

MORRIS-LLOYD MINE.

in the Bessemer ore hoist was consistent throughout the year, as this grade of ore has been replaced with non-Bessemer ore. The Silica ore hoist was increased, when sales of this grade were made last summer, by drawing out the ore remaining in the old shrinkage stopes on the 2nd level.

The cost per ton for 1915 shows a decrease of 30¢ per ton, due to the following causes:

1st: Increased production at the Morris Mine, with a decrease in the number of men working.

2nd: Increased production at the Lloyd Mine, due to developing the Section 6 ore body.

3rd: Decrease in charges on account of shaft sinking.

4th: Decrease in tramping cost, due to less gangs of trammers hand loading, and to increased output trammed by motor from chutes.

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ESTIMATE OF ORE IN SIGHT AT THE MORRIS MINE.

LOCATION.	BESSEMER	MORRIS	SILICA	TOTAL TONS.
Above 1st level,	55,000	8,000	2,000	65,000
Above 2nd level,	195,000	55,000	20,000	270,000
Probable ore below 2nd,	<u>47,400</u>	<u>31,600</u>	<u>15,000</u>	<u>94,000</u>
TOTAL ORE,	297,400	94,600	37,000	429,000
Less 20% for rock and loss in mining,	<u>59,480</u>	<u>18,920</u>	<u>7,400</u>	<u>85,800</u>
NET TOTAL ORE,	237,920	75,680	29,600	343,200

PROBABLE ANALYSES.

Bessemer,	IRON	60.00	PHOSPHOROUS	.055,	MOISTURE	15%
Non-Bessemer,	"	58.50	"	.075	"	15%
Silica,	"	52.00	"	.054	"	15%

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LOCATION.	BESSEMER	NORTH LAKE	SILICA	TOTAL.
Above 2nd level,	5,000	37,000	20,000	62,000
Above 3rd level,	5,000	265,000	90,000	360,000
Probable ore below 3rd,	<u> </u>	<u>5,000</u>	<u> </u>	<u>5,000</u>
TOTAL ORE,	10,000	307,000	110,000	427,000
Less 20% for rock and loss in mining,	<u>2,000</u>	<u>61,400</u>	<u>22,000</u>	<u>85,400</u>
NET TOTAL ORE,	8,000	245,000	88,000	341,000

PROBABLE ANALYSES.

Bessemer,	IRON.	58.50	PHOSPHOROUS.	.055,	MOISTURE,	11.50
Non-Bessemer,	"	58.50	"	.085	"	11.50
Silica,	"	51.50	"	.055	"	10.00

SECTION 6 ORE BODY.

LOCATION	BESSEMER.	NORTH LAKE.	HIGH PHOS. NORTH LAKE.	TOTAL.
Developed above 3rd level,	40,000	568,000	538,000	1,146,000
Probable ore above 4th "	<u> </u>	<u>300,000</u>	<u>300,000</u>	<u>600,000</u>
TOTAL ORE,	40,000	868,000	838,000	1,746,000
Less 20% for rock and loss in mining,	<u>8,000</u>	<u>173,600</u>	<u>167,600</u>	<u>349,200</u>
NET TOTAL ORE,	32,000	694,400	670,400	1,396,800

PROBABLE ANALYSES.

Bessemer,	IRON	60.00,	PHOSPHOROUS,	.048	MOISTURE,	13.42
Non-Bessemer, N.L.	"	59.50	"	.080	"	13.42
Non-Bessemer, H.P.	"	58.50	"	.160	"	13.42

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NET DEVELOPED AND PROBABLE ORE.

	BESSEMER	NON-BESS.	NON-BESS.H.P.	SILICA	TOTAL.
Morris Ore Body,	237,920	75,680		29,600	343,200
Lloyd Ore Body,	8,000	245,000		88,000	341,600
Sec. 6 Ore Body,	<u>32,000</u>	<u>694,400</u>	<u>670,400</u>		<u>1,396,800</u>
GRAND TOTAL,	277,920	1,015,680	670,400	117,600	2,081,600

The estimate of ore in sight at the Morris Mine shows a reduction from the estimate of 1914 of 60,000 tons, which reduction is 17,085 less than the hoist of 1915. The mine is now developed so that an accurate estimate can be made. By the work of 1915 the Chase Lease ore body has been shown to run 90% Bessemer and 10% non-Bessemer, while in 1914, it was figured that it would run about 80% Bessemer and 20% non-Bessemer. The work of 1915 has also proven up more Bessemer ore below the 1st level, so that the Bessemer estimate for 1915 is only decreased 29,000 tons as compared with that of 1914, while the hoist of this grade during 1915 was 60,000 tons.

The estimate of Silica ore is decreased 49,000 tons. During 1915 only 8,242 tons were produced from work done in opening the high grade ore bodies. This is on a ten percent basis, and as the ore bodies are now pretty thoroughly opened up, it is figured the balance of ore in sight can be produced on a basis of one ton of Silica for twelve tons of high grade ore, or on an eight and one half percent basis. The estimate of probable ore below the 2nd level has not been changed, as no new information is available concerning the downward extension of this ore body.

The Lloyd estimate shows a decrease of 74,400 tons from the 1914 estimate. The hoist from the Lloyd ore body in 1915 was 116,947 tons, which is 42,547 tons greater than the decrease in the 1915 estimate. Of the hoist of 1915, 110,223 tons came from the 2nd level, and 7,277 tons from the development work in this ore body between the 3rd and 2nd levels. The estimate of ore in sight above the 2nd level is, however, only de-

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creased 58,223 tons, while the hoist for 1915 was 110,223 tons. When the 1914 estimate was made, it was thought that no more Silica ore would be obtained from the old shrinkage stopes on the 2nd level at the East end of the mine. However, 77,500 tons were trammed from these stopes, to fill charcoal furnace orders during the summer and fall, also a number of Silica ore pillars left on subs above the 2nd level were mined out after they had crushed. This in a large measure accounts for the difference between the estimates and the product.

The estimate of ore between the 3rd and 2nd levels is decreased 30,000 tons, while only 7,277 tons were mined here, a net decrease of 22,723 tons. This decrease is mainly in the Bessemer grade, which is decreased 20,000 tons, or 80%. The development work of 1915 in this territory has failed to show up much Bessemer ore, so that only a nominal tonnage is shown in this territory. The development work in the 50 ft. of ground directly under the 2nd level has been very unfavorable, but from this point down, the showing of ore is larger than was anticipated a year ago. One sub level near the East end of the ore body under the 2nd level showed more high grade ore than was expected from the narrow seam in sight on the 2nd level, and it is probable that more ore will be obtained from this territory than it is now thought advisable to estimate here.

The estimate of Silica ore is only decreased 21,600 tons. In a measure, the amount of ore of this grade estimated, depends on the amount which it is desirable to mine, and not on the amount actually available. The amount of 88,000 tons estimated as in sight, may be either low ~~or~~ or high ~~er~~, depending on the amount eventually wanted.

This is the second year an estimate has been made for the Section 6 ore body. In the estimate of 1914 we allowed for a solid ore body between the limits of the crosscuts opened on the 4th level of the Lloyd, and solid ore at the East end of the ore trough just below surface, where a large number of drill holes had been put down. Between these two ore

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bodies the only ore estimated was a cylinder 50 ft. in diameter at each drill hole which encountered ore in this territory. To this estimate of developed ore there was added 1,500,000 tons of probable ore above the 4th level. The total estimate of 1914 of developed and probable ore was 2,270,000 tons. At the end of the year 1915 the ore body had been developed on the 3rd level, and by raises to a point 200 ft. above the 3rd level. It has been thoroughly crosscutted on the 3rd level as well as on a sub level 100 ft. above the 3rd level. Additional drill holes have also been put down from surface, and the limits of the outcrop of the ore body at ledge has been more accurately determined. The area here has been increased, while the development work underground in the territory above the 3rd level has shown the ore body to be much smaller than was expected from the crosscuts which had been driven on the 4th level in 1914. The ore above the 3rd level was estimated as developed ore. The areas used in making these estimates were conservative, as it was not desired to over-estimate the ore in this territory. From the areas of the ore body on the 4th and 3rd levels, it was estimated that there was 600,000 tons of probable ore between these two levels, although there is as yet no ore actually developed. No allowance was made for an extension of the ore body below the 4th level, as was done in the previous estimate.

The estimate as based on the above conditions is only 1,396,000 tons, a decrease of nearly 1,000,000 tons from that of the previous year. It is entirely possible that the development work and mining operations of 1916 will later permit of largely increasing this estimate, but at this time it does not seem advisable to show more ore in sight at Section 6.

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In January 1915 there were seven gangs working on ore at the Morris Mine, then for three and one half months in the summer there were only six gangs, but from August 15th on to the close of the year there

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were seven gangs again. The rock work was confined to the development work in the winze from the 2nd to the 4th level until in Sept., when some rock work was started above the 2nd level. For the balance of the year there were two gangs in rock. Work is now under way which will permit of a small increase in the output during the coming year, without this work it would have been impossible to even maintain the output of 1915.

Water has not interfered with mining operations to any extent during 1915. The water is caught on the sub levels and carried in drain pipes down through the raises to the main level. Some water, however, comes in through the cribbing of the raises, and all the ore is wet by the time it is loaded in motor cars. The moisture in the ore hoisted during 1915, however, is lower than it was in the ore mined in the previous years.

Owing to the system of mining followed here, it has been possible to maintain a uniform output of high grade ore, which for 1915, averaged over 60% iron. All of the good ore is being mined, none of it being left behind. These results are due to the sub levels being opened directly beneath each other, the floor covering of one sub forming the back lagging for sets on the next sub level. The Morris ore is soft, and this system works perfectly here.

There are two ore bodies at the Morris Mine, one located on the Excelsior Iron Co's. land, and the other on the Chase Lease. Mining has been carried on in both bodies during the year, and the work will be reported under its location.

1st LEVEL.

EXCELSIOR IRON CO. LAND.

During 1914 the ore body on this land had been mined out down to the 30 ft. sub level, where about one half of the ore had been removed. Two contracts worked here and completed mining all the ore the last of January.

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In Feb. the 20 ft. sub level was opened, and during February, March and April this sub was mined out, two contracts working here. This completed all the work which it was possible to do at this time above the 1st level on the Excelsior Iron Co. land, and during the balance of the year no further mining was done here. The ore body on the 20 ft. sub level was 90 ft. long; opposite No. 1 raise it was 30 ft. wide, all the ore lying to the North of the raise, while between Nos. 2 and 3 raises for a length of 40 ft., the ore was 80 ft. wide, extending 50 ft. to the South of these two raises. On this sub level the ore body was roughly L shaped, with a surface area of 4250 sq. ft. During 1915 about 7000 tons were obtained from this ore body above the 1st level.

CHASE LEASE.

1st LEVEL.

At the close of 1914 this ore body was being mined in three sections by sub levels at different elevations. The top of the ore body where mining was started, was 190 ft. above the 1st level, and by the close of the year this section had been mined out down to the 145 ft. sub level. Nos. 14, 15, 16 and 17 raises were in this area. Work in the section immediately East where mining had been first started on the 80 ft. sub under the hanging in December 1914, was in progress the first of the year. This section was above Nos. 10 to 13 raises inclusive. East of the center section was another section where mining had been started on the 60 ft. sub level under the hanging in 1914. By the close of 1914 this section had been mined out down to the 40 ft. sub, and at this time Nos. 6, 7, 8 and 9 raises were included in this section. This method of mining by sections was necessary in order to obtain even a fair hoist from the Morris Mine on account of the small size of the ore bodies.

In Jan. 1915 two gangs were working on the 145 ft. sub level, one mining the ore at the West end of the sub next to the jasper, and the other outlining the ore to the East. Mining was completed here in Feb., as the area of the ore body on the sub level was small.

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The 130 ft. sub level was opened by a contract in January by crosscutting North a short distance from Nos. 14, 15, 16 and 17 raises, and then connecting these crosscuts by drifts. In Feb. three gangs worked here outlining the ore body by crosscuts to the footwall, after which they started slicing out the pillars. The ore body increased in size on this sub level, having a length of 100 ft., with a maximum width of 70 ft. It narrowed up, however, in each end of the sub, and its greatest width was evidently due to a roll in the footwall, as none of the other subs above, and only one opened below, have shown a width equal to this one.

Mining had been nearly completed here in March when the sub commenced to take weight, and all the drifts crushed down. Efforts were made to re-open them, but it was impossible to keep them open for any length of time. A drift was then driven North in the hanging from a raise further to the East, from which point it was possible to drift into the ore body near the footwall and mine the pillars remaining on this sub level. The fact that the ground was taking weight was noticed as long as work was continued on this sub level, but conditions started to improve in April. The ore remaining on the sub was mined out by one contract, which finished work here early in the month of April. It was not definitely known what caused this sub level to take weight, but it is supposed that a large block of ground broke loose from the hanging and came down on top of the mat. At this time there was, of course, only a small amount of timber above the point where mining was in progress, so that there was very little cushioning effect from the timber mat.

The 120 ft. sub was opened in Feb. from No. 15 raise. The ore body had not extended this far to the East on the sub above, so that it was possible to start work here while mining was still being done on the 130 ft. sub. In March a gang started drifting from No. 17 raise to the North, following the jasper on the West end of the ore body. In April two gangs worked here outlining the ore body by drifts and crosscuts, and the last of the month started slicing. Two gangs continued working

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here during May, mining out the pillars. Considerable trouble was experienced in keeping the drifts open due to crushing. In June three gangs worked here, and mining was completed with one gang working early in July. The ore body on this sub level was 110 ft. long by 65 ft. average width.

The 110 ft. sub had already been opened in 1914, at which time all the raises were connected here, and two crosscuts driven North to the footwall. When the 130 ft. sub level crushed in March, all the drifts on the 110 ft. sub were also crushed, and when mining started here again in June, it was necessary to re-open these drifts. Two gangs were working here mining the ore during July and August, and mining was finished here about the 20th of September. The area of ore on this sub level was larger than on the sub level 10 ft. above. It was roughly 60 ft. by 140 ft. in size. No. 17 raise was in jasper on this sub, and it was decided to abandon it as a dirt chute and try to divert all the water to it. Accordingly, a ditch was cut along the jasper on the 110 ft. sub, and this ditch was covered with several thicknesses of timber and lagging to prevent it being blocked. Most of the water came in along the jasper at the West end of this sub level, so that it was an easy matter to catch it and conduct it to this raise. It has worked very well since, and the subs below this point have been comparatively free of water. Fully 100 gallons of water per minute are now carried to the 1st level through No. 17 raise.

The 98 ft. sub level was opened in August, and by the end of the month two gangs were working here. In Sept. slicing started on the pillars North of Nos. 15 and 16 raises. Another gang came to this sub the last of the month and started opening out from No. 14 raise to mine the pillar to the East over to the cave above the center section of the ore body which had already been mined out. The ore area was the same on this sub level as on the 110 ft. sub. It will be noted that this sub was opened 12 ft. below the sub above, whereas the two sub levels above had

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been opened at intervals of 10 ft. This change was made on account of the ground being very heavy in this section, and less trouble was experienced in keeping the drifts open. It required more lagging to fill up the space above the sets, as the 2 ft. of ore in the back dropped off as soon as the ground below was removed. It also permitted the West section to be mined out more rapidly, and reduced the cost of breaking the ore.

The 85 ft. sub was opened in October, and by the end of the month there were three gangs working here. By the end of the year mining had been completed on this sub level, and the gangs dropped down to open the 75 ft. sub level. The area of ore on this sub level was smaller than on the sub above, as it was only 90 ft. in length by 60 ft. in width. There is jasper on the West side of the sub, while on the East side the sub holed to the territory which had already been mined in the central section.

CHASE LEASE.

80 FT. SUB.

This is the central section of the ore body where mining was originally started in December 1914. Two contracts worked here in January, and opened out the ore body North of numbers 10, 11 and 12 raises. They also took out all the ore on the foot side North of No. 13 raise, leaving a pillar about 10 ft. wide North of the raise to keep it from crushing. Mining was completed here the first week of March, by which time all the high grade ore had been removed from the line of No. 13 raise over to the cave above the East section of this ore body. The ore body mined here was 80 ft. long, with an average width of 60 ft. In order to make a timber mat quickly over this territory, to keep the ore clean, this sub level was practically filled with lagging.

The 70 ft. sub level was opened in March, and two contracts worked here for the balance of the month. In April one contract worked here opening out from Nos. 11, 12 and 13 raises. Mining was completed

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on this sub level the third week of May, when all the ore here had been removed. The area of ore on this sub level was smaller than on the sub above, being 80 ft. in length by only 35 ft. in width.

The 60 ft. sub level was opened the last of May by one gang of miners, who completed mining all the ore early in August. The area of ore on this sub was the same as on the sub level above.

The 50 ft. sub level in this section was opened in August, and mining was completed here the first week of October, there being no change in the size of the ore body here.

The 40 ft. sub level was opened in October, and mining was practically completed at the end of the year. The ore area on this sub level is the same as on the three sub levels above, viz., 80 ft. long by 35 ft. wide. There has been absolutely no trouble in obtaining all the ore on this sub level, and at no time has there been any contamination from lean material coming in the back. The floor lagging of one sub level forms the back lagging for the next sub. There is no doubt that the conditions have been more favorable here on account of the top sub having been filled with lagging. This has prevented the lean material from the hanging working down to the point where it was likely to come through the covering.

30 FT. SUB.

This is the East section of the Chase Lease ore body, where only one sub level was mined out during the past year. Mining was started here in January by one gang of miners. No further work was done until March, when two gangs came here and completed opening the sub by drifts and cross-cuts, preparatory to slicing out the pillars between the raises. In this East section mining had originally been started on the 60 ft. sub just beneath the hanging, and during 1914, 30 ft. of ground had been removed. The area of each succeeding sub level was larger as the ore extended further to the East beneath the hanging. The area on the 40 ft. sub level was roughly 110 ft. in length by 35 ft. in width, the hanging being reached at No. 6 raise. On the 30 ft. sub the ore was found to extend beyond this

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raise over to No. 4, so that the territory mined on this sub extended from No. 4 to a point midway between Nos. 9 and 10 raises, making an ore body 180 ft. long by 35 ft. wide. Mining was completed here the third week of June, and no further work was done on this section during 1915, as subs opened lower down would have caused the main haulage drift on the 1st level to crush.

Following is a summary of the work done during 1915 on the Chase Lease ore body above the 1st level.

