October. In November there was a drop due to loss of time by employees, to less working days in the month, and to no over-run from pocket shipments. In December, the product again showed an increase, due to more men employed after the closing of the Gardner-Mackinaw Mine.

The ore statement showing the amount on hand January 1st, 1920, the output for the year, shipments for the year and the amount on hand January 1st, 1921 is as follows:

	STEPH. BESS.	STEPH. NO. 1	STEPH.	STEPHEN-WOOD	NORTH BESS	NORTH-DALE	TOTAL
On hand Jan. 1st, 1920	0	0	437	45,907	0	0	46,344
Output for year,	24,140	0	115,032	27,135	0	8,474	174,782
Transfer,	11,381	6,086	5,295		3	3	
TOTAL,	12,759	6,086	120,764	73,040	0	8,477	221,126
Shipments,	8,773	6,086	68,768	24,137	0	3,301	111,065
In stock Jan. 1st, 1921,	3,986	0	51,996	48,903	0	5,176	110,061

A study of the above table shows that the main product during the year was ore of Stephenson grade, and also that there was a comparatively small output from C. & N. W. Lease, Section29. The production of Stephenwood, or the High Phosphorus grade is appreciably less than in previous years that the mine operated. In fact, it is expected that within a short time there will be practically no product of this grade, as the content of Phosphorus is decreasing in the ore mined at greater depth.

On account of the high fixed cost at this mine for pumping, it is evident that it is desirable to maintain a maximum production. Unfortunately, this was not possible in 1920, due to the labor shortage.

The ore in sight at the Stephenson Mine on December 31st, 1920 was 623,331 tons; this is a decrease of approximately 134,289 tons over the amount of ore shown in the Annual Report for the year 1917. Development work on the 6th level during 1920 did not advance to a point which permitted definite information of the ore lying between the 5th and 6th levels. By the end of 1921 detailed information of the thickness and extent of this ore body will be available, so that an accurate estimate of the tonnage in this territory can be made. In the estimate made in 1919 for the Tax Commission it was assumed that there was 400,000 tons Prospective Ore in this territory. As no further information is available, this same quantity of Prospective Ore has been included in this years estimate. Due to the lack of definite information, it is not possible to accurately estimate the division of product by grades from this territory. It is possible that later there will be a number of changes made.

The ore in sight on December 31st, 1920, was as follows:

Location:	STEPHENSON BESSEMER	STEPHENSON NO.1	STEPHEN-SON	STEPHEN-WOOD	TOTAL
Ore above 1st Level				4,893	4,893
" " 3rd "				1,533	1,533
" " 4th "	10,000	10,000	46,655	35,880	102,535
" " 5th "	57,950	57,950	282,570	115,900	514,370
	67,950	67,950	329,225	158,206	623,331
Prospective,	75,000	75,000	200,000	50,000	400,000
TOTAL ORE,	142,950	142,950	529,225	208,206	1,023,331

Estimated tonnage in mine, sub-divided as required by Tax Commission:

Bessemer Ore:

Developed	1.	Stephenson Bessemer,	67,950	
Prospective	1.	Stephenson Bessemer,	75,000	142,950 tons

Non-Bessemer Ore:

Developed	1.	Stephenson No. 1,	67,950	
	2.	Stephenson,	329,225	
	3.	Stephenwood,	158,206	
Prospective	1.	Stephenson No. 1,	75,000	
	2.	Stephenson,	200,000	
	3.	Stephenwood,	50,000	880,381 "
		T O T A L,		1,023,331

There has been some extraordinary expense at this property during the past year, which has increased the cost of the ore. Practically all of this extraordinary expense was due to the mine being flooded. These expenses were as follows:

1. Expense of over-hauling pumps in 5th level pump house.
2. Expense of draining the water from the deep basin on Sec. 29.
3. Concrete dam on 6th level to control the water from No. 66 Diamond Drill Hole.
4. 10" pipe and ditch for same to conduct water from the concrete dam on 6th level to pump house on 5th level.

The expense of practically all the above was charged to "Maintenance of Pumps". For the year this item amounted to over $27,000.00, as compared with a normal expense of about $3,000.00, in previous years.

The costs under several other accounts have been unusually high the past year. In account "Electric Tram Plant", in addition to extensions of main line tracks and trolley, practically all the motors and motor cars have had to be over-hauled on account of being under water for two years. From two to four men have worked on the cars during a part of the past year. The cost in 1920 is more than double that of 1917. Timbering costs have also been very high, due to the great amount of retimbering necessary on account of the mine having been flooded. The timber in stock at the mine had deteriorated and a considerable amount was culled. This also increased the timbering cost in 1920. The high cost of coal

has also had an influence on operating expense, as the hoisting plant is operated by steam, which cost more during 1920 than electric current. In fact, most of the accounts have been increased on account of the unusual expense due to the mine having been flooded.

STEPHENSON LEASE - SECTION 20.