In the West or top section, an area averaging 116 ft. in length by 57 ft. in width, was mined out for a depth of 70 ft; in the center section an area averaging 80 ft. in length by 40 ft. in width, was mined out for a depth of 50 ft., and in the East section an area 180 ft. in length by 35 ft. in width, was mined out for a depth of 10 ft. During the past year the jasper gained about 100 ft. to the East from the 145 ft. sub down to the 85 ft. sub. The decrease in the length of the ore body in this section now averages slightly more than 1 ft. for each foot of depth. At the end of 1915 the West section had been mined out to a point 85 ft. above the 1st level; the ore remaining in this section has the shape of a triangle, with the apex resting on the 1st level. The area of the center section will remain the same down to the 1st level, and below the 1st level the area will decrease. At the end of the year there was 40 ft. of solid ground remaining in this section. The area of the East section grows larger on each succeeding sub level, owing to the pitch of the jasper hanging to the East. There is a 30 ft. block of ground remaining in this section above the 1st level. During 1915 there was approximately 58,000 tons of ore mined in the three sections on the Chase Lease above the 1st level.

2ND LEVEL.

During 1915 there has been no drifting done on this level. One raise was put up from the footwall drift to the West of No. 1 crosscut

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in the ore body on the Excelsior Iron Co. land. This raise was started in August and completed early in October, when it holed to the 100 ft. sub level. This is the first of several raises which must be put up on the foot side of this ore body in order to mine it, as also to handle the water which will come down after mining has been completed to the 1st level.

In October one of the raises which had been put up near No. 12 diamond drill hole in No. 2 crosscut to the elevation of the 100 ft. sub, was continued up to the 175 ft. sub level. The raise was located in the hanging of the Chase Lease ore body, and was in lean ore averaging about 52% iron. One of the two raises here at the West end of the 2nd level, will be used to carry the water which comes in along the foot at the West side of the Chase Lease ore body above the 1st level, and the other one will be used for ore. The balance of work done during 1915 above the 2nd level, will be reported under the various sub levels.

175 FT. SUB ABOVE 2ND LEVEL.

In April the work of opening this sub level was started from No. 4 raise on the Chase Lease. The object in opening this sub level was to make a main tramming sub at this elevation, to be used when the 1st level haulage way was abandoned. In order to maintain the estimated product from the Morris Mine, it will be necessary to work on all three sections of the Chase Lease ore body. As some of these sections are now mined to a point within 20 ft. of the 1st level, further mining here will soon cause the haulage drift to crush, after which the ore from the sub levels above the 1st must be handled on the sub level below the 1st level. A drift was started in April to the West of No. 4 raise in lean Silica ore running from 45% to 50% iron. Jasper was encountered at a point 20 ft. West of the raise, and the drift was turned to the N.W. following the jasper. It continued in Silica ore until they had reached a point 80 ft. from the raise, where high grade ore was encountered, after which

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the drift was turned to the West to follow the hanging. The high grade ore was struck directly beneath the point where it had been found on the 1st level; it may extend further East, but no attempt has been made to follow it as yet. However, it does not swing to the S.E. and make a junction with the ore body on the Excelsior Iron Co. land as was formerly supposed. Drifting to the West along the hanging was continued during June, July and until the last of August, when this drift holed to a drift that had been started to the East in July from the raise that had been put up from the 2nd to the 1st level in the dropper of ore near the West end of the Chase Lease ore body. This drift from the West end was driven to the East along the hanging. No work was done on this sub level during September, but two gangs worked here from October on to the end of the year. At a point midway between No. 7 and 8 raises, a crosscut was driven North to the footwall, which was followed to the West to the end of the ore body. A drift was also driven to the West in jasper to come under Nos. 14 and 15 raises on the 1st level, and at the end of the year this drift was in 30 ft., with 30 ft. yet to be driven. A drift was also driven to the East from No. 4 raise across the Excelsior Iron Co. ore body to the jasper, and a crosscut driven to the N.E. following the jasper on the East side of this ore body. The drift along the hanging of the Excelsior Iron Co. ore body was connected to No. 1 raise, also a short drift was driven to the East in jasper, and an incline raise put up to the 1st level, which holed to a stub timber storage drift on the 1st level. In October the work of putting up raises to connect with the Chase Lease raises above the 1st level was started, and by the end of the year Nos. 5 to 11 raises inclusive had been connected. Ladder roads were put in alternate raises. Nos. 12 to 15 raises inclusive, have to be put up to complete the work of connecting with all the raises on the Chase Lease above the 1st level. No dirt will be sent down to this sub level until it becomes necessary to abandon tramping on the 1st level, due to the crushing of the drifts.

During 1915 there was a total of 700 ft. of drifting and 120 ft.

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of raising done on this sub level, a grand total of 870 ft. of development work. One hundred eighty feet of drifting was done on the Excelsior Iron Co. land, and 590 ft. of drifting and raising was on the Chase Lease.

150 FT. SUB ABOVE 2ND LEVEL.

This sub level was opened from No. 4 raise the last of June by a drift to the N.W. in Silica ore, and also by a drift to the East from No. 4 over to No. 3 raises. The drift to the N.W. was continued in Silica ore a distance of 110 ft., when the Chase Lease ore body was encountered, after which the drift was turned to the West and followed the hanging of this ore body. After drifting 40 ft., jasper was encountered, which was followed 15 ft. North to the footwall. This cut off the ore body, and is undoubtedly the jasper which pitches to the East beneath the Chase Lease ore body. The Chase Lease ore body on this sub level has a length of about 100 ft., with a probable width of 30 ft., while on the sub 25 ft. above, it has a length of 300 ft. This indicates that the jasper beneath the ore body here has a very flat pitch to the East, as 200 ft. of ore is cut off in a vertical depth of 25 ft. No further work has been done on this sub level during 1915. There was a total of 150 ft. of drifting done here, 138 ft. on the Chase Lease, and 12 ft. on the Excelsior Iron Co. land.

100 FT. SUB ABOVE 2ND LEVEL.

This sub level, the greater part of which is located on the Excelsior Iron Co. land, was opened in 1913 and 1914, and the ore body outlined by drifts and crosscuts. In September a contract came to the East end of the footwall drift on this sub level, and started an incline raise to the 1st level, which will later be used as a timber slide to bring timber down into the subs below the 1st level. The raise was in lean Silica ore, and continued in this material all the way through to the 1st level, a distance of 125 ft. on the incline. It reached the elevation

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of the 1st level in November, and a connection was made to the 1st level haulage drift by drifting 12 ft. to the South of the raise. The point where the raise holed to the 1st level, is nearly 100 ft. East of the ore body, so that there should be no danger of this raise crushing.

50 FT. SUB ABOVE 2ND LEVEL.

This sub level was opened in August from No. 1 raise on the Excelsior Iron Co. land, and a crosscut was driven 65 ft. to the North in ore. A drift was then driven 115 ft. to the West at a point 20 ft. North of the raise, after which connections were made to Nos. 2, 3 and 4 raises by crosscutting to the South. The ore body was found to extend about 30 ft. further West than on the 100 ft. sub, or on the 2nd level, being due undoubtedly to a local roll in the jasper on the West side of the ore body. This sub level was opened in an effort to cut off some of the water that came into the raises through the cribbing below the 100 ft. sub level. There was a total of 220 ft. of drifting done here, 160 ft. of which was on the Excelsior Iron Co. land, and 60 ft. on the Chase Lease.

During 1914 the 175 ft., 150 ft. and 50 ft. sub levels were opened between the 1st and 2nd levels. From this work there was obtained 12,000 tons of ore.

MORRIS WINZE.

The work of sinking a winze from the 2nd to the 4th or 1200 ft. level of the Morris was started in September 1914, and at the end of the year the winze was down 149 ft. below the 2nd level. It was sunk 52 ft. in January, and 49 ft. in February, during which month a drift was also driven 15 ft. West of the shaft at a point 200 ft. below the 2nd level, or on the 1000 ft. level. In March the winze was sunk 60 ft., when sinking was temporarily stopped in order to install runners and case the shaft, so that the crosshead might be put on. This work was not completed until about the 10th of April, when sinking was resumed, the winze

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being sunk 46 ft. during this month. In May it was sunk 48 ft., and in June 22 ft., making the total depth 422 ft. below the 2nd level. The 1200 ft. level was opened at a point 400 ft. below the 2nd level, leaving 22 ft. for a skip pit. Timbering was completed and runners installed to the bottom during June, and a drift was driven 24 ft. to the West of the shaft. No further work was done on the 1200 ft. level until September 1st. This delay in the work was unavoidable, as the hoist from the Chase Mine, which it was planned to use here, was not available for this work until in Aug. After mining was completed at the Chase Mine, and the hoist was released and brought to North Lake, it was necessary to split the drum in two pieces in order that it might be taken underground. This work required some time to complete, as the drum had to be drilled all the way around, and separated by wedging, after which it was necessary to put on flanges in order that it might be securely fastened together again.

During June a drift was driven on the 2nd level a distance of 76 ft. to the N.W. of the winze, and a room cut out for the hoist, this work being completed in July, after which the foundations for the hoist were installed and the work of building the skip dump was started. In August the skip dump was completed and the hoist was taken down and set up, sheaves installed, as also electric lights and bell signals, completing all preparations for starting drifting on the 1200 ft. level. During this time a 6 in. water discharge line was also put in the winze, and a one inch water line for the Leyner drill machines.

Drifting on the 1200 ft. level was started on September 1st, and during the month the drift advanced 340 ft. At a point 210 ft. South of the shaft it was turned to the S.W. on a course of South, 42 degrees West. A ten inch fan pipe was put in the winze in September, and carried out into the drift; the fan was located at the top of the winze on the 2nd level. During the month of September the work was being organized, all necessary supplies, etc., were provided and several changes were made in the men employed on this work. In October the drift advanced 421 ft., in

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November 440 ft., and in December 464 ft., or an average of 416 ft. per month. This progress was only possible through careful supervision of the work, by the elimination of all possible delays due to lack of material, and by the selection of the best men available at the Morris-Lloyd Mine. The average progress in December, with twenty six working days, was 17.6 ft. per day. Two cuts were blasted on each eight hour shift, or four each day. The gradual gain each month was due to increased skill in breaking deeper cuts, due to better judgement in location and number of holes necessary. The best months progress was made when drifting with the slips, which shows the increased efficiency of the men, as the ground breaks much better when crossing the slips, as was the case in the month of October. As much as 22 ft. progress in a day has been made when all conditions were favorable.

This drift was continued on the same S.W. course a distance of 1065 ft. from the shaft, when drifting was stopped with ore in the breast. The slate-jasper contact was encountered at a point 1030 ft. S.W. of the shaft, and after drifting 35 ft. in rich jasper, ore was encountered which ran about 58% iron, .160 phos. It was not advisable to drift to the South in ore until pumping equipment and sump were ready, on account of danger from water.

At a point 880 ft. from the shaft a curve was started to the West, and for the balance of the year the drift was driven in this direction towards diamond drill hole No. 96. At the end of the year this drift was in 610 ft. West of the crosscut from the shaft, or a distance of 1490 ft. from the winze. The breast of the drift is now 1220 ft. distant from diamond drill hole No. 96 from surface. If the present progress can be maintained, this drift should reach the point where it is hoped to find ore by April 1st. All charges on account of this drift appears under account No. 177, "Extraordinary Drifting."

In Nov. ground was removed for shaft, also a drift driven 20 ft. to the North near winze for a pump house. The shaft was then sunk 12 ft. for a sump. A 300 gal. 400 ft. head pump will be installed here to handle the water from drifts. This work was nearly completed at the end of the year.

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2ND LEVEL.

All the ore mined during 1915 has been hoisted from the 2nd level, and the greater portion of it came from the subs in the S.W. deposit. Some ore was obtained from mining operations on the sill floor at the East end of the 2nd level in the S.E. deposit. There has also been about 7,500 tons of ore obtained from the old shrinkage stopes during the year.

S. E. DEPOSIT.

On the 1st of the year a contract was driving a drift near the fault underneath the Bessemer ore shrinkage stope at the East end of the mine in the S.E. deposit. During December 1914 and until Jan. 25th 1915, when the drift holed to the main haulage drift on the footwall, it was in Bessemer ore. After holing their drift the contract started to mine the ore in the back of the drift up to the floor of the old shrinkage stope, but this work had to be abandoned the 1st of February owing to ice in the haulage drift, which made it impossible to tram the dirt out.

In June a contract returned to this point and continued mining operations here. They blasted the back out of the drift until they had holed to the old shrinkage stope some 25 ft. above. Considerable ore had lodged on the footwall of the shrinkage stope, the greater part of which came down to the 2nd level when the old floor of the shrinkage stope was blasted out. Two gangs of trammers were employed here on each shift, starting with July and continuing through Sept., by which time they had trammed out all of the Silica ore which had come down to the 2nd level, after the floor of the shrinkage stope was blasted out. During these three months they obtained 6,330 tons of ore from this point. The contract which had worked here during July, was not able to work here again until October, when the Silica ore had all been removed. They started mining out the high grade ore pillar further to the West, and they have broken ore here for two gangs of trammers for the balance of the year. The greater part of the ore which they obtained during October, November and December, was non-Bessemer grade, but part of it was low enough in

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phosphorous for Bessemer ore. At the end of the year they had mined the pillar out back a distance of 75 ft., from the East end of the 2nd level ore body. They are now stoping the ore out up 20 ft. above the 2nd level, which is as high as the high grade ore extends at this point. As Mining operations have been started below the 2nd level underneath this point, the work here is being pushed as rapidly as possible, but it will be several weeks yet before work is completed here. There are two haulage drifts reaching this territory, and it has been possible to work two gangs of trammers here.

S. W. DEPOSIT.

During the year 1915 two raises were put up from the 2nd level in this deposit. In February a contract started raising on the North side of the main haulage drift about 100ft. West of the crosscut to the shaft. They completed the raise to a point 85 ft. above the 2nd level, the third week of March. This raise was put up to provide a chute for the ore which was obtained from the mining of a body of non-Bessemer ore which was found in the footwall. On completing this raise the contract was moved out 85 ft. in the haulage drift to a point 18 ft. East of the crosscut to the shaft, where they put up another raise a distance of 60 ft. above the 2nd level. This raise holed to a sub 60 ft. above the 2nd level, above which a shrinkage stope had been opened in the seam of high grade non-Bessemer ore in the footwall.

The above is a record of all the work done on the 2nd level during the year 1915.

SUB LEVELS.

S. W. DEPOSIT.

Mining had been practically completed on the 100 ft. sub level at the close of 1914. Two gangs were working here the 1st of January, finishing the mining of some small high grade ore pillars. They also took out some seams of high grade ore which extended through some Silica

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ore pillars near the footwall on this sub level. One gang finished work here the last of January, and the other gang the first week of February. Several Silica ore pillars were left on this sub level, which were later obtained by mining operations on the 85 ft. sub level.

The 85 ft. sub level was originally opened in Feb. 1914, when a drift had been driven on the North side of the deposit to the West end of the ore body. Mining started here in Sept. 1914, and at the end of the year four contracts were working here. In January 1915 there were five gangs of miners working here; all the ore had by this time been mined out back to the raises, and they were engaged in mining the pillars between the raises and the footwall. During the month of January one of the contracts started to drift on a seam of ore which had been encountered in the footwall when a drift was driven on this sub level to a point beneath the timber slide from the 1st level. Drifting was continued on this seam in February, and at the end of the month it was in 125 ft., where jasper was encountered in the breast, after which crosscuts were driven North and South to determine the width of the ore. The other four gangs of miners continued mining during February and until the middle of March, when it was necessary to move one of them down to the 70 ft. sub level. In April three gangs continued mining on the pillars in the main ore body until the latter part of the month, when one gang completed work here and was moved down to the 70 ft. sub level. Two gangs continued working here until the second week of June, when one of the gangs completed work and was moved down to the 70 ft. sub. Mining was continued by one gang on the 85 ft. sub during July and August, and until the third week of September, when work was completed here. Work was prolonged on this sub level due to the mining of the Silica ore pillars which had been left on the 100 ft. sub level. These pillars had crushed and supplied a large amount of ore when they were taken out on the 85 ft. sub level.

Work was continued on the seam of high grade ore in the footwall

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during March and April. After crosscuts had determined the width of the ore, which at the East end was 16 ft. wide, further West 20 ft., and at the West end only 12 ft., they started mining the ore in the back up to the jasper. The ore varied in height from 16 ft. to 30 ft. The ore was broken on top of the timber sets, and considerable of it was loaded without shoveling through holes made in the lagging above the sets. The showing of ore here was considered sufficient to warrant explorations at lower elevations to determine if it would be possible to open a shrinkage stope in this ore body. This ore was found again on the 60 ft. sub, where a shrinkage stope was opened and considerable of the ore mined above the 85 ft. sub was later run down in the shrinkage stope below. It was estimated that there was nearly two thousand tons of high grade non-Bessemer ore obtained from this seam of ore on the footwall above the 85 ft. sub level.

The 70 ft. sub, 15 ft. below the 85 ft. sub level, was originally opened in Feb. 1914 by driving a drift along the footwall the entire length of the deposit. At the East end the ore was found to extend under the hanging nearly 40 ft. further than on the subs above, and during the latter part of 1914 a contract mined out this area under the hanging at the East end of the 70 ft. sub. Mining was finished in this stope early in January 1915, and the contract which had worked here started opening the main 70 ft. sub by driving crosscuts and connecting all the raises to the drift along the footwall. As the contracts ~~was~~ finished mining on the 85 ft. sub, they were brought down to the 70 ft. sub level.

Mining was continued here until in September, when all the ore had been mined on this sub level. During May, June and July, and for a part of August, there were four contracts working on this sub level. Only a small amount of Bessemer ore was obtained near the hanging at the S.E. side of the deposit. Several seams of jasper appeared on this sub level in the good ore area, and the output of high grade ore showed

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a small decrease. These seams of jasper varied from 3 in. to 2 ft. in thickness, and it was necessary to mine them in order to cover the floors of the sub levels. The output of Silica ore increased on this sub level.

The 60 ft. sub level was opened in 1914 in the territory to the East of the 70 ft. sub level, directly beneath the part which had been taken out in the opening of the stope under the hanging. A drift had been driven to the North along the West side of this area, and from this drift several raises had been put up so that the ore could be loaded directly into the sub level cars. At the end of 1914 nearly all of this ore had been drawn from the 70 ft. sub. Work was continued here until about the second week of January, when there was a fall of ground in the open stope above, which crushed the drifts on the 60 ft. sub. The drifts were repaired and the balance of the Silica ore was taken out the last of January. At this time a drift was started to the North towards the footwall, which encountered the seam of high grade non-Bessemer ore which was being mined on the 85 ft. sub level. A drift was driven East and West on this ore to the rock, after which a raise was put up at the East end of the drift, which holed to the 85 ft. sub level. There was a horse of jasper between this ore body in the footwall and the main S.W. deposit, the ore in the footwall averaging about 18 ft. in width. Small raises were put up from the drift on the 60 ft. sub, and these raises were then all connected preparatory to starting a shrinkage stope here. A total of nine raises were put up, and stoping started at the East end, where a connection was made in April to the drift on the 85 ft. sub level. In May 600 cars were obtained from this small shrinkage stope, and in June 900 cars. Mining was finished here in August, after which the arches left between the raises were blasted out. South of this stope and in the territory beneath the area which had been mined out on the 70 ft. sub under the hanging, two contracts worked during May and June mining out the pillars. About 50 percent of the ore obtained from these pillars was Bessemer grade, the balance

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being non-Bessemer. All mining was completed here in August 1915. The area mined was only a small one under the hanging at the East end of the S.W. deposit, together with the small shrinkage stope in the footwall.

The 55 ft. sub, 15 ft. below the 70 ft. sub, was opened in February by a contract which drove a drift along the length of the deposit at a point just North of the raises. One contract continued developing here during the month of March, also April and May, by which time they had developed the ore body by one drift for its entire length, and also connected it by crosscuts to all the raises. They had also driven a drift North to the raise in the footwall, from which they obtained timber from the bottom of the timber slide on the 85 ft. sub. As the contracts finished mining on the 70 ft. sub, they came down and started mining on the 55 ft. sub level. Mining was completed on this sub level early in December.

The 40 ft. sub level, 15 ft. below the 55 ft. sub, was opened in July. This sub was also developed in a similar manner to the 55 ft. sub, i.e., by drifting the entire length of the ore body at a point near the raises, then connecting to the raises by short crosscuts. It was found that on this sub level that the most Westerly raise was back to the South of the fault in the rock at this elevation, and it required 18 ft. of rock drifting to reach this raise. It was also observed that the ore body was being cut off at the West end faster than it was extending to the East under the hanging, in other words, the ore area on this sub as well as on the 55 ft. sub, was smaller than it had been on the sub levels above. Mining was carried on here during the latter months of the year, five contracts working the greater part of the time, and at the end of the year about 85 percent of the ore had been mined on this sub level. All the ore at the West end had been mined out for a distance of 100 ft. back to the East, and the last of the year one contract dropped down to open the 30 ft. sub level. In order to facil-

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itate the handling of timber on the 40 ft. sub level, a drift was driven to the footwall, and a raise put up on the incline, which holed to the bottom of the timber slide on the 85 ft. sub. This permitted timber to be thrown down from the 1st level to the 40 ft. sub without handling.

The last of the year the work of opening the 30 ft. sub level was started by one contract near the East end of the deposit under the hanging. The Silica ore pillars which have been left behind, as also the bands of lean ore which occurred at various points in the deposit, have always crushed after mining was completed on the sub levels. In dropping down 15 ft. for a sub level, which means that 5 ft. of ore is caved from the back, it has been found that some of this lean material would work through the timber and contaminate the good grade ore. As the area of this poor material has shown a decided increase as depth has been gained, it was decided to try one sub level in the S.W. deposit which would be opened at a distance of approximately 11 ft. instead of 15 ft. as heretofore. It is uncertain as to the success of this method, as the ore is hard and requires considerable powder to break it. This may result in blasting out the timber, which will permit the drifts to cave. If this proves to be the case, this method of opening sub levels will have to be abandoned, but it was thought that the good results would warrant a trial, even though the expense of breaking ore might be increased a few cents per ton. At the end of the year the contract at the West end had crosscutted through the rock, and has just struck the ore North of the fault. At the East end two of the raises had been connected, and one contract was drifting to the West over towards the timber slide.

Results obtained by opening a shrinkage stope in the seam of high grade ore in the footwall were so good that it was decided to continue to mine this seam by the same method. Accordingly in August a

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sub level was opened at a point 20 ft. above the floor of the 2nd level from the raise which had been put up in this territory in 1915. A drift was driven North 25 ft. from this raise in good ore, where jasper was struck, which was followed to the East and West to the limits of the ore. The ore was found to extend 50 ft. East and 45 ft. to the West of the crosscut from the raise, which including the width of the crosscut, proved up a length of 105 ft. for this ore body in the footwall. A stope was opened here in October, and a number of chutes put up, which were connected a short distance above the drift. Two contracts worked here in October and November, by which time they had completed mining all the ore up to the stope which had been opened above the 60 ft. sub. All this ore was drawn out early in December, and in a short time it was noticed that the small floor left in the back of the stope had broken through, connecting this stope with the stopes above. The hanging above this territory has continually slabbed off, so that the open space has now been filled up to the 60 ft. sub level.

The ground above the S.W. shrinkage stope has continued settling from surface above the area which has been mined. The latter part of the year a section of the jasper hanging above the ore body caved down, since which time the sand above the capping has been running in over the workings at the East end of the S.W. deposit. This sand has been dry, and has worked down through the broken capping, until in some cases it has appeared at the point where work was in progress. This sand is fine, and when water comes in contact with it, it flows as readily as water. It has caused some trouble at several points, but it is not expected that there will be any serious difficulty in handling the small quantity that gets into the working places. The cave has now extended back beneath the West end of the rock pile on surface, and it is only a question of time until a large part of the rock pile will be drawn down into the cave here.

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In January 1915 there were nine gangs of miners mining ore on and above the 2nd level. This number was reduced by one in the summer, and for the balance of the year there were only eight gangs working on ore.

3rd LEVEL.

The work of opening the 3rd level was started the last of July 1914. During the month of August the plat was cut and a drift driven 100 ft. South of the shaft. On Sept. 1st, a drift was driven to the South, and then turned to the East to reach the downward extension of the Lloyd ore body and the Section 6 ore body. At the end of the year this drift was in a distance of 1140 ft. from the shaft. One hundred feet of this distance was figured as belonging to the plat, the balance of 1040 ft. was driven from Sept. 1st to Dec. 31st, 1914.

In January the drift advanced 298 ft. in twenty four working days. The ground had become harder than in the previous month, the drift being in quartzite and grayhacke. During this month a fan station was cut out on the North side of the haulage drift at a point 1000 ft. from the shaft, and the fan installed. This was a much larger fan than was used on the 4th level, and it was found that it emptied the drift of smoke and gas very quickly. In February the drift advanced only 252 ft., as the ground became much harder. In March the drift advanced 130 ft. in the first half, and 163 ft. in the second half, a total distance of 293 ft. for the month. During the first half of the month the drift continued in hard ground, but about the middle of March the drift was offset 9 ft. to the South, where softer ground was encountered, after which better progress was made. In April the drift advanced 340 ft., an average of 14 ft. for each working day. The grayhacke disappeared, and the drift was all in slate. During the latter half of April, and during the month of May, the automatic loader was used, which permitted of a faster advance. In May the drift advanced 406 ft. in twenty six working days, the average advance being 15 ft. 6 in. each day.

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Up to the 17th of June this drift advanced 205 ft., at which time it holed to the Eastern section of the same drift, which had already been completed by another contract. With the holing of these drifts, the entire main haulage drift to the Section 6 ore body was completed on the 3rd level.

In December 1914 a raise had been completed up to the 3rd level from the 4th in the Section 6 ore body, and a crosscut started from the top of the raise to the North to the line of the 3rd level haulage drift. The line of the 3rd level drift, was reached about the 20th of January, the total length of the crosscut from the top of the raise being 74 ft. to the far side of the haulage drift. The contract then started drifting to the East in the line of the haulage drift, carrying it full size. At the end of February they had completed 135 ft. of the haulage drift. In March they continued the drift 70 ft. further to the East, and also turned the curve to the North to crosscut to the Section 6 shaft. In April they holed the crosscut to the shaft and also cut out for No. 2 crosscut beneath the Section 6 ore body. The 3rd level haulage drift is located in the footwall to the North of the ore body, and the crosscuts to the ore were turned off to the South of the drift. In May this section of the haulage drift advanced 322 ft., which made a total advance in the main haulage drift of 470 ft. In June they continued working here until the 11th of the month, by which time they had advanced some 30 ft. beyond the point where No. 5 crosscut would be turned off. They then returned to the West end of this drift and drove it to the West until June 17th, when they holed to the contract which was drifting from the Lloyd Mine.

LLOYD ORE BODY.

NO. 1 CROSSCUT.

The latter part of 1914 this crosscut was driven to the South of the 3rd level haulage drift a distance of 114 ft., it was in slate,

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being in the footwall formation beneath the West fault. They also cut out on the West side of this crosscut for three raises. In March 1915 the work of putting up these raises was started. Chutes were built in all three raises, and it was decided to crib No. 2 raise all the way through to the 2nd level in order to have a traveling road. Numbers 1 and 3 raises were to be put up without cribbing until they reached the ore, from which point they would be cribbed up to the 2nd level. No. 1 raise was first put up, ore being encountered in April at an elevation of 149 ft. above the main level. The raise was continued up a short distance in the ore, and then No. 2 raise was started. Ore was struck in this raise at a height of 161 ft. in July, after which a contract started No. 3 raise, ore being encountered in this raise in August at an elevation of 153 ft. above the 3rd level. This raise was continued up some 10 ft. higher in the ore, after which the contract was moved to No. 1 raise, which they continued to a corresponding elevation with No. 2, then drifted South connecting with No. 2, and also drifted to a point above No. 3 raise. No. 3 raise was then continued until it holed to this sub level, which was opened at an elevation of 160 ft. above the 3rd level. After completing this work, they cut out for bearers in No. 3 raise, which was then continued through to the 2nd level, being cribbed from the 160 ft. sub. This raise holed to the 2nd level in the middle of November. For a short distance above the 160 ft. sub this raise was in high grade North Lake ore, then struck Silica, in which it was continued through to the 2nd level. On completing this raise the contract went back to the 160 ft. sub and continued No. 1 raise, which holed to the 2nd level in December. Bearers were also put in this raise, and it was cribbed from the 150 ft. sub up to the 2nd level.

On completing this raise, the contract went back to the 160 ft. sub and continued No. 2 raise, which at the end of the year was up 190 ft. above the 3rd level, or within 60 ft. of the 2nd level.

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Both Nos. 1 and 3 raises were in Silica ore the greater part of the distance between the 160 ft. sub and the 2nd level; No. 2 raise has also been in Silica ore. This condition is very discouraging, as it was anticipated from the drill holes which had penetrated this territory, that these raises would all be in high grade non-Bessemer ore. It seems probable that they have been located in seams of Silica ore which ran parallel with the formation, while between these seams there are other seams of high grade ore.

Developments on the sub level 160 ft. above No. 2 crosscut in the Lloyd ore body showed the high grade ore to have a width of 100 ft. at this elevation. It is apparently true from results noted in the raises above No. 1 crosscut, that from this point up to the 2nd level, a distance of 100 ft., there are seams of Silicious ore in the main ore body, which will materially reduce the output of good ore from this territory. There was a total of 690 ft. of raising in this crosscut in 1915, 465 ft. in rock and 225 ft. in ore, also 60 ft. of drifting in ore.

NO. 2 CROSSCUT.

This crosscut was located 200 ft. East of No. 1 crosscut, and was started in December 1914, in ore which had been encountered in the main haulage drift, and continued in ore until it reached a point 50 ft. due South of the main haulage drift, when it struck jasper. It was continued on to the South, passing through about 20 ft. of dike on the fault, when a few feet of ore was encountered, after which the drift again passed into dike. Ore continued to show in the back for a distance of 20 ft., but in the bottom there was rock, which at times extended half way to the top of the drift. The drift then passed into grayhacke, in which it continued for several days, then into dike again, after which it passed into ore. It continued in ore for 17 ft., then dike was struck, which gradually changed to slate. The crosscut was stopped at a point 170 ft. South of the main drift.

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No. 22 diamond drill hole from surface showed ore at the elevation of the 3rd level, which it had been thought from its surface location, must be South of the fault in the regular formation. It is evident from the conditions disclosed by No. 2 crosscut, that the ore encountered in this drill hole was ^{the} 17 ft. seam of ore which was shown up in the crosscut. It was also proven in this crosscut that the fault with a S.W. strike is of later date than the fault with the S.E. strike, as it has thrown the latter fault back to the West. On this theory it is evident that the ore encountered here, which is undoubtedly the same ore as was found by the drill, is merely some ore which has been dragged in along the fault, and does not in itself constitute an ore body. The ore was 20 ft. wide on the East side of the drift, and only 12 ft. on the West side, indicating that it is merely wedge shaped, and would likely cut out at a point about 30 ft. West of the drift. On completing the crosscut here in February, the contract cut out for three raises on the West side of the crosscut. These raises were located with 20 ft. pillars between them, and were later put up in preparation for mining the downward extension of the S.W. ore body below the 2nd level. Consecutive numbers are given the raises under the Lloyd ore body, so that these raises in No. 2 crosscut are called Nos. 4, 5 and 6.

No. 4 raise was put up to a height of 93 ft., jasper being struck at an elevation of 87 ft. This raise was in high grade non-Bessemer ore for the greater part of the distance, with Silica ore near the top before the jasper was encountered.

No. 5 raise struck jasper at an elevation of 70 ft. above the 3rd level, and was continued in jasper to a total height of 76 ft.

No. 6 raise was located a few feet South of the fault, and did not break through the fault until they reached a point 25 ft. above the level. This raise continued in ore until it reached an elevation of 173 ft. above the 3rd level, where jasper was struck, and the raise was

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continued up 3 ft. in this material, making the total height 176 ft. A sub level was opened at an elevation of 160 ft., in order to prove up the size of the ore body at this point. A drift was driven 15 ft. to the West and then to the South a distance of 38 ft. to the limit of the high grade ore. Crosscuts East and West near here showed only a small amount of good ore, with jasper on all sides. After exploring South of the raise, a drift was started to the West in lean ore. This drift was driven a distance of 120 ft., good ore being encountered 40 ft. West of the raise. Near the end of the drift a crosscut was driven to the South, also to the North, to determine the width of the ore which was found to be 100 ft. wide at this point. Eighty percent of this ore was non-Bessemer grade, averaging 59.50 iron, .075 phosphorous, and 20% of it averaged 59.00, .055 phos. The showing of good ore here was better than was expected. No further work was done on this sub level, or in the three raises in No. 2 crosscut during the balance of the year.

No. 7 raise was started in August on the East side of No. 2 crosscut in the small seam of ore in the fault gouge. The raise was up to a height of 30 ft. when work was abandoned here on account of the phosphorous running over one percent. The average analyses of the 30 ft. was 63.00 iron, 1% phos. This ore body will later be explored by drifts at a higher elevation, where it is not expected that the phosphorous will run so high.

Work was completed in No. 2 crosscut for the time being in August 1915, since which time no work has been done here. A total of 286 ft. of drifting has been done from No. 6 raise on the 160 ft. sub in exploring the ore body. There was a total of 375 ft. of raising done in this crosscut during the past year.

NO. 3 CROSSCUT.

It was decided to open another crosscut beneath the Lloyd ore body, from which raises would be put up inclining to the East to

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explore the ground at the East end of the Lloyd Mine. This crosscut was located 100 ft. East of No. 2 crosscut, and was started in March and completed the same month, its total length being 118 ft. including the curve, or 84 ft. South of the haulage drift. It started in ore, in which it was continued to a point about 35 ft. South of the crosscut. It then passed through 6 ft. of dike, and continued in ore until it reached the main fault, when it was stopped.

On completing the crosscut the contract working here cut out for two raises on the East side of the drift, these raises being known as Nos. 8 and 9. No. 8 raise was located in ore North of the dike, and No. 9 in the ore between the dike and the fault.

No. 8 raise was put up to an elevation of 125 ft. vertically above the 3rd level during the summer, at which point a sub level was opened in the foot of the raise in order to prove up the width of the ore. This raise was in non-Bessemer ore averaging 60% iron, .075 phos. from the 3rd level up to the 125 ft. sub level. Rock was encountered after drifting about 10 ft. in the foot of the raise, after which the ore was followed to the South. At a point 45 ft. South of the raise, dike was encountered, and the drift was turned to the S.W., where it continued in ore a distance of 100 ft., when the fault was encountered, and exploring work at this elevation was stopped. This raise was then continued above the 125 ft. sub, where it was in non-Bessemer ore for a short distance, and then passed into Silica ore. It was stopped at an elevation of 195 ft. above the 3rd level, with low grade ore in the back. No further work was done in this raise during 1915, and if it is continued to a higher elevation, it will have to be offset to the South, as it has evidently reached the top of the ore body at this point.

No. 9 raise was started in April, and was continued to a point 85 ft. above the 3rd level, where jasper was encountered in the back, and a sub level was opened. The floor of this sub was 79 ft. vertically

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above the 3rd level. A drift was driven 10 ft. to the East from the foot of the raise, from which point a crosscut was driven 10 ft. to the North and 30 ft. to the South. The drift to the South of the raise was in Bessemer ore averaging 60% iron, .040 phos. No work was done here for a short time while the 125 ft. sub was being opened from No. 8 raise. The showing on this sub level was such that it was decided to continue No. 9 raise, which holed to the 125 ft. sub in August. The raise was then offset more to the South, as it was thought that in this direction it would be more likely to continue in ore through to the 2nd level. It continued in good ore until it reached a point about 30 ft. below the 2nd level, from this point on through to the 2nd, it was in lean Silica ore averaging 47% iron. The raise holed to the 2nd level in a lean Silica ore pillar on the side of the haulage drift along the fault, i.e., at a point near the South side of the Lloyd ore body.

220 FT. SUB ABOVE 3RD LEVEL.

In October the contract which had put up this raise was brought down 30 ft. from the 2nd level, or to a point 220 ft. vertically above the 3rd level, where they opened a sub level to the North of the raise. The first 10 ft. of the drift was in Silica ore, and the last 20 ft. in high grade non-Bessemer ore. There was a small seam of dike crossing in the high grade ore, and a drift was started to the West in this ore North of the seam of dike. The drift advanced 30 ft. to the West, when it was stopped in Silica ore, after which they drove a drift to the East, starting South of the seam of dike. The ore at this point was only 9 ft. wide. The drift was continued due East a distance of 60 ft., where dike was encountered on the South side, and the drift then turned to the N.E., where it was continued 65 ft. further, at which point it reached the end of the ore body. The total length of the drift to the East of their raise was 125 ft. The ore here averaged 60.50 iron, .050 phosphorous.

The latter part of 1915 mining has been started on the 2nd level above this territory, and all the ore mined out above the East end of

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this drift. The ore here was very hard and tight, and it required considerable powder to break it. It was decided to start mining on the 220 ft. sub, and to take the ore out by overhand stoping, using raising drills. The drift was widened the full width of the ore body, which was only 15 ft. wide, and the back of the stope carried up a distance of 20 ft. above the sub level. By the end of 1915 this stope had been extended 55 ft. to the West, or to a point 70 ft. East of this raise. It is figured that the expense of mining the ore here by the regular sub level method would be prohibitive, and that the only way in which the ore could be obtained at a reasonable cost, was by mining it in an open stope.