Work has been done during 1920 at the following points:

Main 4th Level
1st, 2nd, 3rd and 4th Subs below 4th.
5th Level
6th Level

FOURTH LEVEL

At the time the mine was flooded, the work of extending the main 4th level haulage drift to the South-east was under-way. For over a year prior to that time this drift had been advancing to the South-east in the foot near the contact. In the fall of 1917, owing to a turn in the foot, the drift struck ore, but practically no progress was made owing to the ore running, so as to render an advance impossible. On re-opening the mine, the drift was repaired up to the breast, when it was decided to temporarily abandon work at this point and develop the ore along the contact by drifting from the top of raises put up from the 5th level to strike the hanging at the elevation of the 4th level. During the balance of the year work has been conducted on this plan, an area of approximately 75' x 75' in size has been mined out, and the ore body has been developed for a distance of about 75 feet further to the South-east. The work done during 1920 has proven that the 4th level is the top of the ore body, and as stated before, mining has already been started. At the end of the year the footwall again turned back, indicating that the greater part of the years work had been done in a fold in the footwall. There has been approximately 6,000 tons of ore mined at this point during the past year. The ore is very wet, and has been very difficult to handle from raises on the 5th level. The ore developed here has added to the available ore at the property. There is no way of determining how far the ore continues along the contact. It is planned to continue the rock drift on the 5th level, put up additional raises, and continue development work in this direction, where there is an excellent chance that additional ore may be found.

1ST SUB BELOW FOURTH LEVEL.

In June, a gang started working on this sub-level, which is located near

the South-east end of the mine, about 2100 feet from the shaft, measured along the 5th level haulage road. Mining started here as soon as the main 4th level had been mined out, and at the end of the year, an area of approximately 145 x 150 ft. in size had been mined. The area where mining started had been preceded along the contact by a barren area about 120 feet in length. The ore from this sub-level is not so wet as the ore was on the 4th level. Two gangs worked here during the last half of the year.

2ND SUB BELOW FOURTH LEVEL.

When the mine was flooded, mining was in progress on this sub-level. On re-opening, the drifts were retimbered and cleaned up, and mining started again. At the end of the year practically all the ore on this sub-level had been removed, except some pillars left inside the limit of mining, near the C. & N. W. Lease, Section 29, boundary line, and the ore at the South-east end of the mine, referred to in the two preceding paragraphs. This limit of mining will be referred to frequently in this report, and is a certain territory where it is not considered advisable to do any mining until the general water level has been lowered. It covers the territory near the point where water came into the mine in December, 1917, and has been left for the purpose of preventing a continuation of the cave. At the end of the year there were only two gangs working on this sub-level, mining a few pillars near the footwall. In February and March there were fifteen gangs working; the number working here gradually decreased during the year as mining was finished.

3RD SUB BELOW FOURTH LEVEL.

The greater part of the ore produced during 1920 came from this sub-level. The first places that were available for mining, after the mine was re-opened, were on this sub-level, and after drifts and raises were repaired, men were added as fast as they could be hired, and by April there were seventeen gangs working. At the end of the year there were fifteen gangs. Fully 65% of the ore on this sub-level had been mined by the end of the year.

4TH SUB BELOW FOURTH LEVEL.

One gang started working on this sub-level in October. Mining was started here primarily for the purpose of causing the hanging to cave, in order to drain the water away from the 3rd sub. Experience has shown that the water at

the Stephenson Mine follows the hanging, and if a sub-level can be opened in advance of mining operations and a cave started, the greater part of the water will come to this spot, resulting in much better operating conditions on the sub-level above.

At the end of the year a small area had been mined and caved. The latter part of the year a number of raises were put up from the 6th level to the 1st sub above the 5th, and drifts started from the top of the raises, through the hanging, over to the ore body. It is virtually impossible to maintain drifts on the 5th level, near the hanging, so that it is planned to handle the ore from this sub-level through raises to the 6th level. This also gives much greater storage in the raises as compared with handling this ore on the 5th level, where it has to be dumped directly in motor cars, due to the fact that the 4th sub below the 4th level is the first sub above the 5th level. At the end of December there were four gangs opening out from 6th level raises, preparatory to starting mining under the hanging on this sub-level.

FIFTH LEVEL.

When the mine was re-opened there were a number of raises put up from the 5th level to the subs above, some of which were to replace raises that had caved while the mine was flooded; others provided additional working places. During the year a considerable amount of repairing has been necessary on the 5th level, as timber rots more rapidly after having been under water. During the year, there has been 240 feet of ore drifting on the level, and 75 feet of rock drifting. A rock drift was driven in the footwall at the South-east end of the ore body in order that raises might be put up to mine the extension of the ore body on the 4th level. During the year there were five raises started in this territory, two of which were lost and three put through to the 4th level. In August, a dam was put in near the C. & N. W. Lease, Section 29 boundary line, in which drain pipes were put, in order to control the water from the cave at the point where the mine was flooded. By closing the valves on these drain pipes it would be possible to hold the main part of the mine water back for about 48 hours, or long enough to permit of repairing any ordinary accident to the transmission lines. In December, there was some repair work under-way on the old cross-cuts, and also several gangs drifting from the top of raises put up