During 1915 there was 446 ft. of raising done in this crosscut, and 385 ft. of drifting on the several sub levels.

The crosscuts in the Section 6 ore body have been given consecutive numbers starting with one. The raises in each crosscut are numbered by adding consecutive numerals to the designated number of the crosscut, i.e., in No. 1 crosscut the first raise is No. 11, in No. 2 the first raise is No. 21, etc. Under this plan the 2nd raise in No. 1 crosscut is No. 12, and the 2nd raise in No. 2 crosscut is No. 22, etc.

SECTION 6.

No. 1 crosscut was started early in June, at the time that the main haulage drift was being driven to the East to connect with the East section of this drift. At this time they cut out for the curve, and after holing the haulage drift, No. 1 crosscut was continued, and by the end of June was in 85 ft. The contact was struck at a point 40 ft. South of the haulage drift, and here a small amount of lean ore was found, which averaged 50% iron, .100 phos. Drifting was continued here for the first three weeks of July, when work was temporarily stopped on account of there not being sufficient motor cars to handle the product which was coming from the work in the Section 6 ore body. At this time it was in 190 ft. South of the haulage drift, and it was expected that ore would be encountered within a short distance. Work was resumed here on August 10th, and by the end of the month the crosscut had advanced 140 ft. further

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to the South. At a point 275 ft. South of the haulage drift they struck lean ore, which proved to be 55 ft. wide, the fault being struck on the last day of the month. It was expected that ore would be found near the fault, as diamond drill hole No. 58 from surface had shown ore at this elevation which averaged 57.36 iron, .132 phos. The drill hole was encountered in the crosscut at this point in lean ore averaging 54% iron; the general average of the 55 ft. of lean ore shown up in the crosscut was 51% iron, .200 phos. Results of the work at this point were very disappointing, as it had been expected that good ore would be found here, in fact the geological sections indicated an ore body at this point with a probable width of 60 ft., and a length of over 200 ft. It is probable that No. 58 diamond drill hole from surface followed a rich seam of ore through this territory, and failed to give a general average of the lean material near the fault.

A long test hole was then drilled to the South in the fault to make sure that it was not merely a seam of dike, after which no further work was done here until in December, when the ground was removed for raises at two points on the East side of the crosscut. The first of these raises was located 185 ft. South of the haulage drift, and will be put up to strike the ore shown up by diamond drill hole No. 62 from surface. This is the same ore body that was encountered by drifting on the 300 ft. sub level of the Section 6 shaft in June. It is high grade Bessemer ore, and the bottom of the ore in the drill hole is 218 ft. above the 3rd level. The 2nd raise was located at a point 285 ft. South of the haulage drift, and will explore for the ore shown up in No. 58 diamond drill hole from surface, at a point 200 ft. above the 3rd level. This ore is also high grade Bessemer, and is possibly the same body as that encountered in No. 62 drill hole at approximately the same elevation. At the end of the month these two raises had been timbered preparatory to actual raising.

SECTION 6.

No. 2 crosscut was started the 10th of July, and was driven

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through the rock to a point 33 ft. South of the main haulage drift, where ore was encountered. Work was then temporarily stopped here, and was not resumed again until August 23rd. The ore proved to be 22 ft. wide, with Jasper beyond it, in which the drift was continued a distance of 80 ft. At this point they encountered a dike, which proved to be 10 ft. thick; beyond this dike the drift passed through 32 ft. of high grade non-Bessemer ore, and was continued 3 ft. into the main dike on the fault. This made the entire length of the crosscut 180 ft. South of the main haulage drift. It was decided to drive a haulage drift to the West, following the seam of high grade ore near the fault, this drift being started from the crosscut on a curve of standard radius for motor haulage. It passed through 54 ft. of rock, when it struck the ore, in which it was continued a distance of 170 ft. About 20 ft. from the end of the drift rock came in the bottom, which was very flat, and the ore did not disappear in the back until the drift had advanced 20 ft. further. The drift was then continued about 10 ft. further to the West in the rock in order to make sure that it was not merely a seam, but the rock grew harder, indicating that it was probably part of the material which was found along the main fault. After this rock had been mapped on the geological sections, it was evident that it was a roll in the fault, which had swung around to the North at this point, cutting off the ore body. For the last 80 ft. of the drift dike showed on the North side, and a crosscut put in to the South 45 ft. back from the breast, shows the ore body at this point to be only 22 ft. wide. The indications were that the ore encountered here is merely a seam near the fault between a dike and the main fault.

The total length of No. 2 crosscut, including the drift to the West along the dike, is 365 ft. There was a 22 ft. seam of ore shown up on the footwall just South of the slate, and a 32 ft. seam of ore near the fault was developed by a drift for a distance of 140 ft., or including

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the crosscut, it has been proven up for a distance of 180 ft. Five raises have been put up in this crosscut.

No. 21 raise was located in the center of the 22 ft. seam of ore near the footwall. The raise was started in August, and at the end of the month was up 50 ft. in ore which averaged 59.50 iron, .170 phos. Raising was continued during September, but early in the month the raise passed out of the high grade ore into the lean ore at a point about 65 ft. above the 3rd level. Early in October it reached an elevation of 100 ft., the last 35 ft. being in lean ore averaging 48% iron, .200 phos.

A sub level was then opened from No. 21 raise, and this will be reported under the 550 ft. sub level, Section 6 shaft.

No. 22 raise is located in the 32 ft. seam of ore near the fault, 165 ft. South of the main haulage drift. This raise was not started until in December, and at the end of the month was up 49 ft. above the 3rd level in ore. A dike was encountered in the back of the raise at this elevation, which came in from the North side. It was decided to drive a crosscut at this elevation to prove up the width of the ore, to determine if it would be advisable to continue the raise. The crosscut showed the ore to be only 17 ft. wide at this point, and it is probable that the raise will later be offset and continued up to the top of the ore body.

No. 23 raise is located in the drift to the West in the seam of ore near the fault. This raise is 50 ft. West of No. 22 raise. It was started in November, and at the end of the month was up 78 ft. in high grade North Lake ore. In December it was continued to an elevation of 104 ft., when work was stopped. At an elevation of 80 ft. above the 3rd level the ore body seemed to narrow up, and from this point on up to the top of the raise the ore was only about 8 ft. wide. The rock on the foot and hanging side of the raise then seemed to come together and completely cut off the ore at the point where the raise was stopped.

No. 24 raise was located 50 ft. West of No. 23 in the same seam

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of ore near the fault, it was started in October and put up 102 ft., above the 3rd level, at which point rock was encountered in the back, and the raise was stopped. The ore in this raise was narrow in the last 25 ft., the same as in No. 23 raise. It averaged 60% iron, .080 phosphorous. It was finished in November, since which time no further work has been done here.

No. 25 raise is located 50 ft. West of No. 24, in the same ore body, and was started in October. It was the first raise which was put up in this ore body near the fault, and is located near the West end of the drift. It started in high grade North Lake ore, and at the end of October was up 65 ft. It continued in ore until it reached an elevation of 104 ft. above the 3rd level, where a dike came in from the West side and completely cut off the ore.

Numbers 22 to 25 raises inclusive, have all been put up in the seam of high grade North Lake ore near the fault. It is planned to thoroughly explore this territory by raises and drifts, preparatory to starting mining operations here. Drifts must be driven through the dikes to the North at the top of the raises to determine if there is any other ore bodies at this elevation, in which case it may be necessary to continue these raises up in rock to a higher elevation to reach the top of the ore body before mining is started.

SECTION 6, NO. 3 CROSSCUT.

This crosscut is located 100 ft. East of No. 2 crosscut; it was started early in July, and ore was encountered after drifting 45 ft. in rock. It was not possible to handle the ore at this time, and work was stopped for about ten days, being started again on July 23rd, and at the end of the month the crosscut was in 91 ft. South of the main haulage drift. In August it was extended 40 ft. further to the South, making the total length of this crosscut 131 ft. Ore was encountered at a point 45 ft. South of the haulage drift, which continued

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for 39 ft., when a dike one foot thick was encountered, with ore behind it. There was 5 ft. of ore behind the dike, then another small dike, then 5 ft. of ore, beyond which the drift passed into jasper. It was continued a short distance in the jasper, and the breast is probably about 10 ft. from the main fault. Sufficient territory was opened for three raises, which is all that there is room to put up across the deposit, so that it was not considered necessary to continue the crosscut further to the South in rock.

No. 31 raise was located near the footwall in the ore body; it was started in August in high phosphorous North Lake ore. At the end of the month this raise was up 54 ft., when work was temporarily stopped here. Work was started again in the latter part of December, and this raise is now being continued up to the elevation of the 1st sub level 100 ft. above the 3rd. Good ore continued to a point 70 ft. above the 3rd level, and at the close of the year the raise was in jasper.

No. 32 raise was started in August, and at the end of the month was up 16 ft. above the 3rd level. This raise was located 20 ft. South of No. 31 raise, and started in good ore, but encountered a small dike in the back after raising a short distance above the 3rd level. No further work has been done in this raise since August, and it will depend on developments on the 100 ft. sub whether it will be advisable to continue this raise.

The ground was also removed for No. 33 raise, but this raise has not yet been started, and it is very doubtful whether it will be needed. It is located 20 ft. South of No. 32 raise, and there is ore, dike and jasper in the crosscut at this point.

SECTION 6, NO. 4 CROSSCUT.

This crosscut was located 100 ft. East of No. 3, and was started about July 15th. Ore was encountered after drifting 45 ft. in rock. Drifting continued a distance of 47 ft. in ore, when a dike was encountered, which proved to be 5 ft. thick, with 15 ft. of ore behind it, after

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which the drift passed into the main fault on the South side of the ore deposit, in which it was extended 20 ft. The total length of the cross-cut is 130 ft., of which 70 ft. was in ore.

No. 41 raise was located near the footwall in the ore; it was started in August, and at the end of the month was up 27 ft. in high phosphorous non-Bessemer ore. At the end of September it was up 109 ft. on the incline, and early in October it reached the elevation of the 550 ft. sub, where they cut out for a sub level, drifting 10 ft. to the East and 20 ft. to the West of the raise. The raise was started again in November, being offset 10 ft. to the East so as to break the fall of dirt. It was continued to an elevation of 167 ft. above the 3rd, at which point jasper was encountered in the back, and raising was temporarily stopped. Work was resumed in this raise the last of December, and it will be continued to an elevation of 200 ft. above the 3rd level and perhaps higher, if the showing of ore on the 200 ft. sub warrants it. At the close of the year the raise was up 180 ft. above the 3rd level, the last 20 ft. being in jasper. This raise was in ore a distance of 165 ft. above the 3rd level.

No. 42 raise was started in August, and the first 20 ft. was in high phosphorous non-Bessemer ore, after which lean ore was encountered and it was continued through to the elevation of the 550 ft. sub in this material. At the 550 ft. sub they drifted 10 ft. to the East and 20 ft. to the West of the raise, also crosscutted to the North connecting with the drift from No. 41 raise. Work was completed in this raise in October, and no further work has been done here since.

No. 43 raise was started in November from the 3rd level, and early in December reached the elevation of the 550 ft. sub. This raise was in mixed ground consisting of ore, dike and jasper. At the elevation of the 550 ft. sub level they drifted 10 ft. East and 20 ft. West of the raise, and then crosscutted 20 ft. to the North, holing to the drift driven West from No. 42 raise. Raising was continued above the

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550 ft. sub after the raise had been offset 10 ft. to the East. At the end of the year this raise was up about 35 ft. above the 550 ft. sub, the back being in jasper and dike.

At the end of 1915 three raises had been put up in No. 4 crosscut to the elevation of the 550 ft. sub. Two of these raises were in rock at this elevation, and the other in ore.

SECTION 6, NO. 5 CROSSCUT.

This is the most Easterly crosscut that has been opened under the Section 6 ore body up to this time. From the cross-sections which have been made of this ore body from diamond drill holes, it was figured that the raises from this crosscut would continue in ore all the way through to the open pit, a vertical distance of 620 ft. This crosscut was started from the main haulage drift the middle of July, and ore was encountered after drifting 45 ft. in rock. The ore here proved to be 45 ft. wide when the main fault was encountered, in which the drift was continued 60 ft. further South to make room for raises and for motor cars, as the ore from the mills in the open pit will come down in the raises in this crosscut. The total length of No. 5 crosscut, is 150 ft., the total width of the ore here is 45 ft.

No. 51 raise was started in August, and was located in the ore body near the footwall. This raise reached the elevation of the 550 ft. sub in October, where a drift was driven 10 ft. East and 20 ft. West of the raise, and a crosscut driven 20 ft. to the South to connect with the drift from No. 52 raise. The raise was offset 10 ft. to the East on the 550 ft. sub and continued. In Nov. it reached the elevation of the 450 ft. sub, where similar drifts were driven, after which the raise was offset 10 ft. to the East and again continued. At the end of Dec. this raise had reached an elevation of 291 ft. on the incline above the 3rd level. The next offset in this raise will be made at a point 150 ft. above the 2nd sub, or at a point 350 ft. vertically above the 3rd level. The raise continued in high phosphorous North Lake ore until it had reached a point 240 ft. vertically above the 3rd level, where jasper was encountered in
(the back on the West side and

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also on the South side of the raise. Ore was still showing on the North side, and it was decided to drive a small drift to the North in order to gain some knowledge of the width of the ore body at this point. The drift showed 30 ft. of ore to the North between the raise and the footwall. Raising was continued, and the last of the year the jasper was falling back, indicating that the raise would soon pass into ore again.

No. 52 raise is located 20 ft. South of 51 raise, and was started in high phosphorous North Lake ore. There was a 2ft. seam of blue ore in this raise, and the material broken here averaged 63% iron, .150 phos. In October this raise reached the elevation of the 550 ft. sub, where it was connected by a drift with the drifts which had already been driven from No. 51 raise. This raise was also offset 10 ft. to the East at this elevation, after which it was continued, reaching the elevation of the 450 ft. sub level in November. Here drifts were driven East and West of the raise, and a connection again made to the drifts which had been driven from No. 51 raise. The raise was again offset 10 ft. to the East, and continued, and at the end of the year reached an elevation of 296 ft. on the incline above the 3rd level. The section on which they are now raising will be 150 ft. in height, after which they will again make connections with No. 51 raise.

No. 53 raise is located 20 ft. South of No. 52 raise in the dike on the fault. The ground was removed for this raise in August, but work was not started here until in November. The ground here was hard, so that no cribbing was installed in this raise, except above the chute at the bottom for a distance of 15 ft. This raise reached the elevation of the 550 ft. sub in December, where a connection was made with the drifts driven from 51 and 52 raises. This raise was also offset 10 ft. to the East, and the last of the month work here was again started. The raise was up 115 ft. vertically above the 3rd level at the end of the year. The ground in the back is gradually getting softer, so that it is probable that they may have to return to the 550 ft. sub and install cribbing from this point

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up. This raise should break through the dike into the ore body by the time it reaches the elevation of the 450 ft. sub level.

The following brief resume is given of the work done in the Section 6 ore body in order to show what has been accomplished since the ore body was first opened in the latter part of June.

The main haulage drift from the Lloyd shaft was driven a distance of 2439 ft. in 1915, in two sections, one of which was 1794 ft. long, and the other 645 ft. long. Five crosscuts have been driven beneath the Section 6 ore body to the South of the haulage drift, and also a drift driven North 80 ft., holing to the Section 6 shaft. There has been a grand total of 3640 ft. of motor haulage drift completed in 1915 on account of the Section 6 ore body; also a total of 1630 ft. of raising done up to Dec. 31st, 1915. The cost of this work was charged to account No. 177, "Extraordinary Drifting" until Sept. 1st, since which time all the charges for this work have been taken up directly in the operating accounts.

SECTION 6 SHAFT.

The work of sinking the shaft from surface to meet the raise coming up from the 4th level, was started on Dec. 21st, 1914, and by the first of the year the shaft was down 28 ft. below surface. At this time there was 441 ft. of ground between the bottom of the shaft and the raise. Sinking was continued in January until they reached a point 35 ft. below surface, after which they cut hitches for bearers at a point 24 ft. below surface, and timbered the shaft. Nine sets of close timber were put in above the ledge, and two sets with 6 ft. studdles below ledge. Water was encountered at a depth of 55 ft. below surface, and it was necessary to put in a No. 5 Knowles pump, which had to be kept operating nearly all the time to keep the water out. It was not expected that there would be any water in the shaft, as the ledge was only 8 ft. below surface, and no water had been encountered to a depth of 50 ft.

Three eight-hour shifts were authorized in January, and good pro-

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gress would have been made if trouble with water had not developed . At the end of January the shaft was down 80 ft. below surface, with 65 ft. timbered. At this time there was 299 ft. of solid ground between the raise and the shaft. In February the shaft was sunk 59 ft., the total depth at the end of the month being 139 ft. Water seriously interfered with the work in the shaft during the first half of the month, but after the middle of the month it decreased and caused no further trouble. In March the shaft was sunk 64 ft., the total depth at the end of the month being 203 ft. There was 6 ft. of ground between the bottom of the shaft and the raise at this time. During the month a drift was driven in 15 ft. South of the shaft on the 150 ft. sub level, and bearers put in the shaft at the elevation of this sub. The shaft holed to the raise on April 3rd. Stripping was then started, and on April 24th the shaft was timbered down to the 300 ft. sub level. The raise from the 4th level was put up full size a distance of 575 ft., and from this point on, a small raise 6 ft. in diameter was put up 71 ft., making the total height of the raise 646 ft. above the 4th level. After the shaft holed to the small raise, it was necessary to strip the small raise to the full size of the shaft. This work was all completed in April, and six sets of cribbing were removed from the full size raise in order to reach the 300 ft. sub level.

A drift was started on the 300 ft. sub level to the South of the shaft on April 26th, and no further work was done in the shaft until June 4th. The ground from the drift was dumped in the raise, and work in the shaft was impossible while drifting was in progress.

On June 4th bearers were installed at the elevation of the 300 ft. sub level, after which the cribbing was removed from the raise and the shaft timbered. On June 25th the 450 ft. sub level was reached, where a drift was driven 15 ft. South of the shaft, and bearers installed. Timbering below the 450 ft. sub level was resumed early in July, and by the 15th of the month the 550 ft. sub level was reached. A drift was

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driven 18 ft. South of the shaft on this sub level, after which bearers were installed in the shaft and timbering resumed. The 3rd level, 650 ft. below surface, was reached early in August, and bearers were also installed here. The 750 ft. sub level was reached about August 25th, and a drift was driven 15 ft. South of the shaft on this sub. Timbering was then resumed, and the pocket on the 4th level was reached about Sept. 15th. The pocket was then torn out, and a small winze 6 x 8 ft. in size sunk 22 ft. below the 4th level under the pipe compartment of the shaft. The pipe for the counter balance weight on the cage had to extend at least 20 ft. below the 4th level in order to permit the cage to be hoisted above the collar on surface. This work was completed the last of Sept., after which the balance of the shaft timber was installed down to the 4th level. The ground South of the shaft was removed to a height of 20 ft. for a distance of 15 ft. to the South, after which a pocket was built here.

The material which came from sub levels later in the year, was handled in two ton tram cars on the cage and brought to the 4th level, where it was dumped in this pocket and loaded into motor cars.

On completing the pocket, the crew of miners were reduced to two men on day shift only, who completed installing casing plank and runners, and also cleaned the shaft sets and ladder sollar throughout the entire shaft.

Landing catches for the cage were also installed on the sub levels, and also on the 3rd level of the Lloyd. The 12 in. pipe in which the counter balance will run, was also put in the last of October. In November the conduit pipe for the electric wires for lighting system, electric bells and telephones, was installed, and in December the wires were put down. Lights, telephone and bells have been installed on the 1st and 2nd sub levels, also on the 3rd level. The balance of sub levels above the 3rd will be equipped as soon as the material for this work is received at the mine.

The Section 6 shaft started operating on December 13th, when drifting was started on the 1st and 2nd sub levels.

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During 1915 the shaft was sunk full size a distance of 180 ft., and stripped to full size for a distance of 71 ft. It was timbered its entire depth, or 854 ft. Work in the raise to surface was started in Sept. 1914, so that it required 12 months to finish the shaft, although it did not start to operate for fifteen months.

RAISE TO SURFACE, SECTION 6.

At the end of the year 1914, this raise was up 381 ft. above the 4th level, or within 373 ft. of surface. It was in dry ground, and was so dusty when drilling was being done, that the miners had to be provided with respirators.

In Jan. the raise was put up 90 ft., and in Feb. 99 ft., the total height at the end of Feb. being 570 ft. above the 4th level. The cribbing by this time had become badly worn due to rock falling down after each blast when an opening was made through the covering over the raise. It was not considered safe to continue the raise full size, and on March 2nd a small raise roughly 6 x 6 ft. in size was started in the center of the full size raise. The small raise was put up a distance of 71 ft., when work here was stopped, as the blasting above in the shaft made it dangerous for the men working in the raise. The total height of the raise from the 4th level, including the small raise, was 646 ft., of which 194 ft. of full size raise was put up in 1915, and 71 ft. of small sized raise. (The shaft from surface holed to the raise on April 3rd.) During the time that the small raise was being put up, the cribbing in the large raise was repaired to avoid the danger of its collapsing while the shaft was being timbered. Two miners on a shift worked three weeks on this job.

A summary of the work done in the Section 6 shaft in 1915, shows 265 ft. of raising, 180 ft. of sinking, 71 ft. of stripping and 854 ft. of timbering.

550 FT. SUB, or 4TH SUB, SEC. 6 SHAFT.

This sub level had been opened at the shaft by drifting in 20 ft.

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to the South. It had also been opened at the raises put up in Nos. 2, 4 and 5 crosscuts. Drifting to connect these various sections was started in October by drifting from No. 21 raise to the shaft. At this raise a drift was driven 30 ft. to the East, ore being encountered after advancing 20 ft. in jasper. A crosscut was then driven North to the footwall in the ore, from which point the drift was turned to the N.W. towards the shaft. The drift was continued to the N.W. for a distance of 180 ft., holing to the drift from the shaft the last of November. This drift was in rock the entire distance. On completing this connection, the contract returned to a point near 21 raise and drifted to the East along the footwall in the ore. After drifting 170 ft. in ore, they holed to a drift which had been started along the footwall from the top of No. 41 raise. They holed to this point the last of December, and were then brought back to ~~the~~ crosscut to the South, from which connections could later be made to the raises which would be put up from No. 3 crosscut. This drift was in 20 ft. in ore at the end of the year.

Early in November a contract was brought to the top of No. 41 raise, from which point they crosscutted to the North until they reached the footwall. They drifted 30 ft. to the West, and then returned to their crosscut and started drifting to the East. In December they reached a point opposite 51 and 52 raises, from which point they crosscutted to the South until they holed to the section of the sub which had already been opened at the top of these raises. All of the above drifts were in ore.

At the end of the year this sub level had been developed by a drift along the footwall from No. 2 over to No. 5 crosscut, a distance of 270 ft. In addition, there was a drift to the Northwest into the footwall, a distance of 180 ft., where connections were made with the Section 6 shaft. The crosscut connecting Nos. 51, 52 and 53 raises, was 70 ft. long, as was also the crosscut connecting Nos. 41, 42 and 43 raises. Including the connection with No. 21 raise, as also the crosscut which had been started near the points where No. 31, 32 and 33 raises will hole, there has been a total

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of 650 ft. of drifting already completed on this sub level. The ore body along the footwall has been proven up at this elevation for a distance of 270 ft. The width of this body at the West end near the jasper hanging, is about 20 ft. At the point where the raises from No. 5 crosscut on the 3rd level holed, the ore body is 40 ft. wide. There is more rock showing on this sub level than was shown up on the 3rd level. As yet no explorations have been conducted in the seam of ore along the fault at this elevation, and it is possible that the developed ore on this sub will be largely increased when the territory along the fault has been opened up.

450 FT. OR 3RD SUB, SEC.6 SHAFT.

This sub level has been opened from the Section 6 shaft by a drift which was driven 18 ft. South of the shaft last summer. It has also been opened at 51 and 52 raises, which have been connected by a drift at a point 10 ft. West of the raises. The last of December a gang of miners were brought to the shaft to drift to the South for a short distance in order that the hoisting bells and lights can be installed here, without danger of being broken when this sub is opened up later. At the end of the year this drift had advanced 10 ft., or to a point 28 ft. South of the shaft. Including the drifting which has been done at 51 and 52 raises, which are 480 ft. East of the shaft, there has been a total of approximately 100 ft. of drifting done on this sub level.

300 FT. OR 2ND SUB, SEC. 6 SHAFT.

Work was resumed on this sub level on Dec. 13th, when the Section 6 shaft hoist went into commission. In the latter part of April a drift had been started from the shaft to prove up the deposit of Bessemer ore which had been found in the hanging of the main ore body by three diamond drill holes from surface. This drift was driven a distance of 120 ft. South of the shaft and then turned to the S.W. By the end of May it was in 245 ft. from the shaft. It was continued a distance of 15 ft., or to a point 260 ft. from the shaft, when a full breast of high grade ore was

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encountered and drifting stopped. A diamond drill was then brought here and three holes drilled, which will be reported under diamond drilling underground.

Work was then resumed in the shaft, and nothing further was done here until Dec. 13th, when drifting was resumed in the ore, and the drift advanced 30 ft. before striking jasper. This ore averaged about 61% iron, .058 phos. When they had advanced about 10 ft. in ore, they encountered No. 57 diamond drill hole from surface, the hole being about 20 ft. South of its surface location. The contract was brought back near the contact to a point about 100 ft. South of the shaft, where they started drifting to the East in a seam of ore which had been encountered here. After advancing 15 ft., however, the grade of the ore dropped below 50% iron, and it was decided to stop drifting at this point, as the material here was tight and hard, and slow progress would be made in drifting. The contract was then brought back to a point 45 ft. South of the shaft on the contact of the slate and jasper, and a drift started to the East. At the close of the year 1915, this drift was in 25 ft. East of the crosscut from the shaft.

In order to permit of the development of the Section 6 ore body, so that mining can be started at surface in the open pit, it is absolutely necessary that connections be made to the shaft on this sub level as soon as possible. Water has been obtained for the Leyner drills by putting a pipe in No. 57 drill hole, which was encountered on this sub. It is hoped to make an advance of at least 300 ft. per month in this drift, which must be driven 500 ft. to the East before crosscutting to the South to reach the location of the raises which will come from No. 5 crosscut on the 3rd level. At the close of the year there had been 320 ft. of drifting done on this sub level.

150 FT. OR 1st SUB, SEC.6 SHAFT.

This sub level was opened last spring by a drift 15 ft. South

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of the shaft, at the time that the shaft was being sunk from surface. Work was resumed here on Dec. 13th, when a crosscut was driven to the South to the contact, a distance of 50 ft., making the total length of the crosscut from the shaft 65 ft. The contract which had done this work was then taken down to the 3rd sub level for a short time, after which they will return to this sub and start drifting to the East. The crosscut on this sub level to the East will be 585 ft. in length. It will be driven in the footwall, where it is hoped to make rapid progress. This sub level will be the milling sub, as it is planned to drive a drift along the footwall of the ore body beneath the open pit, from which drift three mills will be put up to mine that portion of the ore body which lies to the East of the point where the raises will hole from No. 5 crosscut on the 3rd level. It will probably be necessary to put up a raise in rock on both the foot and hanging side in order to catch the water which will come in on the sides of the open pit. The ore broken in the mills to the East, must be trammed to one of the raises coming up from No. 5 crosscut. It is hoped that the ore body will prove to be such that mill operations can be carried down to the depth of this sub level, which will be approximately 120 ft. below the top of the ore body. In order to prepare the open pit for mining in May, it will be necessary for the drift on this sub level to reach this territory in March, and for this reason work will be pushed here as rapidly as possible.

The rock which has come from the 1st, 2nd and 3rd sub levels since Dec. 13th, has been handled by the cage in the Section 6 shaft. While drifting in ore was in progress on the 2nd sub, the ore was lowered in cars on the cage to the 4th level, where it was dumped in the loading pocket. The rock^{was} hoisted in cars on the cage to surface, where it was dumped. As soon as the work on ore was stopped, it was decided to send the rock to the 4th level, from which point it was trammed to the Lloyd shaft by motor cars and sent to surface. In order to keep

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the top trams operating during severe cold weather, particularly during stormy periods, it is always necessary to put additional men on the top tram. If the rock from Section 6 were handled on surface at that shaft, it would be necessary to have landers here, while if this same rock was sent to the Lloyd, these landers would be available to keep the top trams operating at the Lloyd; also the facilities for handling rock on surface at Section 6 are poor, as the shaft is not designed to permit of a landing platform above the collar of the shaft. This makes a low dump, so that any quantity of rock would extend the tram a long distance from the shaft. As soon as connections are made to the raises on the subs, the material will be sent down in the raises instead of on the cage in the shaft.

UNDERGROUND DRILLING.

During 1915 four underground drill holes were drilled at the Morris-Lloyd Mine. Three of these holes were drilled on the second sub level of the Section 6 shaft, in order to gain some idea of the size and extent of the Bessemer ore which had been shown up by three drill holes from surface. These holes were located near the breast of the drift about 260 ft. S.W. of the shaft.

The first hole was No. 18, and was started on the 5th of June and completed on the 8th. It was drilled on a course of South, 33 degrees West, starting in lean ore and stopping in jasper. From a depth of 5 to 25 ft., it was in good ore averaging 62% iron, .062 phos.

The second hole, No. 19, was started on June 8th, and completed on June 9th; it was drilled on a course of South, 59 degrees West from the same station as hole No. 18. It showed 35 ft. of ore averaging 61% iron, .037 phos., and was stopped in jasper.

The third hole, No. 20, was drilled from the same station, on a course of North, 68 degrees West. It was started on June 10th, and completed on June 12th. Following is a result of this drill hole;

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Hole No. 20.

DEPTH.	IRON	PHOS.
0 to 5 ft.	48.40	.064
5 to 20	56.30	.068
20 to 40	61.70	.068
40 to 45	53.80	.078
45 to 50	Jasper	
50 to 60	55.00	.105
60 to 70	52.60	.092
70 to 85	Jasper	

These three holes indicated a 30 ft. seam of ore, with an approximate length of 80 ft. The ore near the hanging or South side, was apparently a high grade Bessemer ore, while on the foot or North side it is non-Bessemer, and not quite as high grade. The limits of this ore body, however, are not accurately determined, but it is evident that there is sufficient ore here to warrant further explorations and the putting up of raises from the 3rd level to mine it.

On completing the drilling at Section 6, the drill was brought to No. 1 crosscut on the 3rd level of the Lloyd Mine, where a hole was drilled to the South. The work in No. 2 crosscut here had indicated that the fault, with a S.W. strike, was more recent than the other fault, which has a S.E. strike. As there was ore showing in No. 2 crosscut at the junction of these two faults, it was thought possible that this ore would continue to the West along the S.W. fault. This hole was put in to determine if this ore continued to a point 200 ft. West of No. 2 crosscut. It was started in slate in the footwall back of the fault with a S.E. strike on June 14th, and was completed June 25th, being drilled to a depth of 225 ft. in slate without striking any change of ground. The core did not indicate that it had passed through the fault with a S. W. strike, which should have been encountered within a distance of 150 ft. As no ore was shown up in the hole, it was not considered advisable to do any further drilling at this point.

From the results of this drill hole, it seems probable that the S.W. fault in No. 2 crosscut had merely dragged in along its course some of the ore in the trough, and that this ore does not extend any distance to the West of No. 2 crosscut.

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ACCIDENTS TO EQUIPMENT.

The first accident of the year occurred on Jan. 18th at 11:30 A.M., when one of the coils on the starting transformer of the Nordberg compressor burned out. It required eight hours to repair this transformer. There was no loss of product, and no interruption in mining work, as air was furnished by the Ingersoll-Rand compressor while the Nordberg was out of commission.

On Jan. 25th, at 10:30 A.M., the South skip at the Morris shaft was pulled up against the sheave at the top of the shaft. The rope broke loose from the skip, but luckily the skip tipped over and wedged in the shaft. It is thought that the accident was caused by the North skip freezing to the runners when the South skip was stopped at the top tram, and then the North skip broke loose from the runners just as the South skip was dumping, probably dropping a short distance, which caused the South skip to be pulled up out of the dump against the sheave. The brake was set on the drum, but the drum moved in spite of this fact with the power turned off, so that this explanation of the accident seems reasonable. It required eight hours to make repairs, so that hoisting was resumed when the night shift started work. As the Morris Mine was not operating at anywhere near capacity, it was possible to make up the hoist on night shift, so that no product was lost on account of this accident.

On Feb. 22nd, night shift, one of the 1000 gallon pumps of the main pumping plant, broke a flange on the foot valve, due to excessive pressure. The pump was out of commission eight hours while repairs were being made. As all the water is handled by one pump, this accident did not effect the operation of the mine.

On March 11th, at one o'clock, the South skip at the Lloyd Mine caught in the timber when the skip was being hoisted at full speed. The skip turned over in the shaft, tearing out three sets of timber, and bending the skip cradle. Operations were resumed at 12:30 P.M., on March 12th, and it was estimated that 250 tons were lost on account of

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this accident on March 11th. It was assumed that this accident was caused by a piece of rock or ore getting on the bottom of the cradle beneath the skip, which caused the skip to tip over, causing it to catch in the shaft timber.

On April 8th, the Nordberg compressor was out of commission for three hours, due to a short circuit in the auto starter.

On October 12th, there was a one and one half hours delay on the Nordberg compressor, due to a nut coming loose on the valve stem on the head end of the low pressure cylinder dashpot.

SURFACE.

During the early months of the year a small surface crew was kept at the mine for unloading lagging and mine timber. In April other surface work was taken up, the surface around the mines and the location being cleaned; also the work of repairing the steam shovel was started.

This work was continued during May, and the new roof for the shovel was completed in June, after the shovel had gone into commission.

Considerable work was done on the trestles and stockpile grounds during the past year. In the summer sixteen bents of the East stocking trestle at the Lloyd Mine was dismantled in order to clean up the Silica ore which was stocked here. All the ore was removed here, after which the trestle was re-erected. Neither the North Lake or North Lake Bessemer piles were cleaned up in 1915, and before stocking could start in the fall, it was necessary to line up the tracks on this trestle again. Several legs had broken off where the stockpile was not entirely filled, and it was necessary to put in short legs here. As soon as it was known that the North Lake pile would not be removed, the work of preparing trestle timber and legs, as well as laying plank on a new stockpile ground for a single track trestle to the East of the Lloyd shaft, and North of the present pile was started. This trestle was put up the last of the year, there being eighteen bents erected here, six bents of which will be permanent trestle and twelve bents stocking trestle.

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Sales made to the furnaces in the fall, have taken care of the entire product of this grade, and thus far it has been unnecessary to start stocking from this new trestle. ~~summer the garbage was removed weekly.~~

~~For the~~ The North stocking trestle at the Morris was dismantled in order to permit of loading out the Morris Bessemer pile, as also one of the two Morris piles here. This trestle was re-erected in the fall, and it was necessary to replace a number of legs which had rotted off. ~~ess-~~

~~ive rain~~ During 1915 the greater part of the Silica ore pile West of the Lloyd shaft was loaded out. The sales of this ore, however, were not large enough to permit of tearing down the trestle here. After steam shovel loading stopped in November, it was necessary to start hand loading from this pile in order to fill the orders from furnace plants. Hand loading of North Lake ore has also been necessary, as there was not sufficient ore of this grade hoisted to fill the orders. ~~that all the Chase houses were occupied as soon as they were completed.~~

WATER SUPPLY.

WELFARE.

Owing to the heavy rainfall during the year 1915, the spring has provided nearly all the water for the system. However, when the work of ~~ens, window boxes and gardening, also vine planting, which was started~~ stripping the Section 6 ore body started in September, it was necessary in 1912, was continued for the year 1915. A further improvement in the to occasionally run the supply pump at the mine, taking water from the ~~location was noticeable, and more tenants each year are endeavoring to~~ Carp River, in order to maintain a supply. Water was furnished the con- win prizes.

tractor at Section 6 for steam shovel, locomotives and for the camp. The ~~Owing to the unfavorable season, however, results obtained~~ latter part of December after this work had stopped, and winter weather from the vegetable gardens were very poor, as there was a frost in set in, it was again necessary to get water from the Carp River, as the every month of the year. In 1914 splendid yields of potatoes were ob- tained by a number of the tenants, while in 1915 very few obtained more outbreak of typhoid in one of the Finnish boarding houses at North Lake, than the equal of the seed which they planted. Better results were ob- all the water pumped into the tank, both from the spring and the Carp ~~tained from shrubs and flowers, as they were more extensively planted,~~ River, has been treated with calcium chloride. With the addition of and were not killed by the frost.

the five double houses from the Chase Mine, and the twenty single houses from Lake Angeline, an additional source of water supply will soon be all the tenants on the main street set out maples during the past year imperative.

~~in their lots, which in a few years will materially add to the attract- iveness of the location.~~

LOCATION.

In the spring the alleys and streets of the location were cleaned up, and throughout the summer the garbage was removed weekly. For the first time since opening the location, it was found that a number of the cess pools which carry the water from the kitchens, had become filled, and it was necessary to make some new ones. In some cases the old pools were merely filled with water, due to the excessive rain fall, and it was possible to pump them out.

Considerable work was done in 1915 in preparing for the Chase Mine houses, but this work will be reported under the E and A covering this work.

There were very few unoccupied houses in the location during the past year, and the demand for houses in the fall was so great, that all the Chase houses were occupied as soon as they were completed.

WELFARE.

Awarding of prizes for the best kept premises, vegetable gardens, window boxes and gardening, also vine planting, which was started in 1912, was continued for the year 1915. A further improvement in the location was noticeable, and more tenants each year are endeavoring to win prizes.

Owing to the unfavorable season, however, results obtained from the vegetable gardens were very poor, as there was a frost in every month of the year. In 1914 splendid yields of potatoes were obtained by a number of the tenants, while in 1915 very few obtained more than the equal of the seed which they planted. Better results were obtained from shrubs and flowers, as they were more extensively planted, and were not killed by the frost.

The East half of the location has no shade trees, and nearly all the tenants on the main street set out maples during the past year in their lots, which in a few years will materially add to the attractiveness of the location.

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With the increase in number of tenants at North Lake, there has been an increase in the number of children attending school. The four-room school house erected here in 1912, is now nearly filled to capacity, there being 143 children in school. All the grades up to and including the 8th grade, are taken care of at this school, and a demand is developing for the work to be carried on to the 10th grade, which is equivalent to the 2nd year at high school. Up to this time the city schools have taken all children who desire to continue the high school work without charge, and some of the children have availed themselves of this privilege. These children have to walk into Ishpeming, which entails a considerable hardship during the severe winter weather. A new policy has been adopted in the Ishpeming schools, making it necessary for the Township to pay a liberal tuition fee for all children attending the schools in town. There has also developed a demand that the higher grades be taught at North Lake, as a number of the children are not physically able to attempt to walk to Ishpeming. For the above reasons it will probably be necessary to erect an additional school building at North Lake, which will provide for the expansion of the present grades, as well as for the two additional grades. It has proven very

In the fall of 1915 sewing and manual training work were introduced in the school on a small scale, and from present indications, this work will prove very successful. On July 9th, 1915, and the contract-

With the increased population at the North Lake location, the lack of a civic center or common meeting place has become more noticeable. There is a strong sentiment among the tenants that the Company should provide a building where religious services can be held. In addition to the general meeting place, this building should have a room for reading, where the better class of newspapers and magazines should be kept, also a kitchen where meals could be prepared when socials or other entertainments were held. At present there is no amusements or meeting place for the young people at North Lake. We have of

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lost a number of our better class of tenants for this reason, and from the Company standpoint, it seems desirable that some place be provided that will make the people better contented. It is probable that enough interest would be shown to provide funds for maintaining a building.

yet it be E and A No. 285, Hoisting Plant, Section 6. This estimate was authorized June 21st, 1915, at which time it was estimated that the work would be completed by Sept. 30th, but it was not entirely finished at the close of the year. Work here did not really start until in Sept., at which time the contractor started the erection of the Section 6 engine house. Work on this building was finished in November, and the foundations for the hoist were put in in October. The hoist was shipped the last of October, and received in November. It was installed as soon as possible, but work was not completed on it until the 12th of December. The rope was installed and work completed so that the hoist went into commission on Dec. 13th. In order to complete this E and A, it will be necessary to erect a pulley stand midway between the engine house and the head frame, and also put the finishing coat on the concrete floor.

delivered to The hoist which was built by the Ottumwa Iron Works, is the first of this type purchased by the Company, and it has proven very satisfactory. screens and pockets were installed. Some work was done during the E and A No. 287, Moving Dwellings from Chase Mine to North Lake. This estimate was authorized on July 9th, 1915, and the contractor completed his work by Dec. 1st, 1915. Under this estimate, accounts 1, 3 and 4 have been completed, while Account No. 2, covering fences, walks and grading, has not yet been completed. The fences have been built, but there is some further grading to do in the streets as well as around the houses. These five double houses were located to the East of the main road through the location, in one group. In order to complete that part of the work under this E and A which was done by men employed at the mine, a large crew was put to work here, and work was continued until it was necessary to abandon it on account of

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winter weather. The Captain's house was located to the West of the two cottages in a lot along the Public Road. This dwelling has already been completed, but has not yet been occupied. The boarding house is located to the West of the present boarding house, but as yet it has been impossible to find a desirable tenant for it. If surface labor is available in 1916, this E and A will be completed as soon as the weather permits.

E and A No. 288, Crusher and Loading Pocket for Lloyd Mine.

This estimate was authorized on July 31st, 1915, at which time it was estimated that the work would be completed within sixty days. The crusher went into operation on October 5th, or sixty six days after the estimate was authorized, but the auxiliary loading pocket was not completed at the end of the year. This delay was due to the unusual amount of other carpenter work necessary at the mine, in erecting trestles, housing in crusher, etc. In August the forms were built and the foundations for the crusher installed, also concrete foundations were put in for the auxiliary loading pocket. Material was received for the screens and chutes, and during the month this material was being prepared in the shops. The crusher was erected in September, also the screens and pockets were installed. Some work was done during this month on the auxiliary loading pocket, the timber being framed and erected.

The last of November it became apparent that it would be necessary to house in the crusher if it was to continue in operation during the winter months. Material for this work was ordered, and as soon as it was received, the work was pushed as rapidly as possible. It was necessary to put up a small building to house the boiler, also to enclose all parts of the crusher, including the screens. This work was all completed, and the heating plant went into operation on Dec. 27th. The crusher was operated through December with great difficulty,

by the Superintendent, and in which he states he can complete the work

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owing to the blocking of screens and chutes with frozen ore, but no further trouble has been experienced since the heating plant went into commission.

The frame of the auxiliary loading pocket has been erected, and all the wood work of the pocket has now been installed with the exception of the floor. To complete the pocket, it will be necessary to install chutes with closers, also to line the entire pocket with plate, and build up from the top of the pocket to the trestle. There is a distance of about 6 ft. between the top of the pocket and the trestle, which must be enclosed in order to guide the dirt down into the pocket.

This crusher plant has worked very satisfactory, but as yet there has not been sufficient product to work it to capacity.

E and A No. 297, Moving Dwellings from Lake Angeline to North Lake. This estimate was authorized on Dec. 2nd, 1915, and it is estimated that the work will be completed by July 1st, 1916. It was decided to locate these houses on a new street to the East of the present location. This street was laid out and the houses located in December, and at the close of the year the contractor was engaged in building the double sheds. He also has a gang of men tearing down the houses at Lake Angeline. These are single houses, and they will be in great demand by small families. It is probable that they will be the last houses which it will be necessary to erect at the North Lake location.

E and A No. 294, Stripping Section 6 Ore Body. This work was authorized on July 30th, and it was estimated that it would be completed by May 1st, 1916. The contractor started moving in his equipment in August, and actual stripping commenced in September. The work of stripping was continued until the 10th of December, when work was stopped owing to severe winter weather. The contractor has given a signed statement, whereby he agrees to commence work at any time designated by the Superintendent, and in which he states he can complete the work

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in three weeks.

At the present rate of development of the Section 6 ore body, this contract will have to be completed by the middle of April, so that work will have to be resumed in the pit in March.

A railroad line was constructed from the South loading track at the Lloyd Mine over to the pit at Section 6, and this track will be left on the ground until the work is completed.

The contractor decided to approach the pit from the East, stripping it in its longest axis, i.e., from East to West. In the preliminary cut he encountered rock in the approach, which continued for about 300 ft. when it disappeared. As it was not supposed that rock would be encountered in the approach, it was necessary to modify the contract in order that payment might be made for rock work. Succeeding cuts in the approach made it necessary to remove a large quantity of rock, which work however, was completed when work was stopped in December, by which time there had been 8232 cubic yards of rock taken out in the approach to the pit. In addition to the rock removed from the approach, there had been 11,312 cubic yards of dirt taken out. Above the ore body there was 75,668 cubic yards of earth removed when the work was stopped. On the North side of the pit near the East end, the ore is now exposed over a considerable area. To the West and South of this point there remains from 1 to 5 ft. of sand over the ore. When this material is removed, the work will be completed and the pit ready for mining operations. The contractor estimates that he can complete all the work in the pit in from two to three weeks time.

At the East end of the pit the ore body was found to extend about 20 ft. further to the South than was indicated by the surface drilling. This was determined by a series of trenches which were put in across this part of the pit to locate the ore body in order that the contractor might complete the approach to grade. In one of these trenches a dike was found, which may later cause some trouble in mining operations. This

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dike was encountered in one of the drill holes from surface, and it was thought to be the fault on the South side of the ore body. It will have to be removed when mining starts in this part of the pit.

No. 81 was located further South near the fault. This hole was started on August 13th, and completed on August 16th; it showed 28 ft. of surface and

SURFACE EXPLORATIONS.

Early in July it was decided that it would be advisable to put down a number ^{of} stand pipes at the East end of the Section 6 ore body at the point where it came up to ledge, in order to more accurately determine the area to be stripped. A series of three holes were put down 100 ft. to the East of the Most Eastern hole which had previously been drilled here. The South one of these holes, No. 77, encountered dike at ledge, and was stopped. The next hole, No. 78, 25 ft. to the North, struck ore, and the next hole, No. 79, 25 ft. further North, struck slate. The following is a record of these three holes.

Hole No. 77, was started July 14th, and was completed on July 16th, there being 33 ft. of surface and 17 ft. of dike, total depth 50 ft. Hole No. 78 was started on July 20th, and completed on July 27th, there being 28 ft. of surface and 97 ft. of high grade ore, 25 ft. of low grade ore and 35 ft. of dike, total depth 185 ft. Hole No. 79 was started on July 31st, and completed on August 3rd. In this hole there was 28 ft. of surface, 43 ft. of slate, total depth being 71 ft. and 19 ft. of jasper, the total depth being 90 ft. This hole

showed that when the ore body was stripped in the fall, it was found that the dike encountered in hole No. 77, was merely a seam of dike instead of the main dike on the fault as had been supposed. The ore actually extended 20 ft. South of hole No. 77. These three holes were supposed to have located the Eastern limits of the ore as close as was necessary, and the next section drilled was at a point 250 ft. West, or 50 ft. West of the original cross-section which was drilled here in 1911.

One hole, No. 80, was first put down here in what was assumed to be the center of the ore trough. It was started on August 6th, and

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completed on August 11th, showing 32 ft. of surface and 48 ft. of high grade ore, being stopped at a depth of 80 ft. in ore.

It was then decided to move 50 ft. further West, where hole No. 81 was located further South near the fault. This hole was started on August 13th, and completed on August 16th; it showed 28 ft. of surface and 45 ft. of ore, the hole being stopped in ore at a depth of 73 feet.

Hole No. 82 was then drilled 50 ft. further South on the same section, and was continued until it struck the fault at a depth of 220 ft. It was started on August 18th, and completed on August 24th. In this hole there was 25 ft. of surface, 20 ft. of lean ore, 175 ft. of high grade ore, and then 3 ft. of dike, the total depth of the hole being 223 ft.

Hole No. 83 was then drilled on the North side of the same section near the supposed location of the slate footwall. This hole was started on August 19th, and completed on August 24th; it showed 23 ft. of surface, 17 ft. of jasper and 14 ft. of lean ore, the total depth being 54 ft.

It was then decided to drill the next hole 50 ft. West of this section in the center line of the trough. This hole, No. 84, was started on August 26th, and completed on August 28th; it showed 19 ft. of surface and 19 ft. of jasper, the total depth being 38 ft. This hole showed that the ore did not extend this far to the West.

The next hole, No. 85, was located 25 ft. South of No. 83, in an effort to find the North limits of the ore body on this section. This hole was started on August 26th, and completed on August 28th; it showed 24 ft. of surface and 34 ft. of jasper, the total depth being 58 ft.

Hole No. 86 was located 25 ft. further South on the same section, or 25 ft. North of hole No. 81. It was started on August 30th, and completed on Sept. 1st. This hole showed 23 ft. of surface and 26 ft. of

MORRIS-LLOYD MINE.

Jasper. Ore had been found on this section in holes No. 81 and 82 only, which were located South of the center of the ore trough as determined by the holes further to the East.

Hole No. 87 was next drilled at a point midway between No. 81 and 82, in order to determine if there was a continuous ore body between these two drill holes. It was started on August 31st, and completed on September 1st, and showed 25 ft. of surface and 50 ft. of ore, the total depth being 75 ft., the hole being stopped in ore.

Hole No. 88 was then drilled at a point 35 ft. South of Hole No. 80 on the section 50 ft. East, to make sure that the ore was continuous across this section also. It was started on Sept. 3rd, and completed on Sept. 7th. It showed 25 ft. of surface, 15 ft. of lean ore, and 19 ft. of good ore, the hole being stopped in ore at a depth of 59 ft.

In order to make sure that the ore encountered in holes 81, 82 and 87 continued to the East and connected with the ore found in the section 50 ft. East, hole No. 89 was put down 30 ft. East of these holes. This hole was started on Sept. 3rd, and completed on Sept. 7th, and showed 30 ft. of surface and 30 ft. of high grade non-Bessemer ore, being stopped in ore.

The drilling at the West end of the area to be stripped, showed that the ore did not extend all the way across the trough. On the foot side it was cut out by jasper, while on the fault side the ore was found to extend further to the West than had been previously supposed. There was a total of 1072 ft. of standpiping and drilling done here, 432 ft. of drilling in 60% ore, and 97 ft. in lean ore. This work together with the previous work done here, permitted an accurate determination of the area to be stripped, as well as a close calculation of the yardage.

MORRIS-LLOYD MINE.

ANALYSIS OF COST SHEETS, SHOWING INCREASE OR DECREASE IN
VARIOUS COST DATA FOR YEARS 1915 - 1914.

	YEAR 1915.	YEAR 1914.	INCREASE	DECREASE.
Shifts and hours per day,	2-8 hr.	2-8 hr.		
Product,	221,585	192,145	29,440	
Average Daily Product,	729	643	86	
Number of Days Operated,	304	299	5	
Number of Days Idle,	9	14		5
Number of Men Surface,	54	44		10
Average Rate, "	2.33	2.39		.06
Tons Per Man Surface,	13.37	13.86		.49
Number of Men Underground,	208	199	9	
Average Rate "	2.83	2.85		.02
Tons Per Man, "	3.48	3.10	.38	
Total Average Men,	262	243	19	
Total Average Rate,	2.72	2.77		.05
Total Tons Per Man Per Day,	2.76	2.53	.23	
General Expense,	.074	.070	.004	
Maintenance,	.095	.157		.062
Mining Expense,	1.075	1.318		.243
Cost of Production,	1.244	1.545		.301
Average Daily Cost, Labor	586.00	648.00		62.00
" " " Supplies	321.00	345.00		24.00
" " " Total	907.00	993.00		86.00

	LABOR	PER TON.	SUPPLIES.	PER TON.	TOTAL	PER TON.
Year 1915,	\$178,145.41	.804	97,464.12	.440	275,609.53	1.244
Year 1914,	193,822.98	1.009	103,064.08	.536	296,887.06	1.545
DECREASE 1915,	15,677.57	.205	5,599.96	.096	21,277.53	.301

W A G E R A T E S .

Decreased Oct. 1st, 1914. Increased Aug. 1st, 1915.

Lloyd, (No. 2 Shaft) started operating April 1st, 1911.

Morris, (No. 1 Shaft) started operating May 1st, 1913.

Cost Sheets combined on May 1st, 1913.

MORRIS-LLOYD MINE.

ANALYSIS OF COST SHEETS, EXPLAINING INCREASE OR DECREASE IN VARIOUS ACCOUNTS BETWEEN YEARS 1915 - 1914.

Tracks & Yards,		GENERAL EXPENSE.		Cost per ton	
Acct. 125.	Year 1915	1,288.74	" " "		.004
Engineering,	Year 1914		" " "		.008
Acct. 27,	Year 1915,	\$1,650.63	Cost per ton,		.008
	Year 1914,	1,164.95	" " "		.006
	Increase 1915,	485.68	" " "		.002
The 1915 charge is higher due to improvements to grounds, such as grading. The increase is in the labor charge, and is due to more time put in by engineers on account of the development of the Section 6 ore body, sinking winze at Morris Shaft, and drifting on the 1200 ft. level, also to stripping Section 6 ore body.					
Acct. 126.	Year 1915,	\$4,306.16	Cost per ton		.020
Analysis,	Year 1914,	3,540.34	" " "		.018
Acct. 28,	Increase 1915,	765.82	" " "		.002
In 1915 there were 27,575 determinations made at the North Lake laboratory, costing \$3,437.58, or .125 each; in 1914, 21,549 determinations costing \$3,095.13, or .144 each. The balance of 1915 charges amounting to \$868.58, are for sampling the ore crushed at South Jackson, and for analysis of this ore at the Cliffs Shaft laboratory, also for sampling underground and during shipping season at the Morris-Lloyd Mine. The increase in number of determinations in 1915 is due to opening up the Section 6 ore body, also to more ore shipped.					
Acct. 30.	Year 1915,	\$870.19	Cost per ton,		.004
Personal Injury Exp.	Year 1914,	102.32	" " "		.001
	Increase 1915,	767.87	" " "		.003

The latter part of 1915 it was decided to set up a liability account for amount still due on all personal injuries. This accounts in a large measure for the increased expense in this account in 1915.

District Office,	Year 1915,	\$8,898.93	Cost per ton,		.040
Acct. B	Year 1914,	8,466.90	" " "		.044
	Increase 1915,	432.03	Decrease 1915,		.004

Up to August 1st 1915, the Chase Mine absorbed part of the District Office charge, but since Aug. 1st, the Morris-Lloyd Mine has carried all of the District Office expense. The 1914 charges also include a charge of \$811.75 on account of temporary hoist and derrick for sinking Section 6 shaft.

SUMMARY OF GENERAL EXPENSE.

Compressors and Power Drills,	Y E A R.	AMOUNT.	COST PER TON.
Acct. 121.	1915	16,291.19	.074
	1914	13,560.39	.070
	INCREASE 1915,	2,720.80	.004

The 1915 charges cover the cost of eight new drill machines and four second hand ones. The balance of this charge is on account of repairs to Nordberg compressor, which includes one new auto starter and repairing two burned out transformers. The 1914 charges are made up of a charge of \$1577.64 for new drills, 4 in. air line to Section 6 shaft \$155.75, the balance of charge being for repairs to Nordberg compressor.

MORRIS-LLOYD MINE.

MAINTENANCE E.			
Tracks & Yards, Acct. 125.	Year 1915	\$877.48	Cost per ton .004
	Year 1914	<u>1,206.74</u>	" " " .006
	Decrease 1915,	329.26	" " " .002

The 1915 charges cover cost of keeping surface at mines in shape only, while the 1914 charge is higher due to improvements to grounds, such as grading, seeding and planting of shrubbery and pines.

Docks, Trestles and Pockets, Acct. 126.	Year 1915	\$1,785.18	Cost per ton .008
	Year 1914	<u>3,965.60</u>	" " " .021
	Decrease 1915,	2,180.42	" " " .013

The 1915 charges cover the cost of building new single track stocking trestle at the Lloyd Mine, stockpile plank and laying same, grading stockpile grounds, also repairs to shaft house pockets. The 1914 charges were higher due to laying more stockpile plank, the charge for this alone being \$2,168.92, also to erection of more new trestles and grading work.

Buildings, Acct. 127,	Year 1915	\$257.52	Cost per ton, .001
	Year 1914	<u>1,027.09</u>	" " " .005
	Decrease 1915,	769.57	" " " .004

The 1915 charges in this account are for minor repairs to buildings, while the 1914 charge was high due to three special items, viz., repairs to barn and painting new drive shed, \$233.22, temporary engine house at Section 6, \$210.70, and alterations in warehouse \$195.41, a total of \$639.33.

Hoisting Mach'y. Acct. 130.	Year 1915,	\$1,419.46	Cost per ton .007
	Year 1914,	<u>3,365.86</u>	" " " .018
	Decrease 1915,	1,946.40	" " " .011

The 1915 charges were incurred for repairs to electric equipment of hoists, new brake blocks, re-babbiting bearings, new sheaves for pulley stands, with two other items, viz., two new skip ropes for Morris, and two contactors for spares for skip hoist at the Morris. The 1914 charges were high on account of sinking Lloyd shaft 400 ft., from 2nd to 4th level, which necessitated new cage and skip ropes, new gear for Lloyd skip hoist to increase speed, and the lengthening of the counter balance pipe. The 1914 charges also include a charge of \$311.75 on account of temporary hoist and derrick for sinking Section 6 shaft.

Compressors and Power Drills, Acct. 131.	Year 1915	\$1,972.60	Cost per ton .009
	Year 1914	<u>2,108.56</u>	" " " .011
	Decrease 1915	135.96	" " " .002

The 1915 charges cover the cost of eight new drill machines and four second hand ones from the Chase Mine, amounting to \$1279.00, the balance of this charge is on account of repairs to Nordberg compressor, which includes one new auto starter and repairing two burned out transformers. The 1914 charges are made up of a charge of \$1377.84 for new drills, 4 in. air line to Section 6 shaft \$168.72, the balance of charge being for repairs to Nordberg compressor.

MORRIS-LLOYD MINE.

Pumping Machinery, Acct. 152.	Year 1915	\$1,071.49	Cost per ton	.005
	Year 1914	<u>2,234.23</u>	" " "	<u>.012</u>
	Decrease 1915,	1,162.74	" " "	.007

The 1915 charges represent cost of repairs, with only one large special item of \$400.00 for re-babbitting bearings. The 1914 charges in addition to repairs, cover cost of enclosing pump houses underground, also three concrete dams for shutting off the water on the 1st and 2nd levels of the Morris for use in case of accidents to the pump.

Telephones & Safety	Year 1915	\$948.30	Cost per ton	.004
Top Tram Engines and Cars, Acct. 133.	Year 1914	<u>748.44</u>	" " "	<u>.004</u>
	Increase 1915,	199.86	" " "	.000

There is a small increase in the 1915 charges, due almost entirely to material and labor for building one new side dump car for the top tram system. There was also a charge in 1915 for repairing drum on the endless rope haulage system at the Lloyd. The balance of 1915 charges, as well as all those of 1914, are for general repairs to top tram cars, new spools, rollers, turn sheaves and wire rope.

Skips & Skip Roads, Acct. 134,	Year 1915	\$1,048.15	Cost per ton	.005
	Year 1914	<u>809.37</u>	" " "	<u>.004</u>
	Increase 1915,	238.78	" " "	.001

The increase in 1915 is due to building skip and dump plates in shop for the Morris winze, which cost about \$250.00. The balance of charges are for repairs to skips and skip roads.

Underground Tracks and Cars, Acct. 135,	Year 1915	\$2,220.18	Cost per ton,	.010
	Year 1914	<u>2,135.29</u>	" " "	<u>.011</u>
	Increase 1915	84.89	Decrease 1915,	.001

There is a small increase in money cost in this account, but owing to the increased hoist there is a decrease in the cost per ton. In 1915 the Lloyd 2nd level was the only hand tram level in operation until Sept., when the drift was started on the 1200 ft. level of the Morris. In the last few months of the year opening of sub levels in the Section 6 ore body increased both the labor and supply charges. During 1915, material for ten sub level cars was purchased, also nine sets of roller bearing trucks for sub level cars. In 1914 there was only one hand tram level in operation, but more extensive repairs were necessary to cars on account of taking dirt from the shrinkage stopes. The Morris ore body was also opened for mining in 1914, and a number of sub level cars were built for use here.

Electric Tram Plant, Acct. 136.	Year 1915,	\$7,769.86	Cost per ton	.035
	Year 1914,	<u>9,141.54</u>	" " "	<u>.048</u>
	Decrease 1915,	1,371.68	" " "	.013

The decrease in 1915 is in two items, Wiring and Main Level tracks, while maintenance of locomotives and cars show an actual increase as compared with the previous year. The wiring and main line track extensions were all on account of opening the Sec. 6 ore body on the 3rd level of the Lloyd. The cars and locomotives are requiring more repairs each year, and the cost in 1915 is nearly double that of the previous year. Of ten cars purchased in 1915, two have been charged out. The following table gives the detail of charges for 1915 and 1914.

MORRIS-LLOYD MINE.

Electric Tram Plant, (Cont'd)	1915	\$16,398.23	Cost per ton	.074
Acct. 151.	Year 1914	14,729.15	" " "	1914
	Increase 1915,	1,669.08	Decrease 1915,	.003
Locomotives,		\$705.99		\$408.33
Wiring,		1,062.33		1,610.45
Main Line Tracks,		4,560.03		6,355.59
Main Line Cars,		1,441.51		767.17
TOTAL, up.		7,769.86		9,141.54

Telephones & Safety	Year 1915	\$939.36	Cost per ton	.004
Acct. 137.	Year 1914	2,235.96	" " "	.012
	Decrease '15	1,296.60	" " "	.008

There was a very large decrease in this account in 1915, as the 1914 charges were extraordinarily high on account of purchase of equipment for fire fighting, rescue and first aid work, also the safety devices recommended by the Mechanical Inspection Committee, were installed at a cost of about \$700. The 1915 charges cover the cost of 1 toboggan stretcher, one safety bulletin board, four speed limit switches for cage hoists, one underground telephone, 1 breathing apparatus, safety gates, signs, etc.

Ventilation,	Year 1915	\$474.18	Cost per ton	.002
	Year 1914	826.13	" " "	.004
	Decrease 1915,	351.95	" " "	.002

This was a new account opened in Dec. 1914, for ventilating equipment only. The 1914 charge covers cost of a new fan and motor used in the drift to Section 6, also 500 ft. of 10 in. fan pipe. The 1915 charges cover the cost of 900 ft. of 10 in. fan pipe used in the Section 6 drift. All this equipment is now used in ventilating the drift on the 1200 ft. level of the Morris.

	Year 1915	\$6,283.95	Cost per ton	.031
	Year 1914	24,477.70	" " "	.127
	Decrease 1915,	17,893.75	" " "	.096

SUMMARY OF MAINTENANCE.

	AMOUNT	COST PER TON.
1915	21,090.03	.095
1914	30,100.26	.157
Decrease 1915,	9,010.23	.062

The decrease is distributed over all the accounts, and is due in a large measure to unusual expenses in this account in 1914 on account of new equipment due to sinking Lloyd shaft, and opening new levels and drifts to the Section 6 ore body.

MINING EXPENSE.

Air pipes,	Year 1915	\$3,419.72	Cost per ton	.015
Acct. 150.	Year 1914	3,611.40	" " "	.019
	Decrease 1915,	191.68	" " "	.004

The charges in this account for both 1914 and 1915 are high, due to opening new territory. The Sec. 6 ore body is 4000 ft. East of the Lloyd shaft, and 6 in. and 4 in. air lines were installed here to insure good pressure at the drill machines. A 4 in. air line was installed in the Morris winze, and over 1000 ft. of pipe on the 1200 ft. level during 1915, in addition to the large amount of 1", 2", 4" and 6" pipe used at Section 6.

MORRIS-LLOYD MINE.

Compressors, (Cont'd)	Year 1915	\$16,395.24	Cost per ton	.074
Acct. 151,	Year 1914	<u>14,720.95</u>	" " "	<u>.077</u>
	Increase 1915,	1,674.29	Decrease 1915,	.003

The increase in this account is due to more gangs of miners employed, and more rock work, which increased the air consumption. This increase occurred in the latter part of the year when the Section 6 ore body was being opened up. In 1915, 1718 cu. ft. per minute was used, while in 1914 only 1499 cu. ft. was used.

Hoisting,	Year 1915	\$12,539.54	Cost per ton	.057
Acct. 152,	Year 1914	<u>9,707.41</u>	" " "	<u>.051</u>
	Increase 1915,	2,832.13	" " "	.006

The increase here is due to three reasons, viz., the increased hoist of 1915, 298,816 tons as compared with 247,561 tons in 1914; hoisting from greater depth, due to increased output from 3rd and 4th levels Lloyd, and to brakemen at Section 6 while the shaft was being sunk and timbered.

Pumping,	Year 1915	\$14,163.27	Cost per ton	.064
Acct. 153,	Year 1914	<u>15,701.49</u>	" " "	<u>.082</u>
	Decrease 1915,	1,538.22	" " "	.018

The decrease is due to a small decrease in amount of water pumped in 1915, 568 gals. per minute as compared with 613 gals. in 1914; also to less expense connected with cleaning the settling basin and main sump at the pumping plant. In 1915 they were cleaned twice, and in 1914 three times.

Sinking and Shaft Rep.	Year 1915	\$6,923.98	Cost per ton	.031
Acct. 154,	Year 1914	<u>24,477.30</u>	" " "	<u>.127</u>
	Decrease 1915,	17,553.32	" " "	.096

There is a very large decrease in this account due to less sinking in 1915. The 1915 charges cover the cost of sinking and timbering 273 ft. of the Morris winze, also repairs necessary to loading pockets. The 1914 charges cover the cost of sinking and timbering the Lloyd shaft from the 2nd to the 4th levels, cutting 3rd level plat, cutting out for, and installing the 80-ton storage pockets on the 3rd and 4th level Lloyd shaft, and sinking the Morris winze 149 ft.

Rock Drifting,	Year 1915,	\$13,172.16	Cost per ton	.059
Acct. 155,	Year 1914	<u>14,591.42</u>	" " "	<u>.076</u>
	Decrease 1915,	1,419.26	" " "	.017

In 1915 there was 2,050 ft. of rock drifting costing \$6.43 per ft., while in 1914 there was 1,735 ft. costing \$8.41 per ft. Owing to the reduced cost of the rock work in 1915, a greater amount was done for less cost than in 1914. The greater part of the rock work of 1915 was done in opening the Lloyd ore body on the 3rd level, and in opening the Section 6 ore body. The ground here was not as hard as on the 1st level of the Morris, which accounts for the lower cost per ft. in 1915.

Breaking Ore,	Year 1915	\$79,566.33	Cost per ton	.359
Acct. 156.	Year 1914	<u>79,757.74</u>	" " "	<u>.415</u>
	Decrease 1915,	191.41	" " "	.056

MORRIS-LLOYD MINE.

Breaking Ore (Cont'd)

The cost of breaking ore in 1915 was almost the same as in 1914, but owing to the increased product, there was a decided reduction in the cost per ton. This reduction is due principally to the increased output from the Morris Mine, with fewer men working, also to the several small shrinkage stopes at the Lloyd Mine. In the following table is a comparison of the contract work for 1915 and 1914.

	Year 1915	Year 1914
Feet ore drifting,	6,530	7,725
Average Rate,	\$4.18	\$4.96
Feet ore raising,	2,775	1,548
Average Rate,	\$4.85	\$5.32
Cars ore stoping,	51,929	37,782
Average Rate,	\$.92	\$.941

The rate for ore drifting shows a decrease of 78¢ per ft., for ore raising 47¢ per ft., and for cars ore, 21¢ per ft. Owing to better working conditions at the Morris, the contract price for ore drifting was reduced more than a dollar per foot in 1915, and the price per motor car from twenty to thirty five cents. The ore from shrinkage stopes at the Lloyd never costs more than one half as much as from regular mining operations, and usually less, and this fact, with the reduction in price per car at the Morris, accounts for the reduction in contract price per car.

	Year 1915	Year 1914	Decrease 1915,	Cost per ton	
Tramming,	\$28,332.32	31,980.23	3,647.91	.128	.166
Acct. 157,				" "	" "
					.038

There was a large decrease in tramming for 1915, due principally to an increase in the amount of ore handled by motor haulage, also to a decrease in the number of trammers employed on the 2nd level of the Lloyd, where hand tramming is still used.

	Year 1915,	Year 1914,	Decrease 1915,	Cost per ton,	
Filling,	\$149.75	638.66	688.91	.001	.004
Acct. 158,				" "	" "
					.003

The charges for 1914 in this account were incurred in the months of March and May, when capping was broken at the Lloyd on the sub levels, as they gained to the East under the jasper hanging. In 1914, capping was broken at both the Morris and Lloyd to form a mat above sub levels.

	Year 1915,	Year 1914,	Increase 1915,	Cost per ton	
Timbering,	\$43,936.49	38,823.86	5,112.63	.198	.202
Acct. 159,				" "	" "
					.004

There was a large money increase in this account, but owing to the increased hoist, a slight decrease in cost per ton. The average cost for the first eight months of 1915 was \$3,230. per month, and for the last four months \$4,524 per month, an increase of \$1,294. The average for the first eight months of 1915 was exactly the same as the average of the year 1914. The increased cost for the last four months of 1915 was due entirely to the expense connected with opening the Sec. 6 ore body. This increased the amount of timber used, on account of cribbing for the raises, and made it necessary to employ four instead of two timber cutters on surface, also made it necessary to build four timber trucks in the shops, and to buy two new timber hoists costing \$294.14 each.

MORRIS-LLOYD MINE.

Capt. & Bosses, Acct. 160.	Year 1915,	\$8,851.51	Cost per ton	.040
	Year 1914,	<u>8,443.74</u>	" " "	<u>.044</u>
	Increase 1915,	407.77	Decrease 1915,	.004

There was a small increase in money expense in this account, but owing to the increased hoist, a slight decrease in the cost per ton. The increased cost is due entirely to Capt. Tamblin's wages from Sept. 1st, to Dec. 31st, while he was acting as Mine Foreman under Capt. Stephens. It is now over one and one quarter miles from the East end of the Section 6 drift over to the West end of the drift on the 1200 ft. level of the Morris. This extent of territory is more than Capt. Stephens can cover in one day and get the best results, so Capt. Tamblin has been employed since the Chase Mine closed down, as an assistant captain or mine foreman.

Dry House, Acct. 161,	Year 1915	\$2,238.67	Cost per ton	.010
	Year 1914	<u>2,656.89</u>	" " "	<u>.014</u>
	Decrease 1915,	418.22	" " "	.004

There was a small decrease in this account in 1915, of which amount \$47.00 was due to an adjustment in coal on account of overrun in piles. In this account there has been less coal charged out during 1915, also during the past year the dryman was compelled to keep the dry clean, while in previous years an extra man worked one day each week in the dry.

Top Landing and Tramming, Acct. 162,	Year 1915	\$7,432.29	Cost per ton	.034
	Year 1914	<u>6,538.14</u>	" " "	<u>.034</u>
	Increase 1915,	894.15	" " "	.000

There was a small increase in money cost for 1915, but no increase in the cost per ton. The increase in 1915 is due entirely to top landers employed at Section 6 during the time the shaft was being sunk and timbered.

Stocking Ore, Acct. 163,	Year 1915,	\$588.50	Cost per ton	.003
	Year 1914,	<u>614.70</u>	" " "	<u>.003</u>
	Decrease 1915,	26.20	" " "	.000

The charges for the two years are almost equal, the slight decrease in 1915 being due to a small decrease in charges for re-erecting stocking trestles which had been torn down to permit the ore to be loaded by the steam shovel.

Sorting Ore, Acct. 164,	Year 1915,	\$504.74	Cost per ton	.002
	Year 1914,	<u>685.67</u>	" " "	<u>.004</u>
	Decrease 1915,	80.93	" " "	.002

There is a small decrease in this account due to less time put in picking timber and rock from the ore stocked. More Silica ore was stocked in 1914, and this grade is always watched very carefully in order that all rock may be removed.

SUMMARY OF MINING COSTS.

Y E A R	AMOUNT.	COST PER TON.
1915	\$238,228.31	1.075
1914	<u>253,226.41</u>	<u>1.318</u>
Decrease 1915,	14,998.10	.243

The decrease in mining cost is due principally to the larger output, also to less charges in 1915 for shaft sinking and rock drifting.

MORRIS-LLOYD MINE.

ANALYSIS OF MINING COSTS FOR YEARS 1915 - 1914.

Product,	YEAR 1915.		YEAR 1914.		PER TON INCREASE	PER TON DECREASE
	AMOUNT.	PER TON	AMOUNT	PER TON		
Average Daily Product,		729		643		
Number of shifts and hours,		2-8 hr. 304		2-8 hr. 299		
MAINTENANCE.						
150 - Air Pipes,	\$3419.72	.015	\$3611.40	.019		.004
166 - Cave-In,	13.80	.000	70.19	.000		.004
TOTAL,	\$3433.52	.015	3681.59	.019		.004
SUPERINTENDENCE.						
160 - Capt. & Bosses	8851.51	.040	8443.74	.044		.004
161 - Dry House,	2238.67	.010	2656.89	.014		.004
TOTAL	11090.18	.050	11100.63	.058		.008
POWER						
151 - Compressors,	16395.24	.074	14720.95	.077		.003
152 - Hoisting,	12539.54	.057	9707.41	.051		.006
153 - Pumping,	14163.27	.064	15701.85	.082		.018
TOTAL.	43098.05	.195	40129.85	.210		.021
MINING						
159 - TIMBERING,	43936.49	.198	38823.86	.202		.004
156 - Breaking Ore,	79566.33	.359	79757.74	.415		.056
157 - Trammig,	28332.32	.128	31980.23	.166		.038
158 - Filling,	1149.75	.001	838.66	.004		.003
164 - Sorting Ore,	504.74	.002	685.67	.004		.002
TOTAL,	152469.63	.688	152086.16	.791		.103
DEVELOPMENT.						
154 - Sinking,	6923.98	.031	24477.30	.127		.096
155 - Drifting,	13172.16	.059	14591.42	.076		.017
TOTAL,	20096.14	.090	39068.72	.203		.113
HANDLING OUTPUT,						
162 - Top Landing,	7432.29	.034	6538.14	.034		
163 - Stocking Ore,	588.50	.003	614.70	.003		
168 - Crushing & Screening						
170 - Stkg. Pres. Isle.						
TOTAL,	8020.79	.037	7152.84	.037		
Ventilation,			6.62	.000		
TOTAL MINING,	238228.31	1.075	253,226.41	1.318		.219

The 11 ft. of sinking at the Morris, refers to ground removed from shaft below the 1200 ft. level for a temporary sump. The items of installing hoist and hoisting expense, are included in the cost of the Morris drift, as the dirt is hoisted from the 1200 ft. level to the 2nd level through a winze, going directly from the winze into the loading pocket.

The following table, which combines the cost of work at Section 6 and the Morris, is given to show a comparison with the work of 1914 under this same account.

MORRIS-LLOYD MINE.

Exploring in Mine,	Year 1915,	\$502.89	Cost per ton,	.002
Acct. 176,	Year 1914,	<u>1,951.77</u>	" " "	<u>.010</u>
	Decrease 1915,	1,448.88	" " "	.008

In 1915 four short holes were drilled underground at the Morris-Lloyd, three in ore and one in rock, while in 1914 two long holes were drilled in rock; this accounts for the decrease in the 1915 charges.

Extraordinary Drifting, Year 1915,	\$70,181.38	Cost per ton,	.317
Acct. 177,	Year 1914,	<u>33,759.54</u>	" " "
	Increase 1915,	36,421.84	" " "

There is a very large increase in the charges under this account, which are explained by the following table, which also gives a division of the charges.

SECTION 6 ORE BODY.

	FEET.	AMOUNT.	PER FT.
Raising Section 6 shaft,	280	\$5,439.13	\$19.40
Sinking & Timbering Sec. 6 shaft,	308	14,100.56	45.78
Drifting,	3270	21,042.11	6.43
Tramming, Rock from drifts, raising and sinking Sec. 6 shaft,	3550	8,989.42	2.53
Prop. of Electric Haulage,	3550	2,951.34	.83
Avg. Cost per ft. raising and drifting not included,			\$9.79

MORRIS MINE.

Sinking Morris Shaft,	11	249.67	\$22.70
Installing hoist in winze,	1739	1011.94	.58
Drifting, 1200 ft. level,	1728	10412.26	6.02
Tramming,	1739	5023.75	2.31
Hoisting,	1739	969.44	.55
Avg. Cost per ft., sinking not included,			\$9.46

The figures from above statement show that fast drifting on the 1200 ft. level of the Morris cost less per foot than the slower drifting at Section 6. There is no separation, however, of the tramming cost and proportion of Electric Haulage expense Sec. 6, raise and shaft sinking, so that the tramming costs of the two drifts are hardly comparable. Taking all the facts into consideration, it is probable that fast drifting does not cost but little, if any more than slower drifting.

The item of sinking and timbering the Section 6 shaft, really covers the cost of sinking 308 ft., and timbering 854 ft., or the entire shaft. The item of drifting covers motor haulage rock drift on the 3rd level and Nos. 1, 2, 3, 4 and 5 crosscuts, also all timbering done in the drift and crosscuts.

The 11 ft. of sinking at the Morris, refers to ground removed from shaft below the 1200 ft. level for a temporary sump. The items of installing hoist and hoisting expense, are included in the cost of the Morris drift, as the dirt is hoisted from the 1200 ft. level to the 2nd level through a winze, going directly from the winze into the loading pocket.

The following table, which combines the cost of work at Section 6 and the Morris, is given to show a comparison with the work of 1914 ..under this same account.

MORRIS-LLOYD MINE.

Extraordinary Drifting
Acct. 177, (Cont'd)

	1915.			1914.		
	AMOUNT	FEET	PER FT.	AMOUNT	FEET	PER FT.
Drifting,	\$31,454.37	5289	5.95	14,008.61	2136	6.56
Raising,	5,439.13	280	19.40	8,230.30	600	13.714
Sinking,	14,340.23	319	44.95	240.76	15	16.05
TOTAL,	\$51,233.73	5888	8,700	22,479.67	2751	8.17
Hoisting,	961.24	5888	.163			
Installing hoist, etc.	1,011.94	"	.172			
Tramming,	14,013.17	"	2.360	7,007.19	2751	2.55
Ventilation,				2,317.44	2751	.81
Electric Haulage,	2,951.35	"	.501	2,054.34	2751	.74
TOTAL COST PER FT.	70,181.38	5888	11.916	33,759.54	2751	12.27

Decreased cost per ft. 1915, \$.354

The above table shows a total of 5,888 feet of drifting, sinking and raising in 1915, as compared with a total of 2,751 ft. in 1914, which explains the increased charges in this account for 1915.

	Year 1915,	Year 1914,	Increase 1915,	Cost per ton,
Exploring on Surface, Acct. 178.	\$2,131.61	---	2,131.61	.010
				" " "
				.010

There were no charges in this account in 1914. In 1915 the charges were incurred in standpiping and drilling at the East end of the Section 6 ore body, to determine the limits of ore body to be stripped and yardage to be removed.

	NO. LAKES BESSMER	NO. LAKES SILICO	NO. LAKES SILICO	NO. LAKES S. FINE	TOTAL	TOTAL LAKES YEAR
On Hand Jan. 1st, 1915	25,014	9,338	114,467		148,819	148,440
Output for Year,	14,350	86,008	87,532	5,700	144,590	123,569
Total,	41,374	74,346	171,999	5,700	263,319	272,009
Shipments,	19,761	49,327	126,194	0	186,282	123,210
Balance on Hand,	30,523	25,019	45,805	5,700	107,047	148,819
Increase in Output-11.5%					14,911	
Decrease in Ore on Hand,					41,772	

2 - 8 Hr. Shifts during 1914 & 1915.

LLOYD MINE

SHIPMENTS FOR YEAR-1915

AVERAGE MINE ANALYSIS OF OUTPUT FOR YEAR-1915

GRADE	POUNDS	IRON	PHOS.	SILICA	TOTAL LAST YEAR
North Lake Bessemer,	1,77	58.30	.057	16.73	19,716
North Lake,	41,36	59.06	.089	16.56	13,056
North Lake (High Phos.),	41	58.92	.176	15.71	91,438
North Lake Silica,		52.81	.058	14.95	0

Total, 94,159 102,114 104,272 123,210

AVERAGE ANALYSIS ON STRAIGHT CARGOES FOR YEAR-1915

GRADE	Mine			Lake Erie		
	IRON	PHOS.	SILICA	IRON	MOIST.	
North Lake Bessemer,		All Mixed				
North Lake,	59.08	.071				
North Lake Silica,	50.98	.053	18.57	51.91	9.50	

ORE STATEMENT - DECEMBER 31ST, 1915

	NO. LAKE BESSEMER	NO. LAKE	NO. LAKE SILICA	NO. LAKE H. PHOS.	TOTAL	TOTAL LAST YEAR
On Hand Jany. 1st, 1915	25,014	9,338	114,467		148,819	142,440
Output for Year,	16,260	65,008	57,532	5,700	144,500	129,589
Total,	41,274	74,346	171,999	5,700	293,319	272,029
Shipments,	10,751	49,327	126,194	0	186,272	123,210
Balance on Hand,	30,523	25,019	45,805	5,700	107,047	148,819
Increase in Output-11.5%					14,911	
Decrease in Ore on Hand,					41,772	

2 - 8 Hr. Shifts during 1914 & 1915.

LLOYD MINE

AVERAGE SHIPMENTS FOR YEAR--1915 YEAR-1915

GRADE	GRADE	POCKET	IRON STOCKPILE	PHOS. SILICA TOTAL	TOTAL LAST YEAR
North Lake Bessemer,	Morris Bessemer,	1,776	8,975	10,751	18,716
North Lake,	Morris,	41,969	7,358	49,327	13,056
North Lake Silica,	Morris (As North Lake),	40,413	85,781	126,194	91,438 (2432 tons)
North Lake - High Phos.	Morris Silica,	0	0	0	0
Total,		84,158	102,114	186,272	123,210
Total Last Year,		59,327	63,883	123,210	
Increase - 51%			All Mixed	63,062	
	Morris,	"	"		
	Morris Silica,	"	"		

ORE SHIPMENT - THROUGH 31ST, 1915

	MORRIS IRON	MORRIS PHOS.	MORRIS SILICA	TOTAL	TOTAL LAST YEAR
On Hand Jan. 1st, 1915,	27,245	7,802	21,094	56,141	22,559
Output for Year,	56,042	10,698	2,392	77,032	52,556
Total,	83,287	18,500	23,486	135,273	75,115
Shipments,	71,757	15,402	3,628	90,787	29,063
Balance on Hand,	11,530	3,158	26,858	41,546	46,052
Increase in Output-				14,822	
Decrease in Ore on Hand,				14,166	

2-2 Hr. Shifts during 1914 & 1915.

MORRIS MINE

AVERAGE MINE ANALYSIS OF OUTPUT FOR YEAR-1915

GRADE	IRON	PHOS.	SILICA	TOTAL
Morris Bessemer,	60.54	.052	6.52	
Morris,	58.42	.061	7.74	
Morris (As North Lake),	59.16	.059	6.50	(2429 tons)
Morris Silica,	51.76	.051	19.49	
Total,				

AVERAGE ANALYSIS ON STRAIGHT CARGOES FOR YEAR-1915

GRADE	
Morris Bessemer,	All Mixed
Morris,	" "
Morris Silica,	" "

ORE STATEMENT - DECEMBER 31ST, 1915

	MORRIS BESS.	MORRIS	MORRIS SILICA	TOTAL	TOTAL LAST YEAR
On Hand Jany. 1st, 1915,	27,246	7,902	21,034	56,182	22,689
Output for Year,	58,049	10,638	8,398	77,085	62,556
Total,	85,295	18,540	29,432	133,267	85,245
Shipments,	71,757	15,402	3,090	90,249	29,063
Balance on Hand,	13,538	3,138	26,342	43,018	56,182
Increase in Output-23%				14,529	
Decrease in Ore on Hand,				13,164	

2-8 Hr. Shifts during 1914 & 1915.

MORRIS MINE

SHIPMENTS FOR YEAR--1915

GRADE	POCKET	STOCKPILE	TOTAL	TOTAL LAST YEAR
Morris Bessemer,	36,675	35,082	71,757	11,565
Morris,	2,665	12,737	15,402	617
Morris Silica,	205	2,885	3,090	16,881
Total,	39,545	50,704	90,249	29,063
Total Last Year,	19,519	9,544	29,063	
Increase - 211%			61,186	

MORRIS SHIPMENTS	M. LIME	REFR. LIME	SILICA	M. LIME M. SILICA	TOTAL	TOTAL LAST YEAR
36,675	35,082	2,665	205	39,545	29,063	61,186
11,565	617	16,881		29,063		
15,402				15,402		
16,881				16,881		
29,063				29,063		
29,063				29,063		
61,186				61,186		

MORRIS MINE.

MORRIS-LLOYD MINE

CONSOLIDATED ORE STATEMENT - DECEMBER 31ST, 1915

GRADE	MORRIS BESS.	MORRIS	MORRIS SILICA	N.LAKE BESS.	NORTH LAKE	N.LAKE SILICA	N.LAKE H.PHOS.	TOTAL	TOTAL LAST YEAR
On Hand Jany. 1st, 1915,	27,246	7,902	21,034	25,014	9,338	114,467	3,868	205,001	165,129
Output for Year, 1915,	58,049	10,638	8,398	16,260	65,008	57,532	5,700	221,585	192,145
Total, 1915	85,295	18,540	29,432	41,274	74,346	171,999	5,700	426,586	357,274
Shipments, 1915	71,757	15,402	3,090	10,751	49,327	126,194	0	276,521	152,273
Balance on Hand, Dec. 31, 1915,	13,538	3,138	26,342	30,523	25,019	45,805	5,700	150,065	205,001
Increase in Output-15%								29,440	
Decrease in Ore on Hand,								54,936	

2 - 8 Hr. Shifts during 1914 & 1915.

Total Last Year,	75,848	75,427	152,273		124,248				
Increase - 25%									

MORRIS-LLOYD MINE.

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MORRIS-LLOYD MINE

CONSOLIDATED STATEMENT OF SHIPMENTS FOR YEAR--1915

GRADE	POCKET	STOCKPILE	TOTAL	TOTAL LAST YEAR
Morris Bessemer,	36,675	35,082	71,757	11,565
Morris,	2,665	12,737	15,402	617
Morris Silica,	205	2,885	3,090	16,881
North Lake Bessemer,	1,776	8,975	10,751	18,716
North Lake,	41,969	7,358	49,327	13,056
North Lake Silica,	40,413	85,781	126,194	91,438
North Lake - High Phos.	0	0	0	0
Total,	123,703	152,818	276,521	152,273
Total Last Year,	78,846	73,427	152,273	
Increase - 82%			124,248	

MORRIS-LLOYD MINE.

MORRIS-LLOYD MINE.

MORRIS-LLOYD MINE.

COMPARATIVE MINING COST FOR YEAR.

	1915.	1914.	INCREASE.	DECREASE.
<u>PRODUCT</u>	221,585	192,145	29,440	
General Expense	.074	.070	.004	
Maintenance	.095	.157		.062
Mining Expense	1.075	1.318	.243	
<u>Cost of Production</u>	1.244	1.545		.301
Exploratory	.012	.010	.002	
Extraordinary Drifting	.317	.176	.141	
<u>DEPRECIATIONS.</u>				
Plant Account	.250	.253		.003
Equipment	.006	.008		.002
Uncompleted Construction	.001	.001		
<u>Total Depreciations</u>	.257	.262		.005
Taxes	.071	.058	.013	
Central Office	.078	.093		.015
Miscellaneous	.002			.002
Sundry Expense	.061	.038	.023	
<u>COST ON STOCKPILE</u>	2.038	2.182		.144
Loading & Shipping	.056	.037	.019	
<u>Total Cost on Cars</u>	2.094	2.219		.125
No. Days Operating	304	299	5	
No. Shifts and Hours	2-8hr	2-8hr		
Avg. Daily Product	729	643	86	
<u>COST OF PRODUCTION</u>				
Labor	.804	1.009		.205
Supplies	.440	.536		.096
<u>Total</u>	1.244	1.545		.301

MORRIS-LLOYD MINE.

COMPARATIVE WAGES AND PRODUCT.

KIND.	1 9 1 5.	1 9 1 4.	INCREASE.	DECREASE.
PRODUCT				
No.Shifts and Hours	221,585 2-8hr	192,145 2-8hr	29,440	
AVERAGE NUMBER MEN WORKING				
Surface	54	44	10	
Underground	208	199	9	
Total	262	243	19	
AVERAGE WAGES PER DAY				
Surface	2.33	2.39		.06(2.51%)
Underground	2.83	2.85		.02(.7%)
Total	2.72	2.77		.05(1.8%)
WAGES PER MONTH OF 25 DAYS				
Surface	58.25	59.75		1.50
Underground	70.75	71.25		.50
Total	68.00	69.25		1.25
PRODUCT PER MAN PER DAY				
Surface	13.37	13.86		.49
Underground	3.48	3.10	.38	
Total	2.76	2.53	.23	
LABOR COST PER TON				
Surface	.174	.172	.02	
Underground	.811	.920		.109
Total	.985	1.092		.107
Average product Breaking & Trm'g	6.80	5.62	.18	
" Wages Contract Miners	2.98	2.93	.05	
" " Trammers	0	0		
" " Labor	3.98	2.93	.05	
TOTAL NUMBER OF DAYS				
Surface	16,570½	13,861	2,709½	
Underground	63,606	62,055½	1,550½	
Total	80,176½	75,916½	4,260	
AMOUNT FOR LABOR				
Surface	38,654.50	33,107.04	5,547.46	
Underground	179,732.58	176,785.58	2,947.00	
Total	218,387.08	209,892.62	8,494.46	
Prop. Surface to Underground men -				
1915 - 1 to 3.85				
1914 - 1 to 4.48				
1913 - 1 to 4.05				
1912 - 1 to 4.37				
1911 - 1 to 4.06				
	NOTE:			
	Oct.1,1914, Wage rates reduced 10% from			
	schedule adopted Feb. 1, 1913.			
	Aug. 1,1915, Wages restored to scale in effect			
	prior to Oct. 1,1914.			
	Avg.wages 9 mos. Jan.1st to Sept.30,1914 ... 2.82			
	" 10 " Oct.1,14, to Aug.1,1915 ... 2.59			
	Decrease during 10 month period23			
	Per Cent " " ... 8.16			

MORRIS-LLOYD MINE.

TIMBER STATEMENT FOR THE YEAR ENDING DECEMBER 31, 1915.

KIND.	LINEAL FEET.	AVG. PRICE PER FOOT.	AMOUNT.	LAST YEAR.
6" to 8" Timber	175,333	.02	3,579.04	2,670.01
8" to 10" "	64,754	.04	2,620.06	1,790.73
10" to 12" "	19,891	.06	1,214.92	2,138.81
12" to 14" "	9,963	.08½	817.95	1,135.62
Total 1915	269,941	.03½	8,231.97	
Total 1914	218,092	.03½		7,735.17
	LINEAL FEET.	PER 100'		
5' Lagging	605,200	.474	2,870.37	2,410.33
7' "	54,500	.55	301.70	208.39
8' "	317,620	.55	1,736.20	983.15
Total Lagging	977,320	.502	4,908.27	3,601.87
Poles	115,977	.93	1,078.97	998.07
Total 1915	1,093,297	.548	5,987.24	
Total 1914	700,904	.579		4,599.94
			1915.	1914.
Product			221,585	192,145
Feet Timber per ton of ore			1.218	1.135
Feet of Lagging "			4.41	3.59
Feet of Lagging per foot of Timber			3.62	3.16
Cost per ton for Timber			.0371	
" Lagging			.0221	
" Poles			.0049	
" Timber, Lagging & Poles			.064	.064
Equivalent of stull timber to Board Measure			404,299	243,390
Feet of Board Measure per ton of ore			1.825	2.05
Total Cost for Timber, Lagging & Poles 1915			14,219.21	
" 1914			12,335.11	
" 1913			8,394.16	
" 1912			6,634.06	
" 1911			6,001.30	

SECTION 2. PETERSON OPTION.

The drilling of 1914 on this option had shown a small amount of hard ore on the lower MORRIS-LLOYD MINE.

STATEMENT OF EXPLOSIVES USED FOR BREAKING ORE.

KIND.	QUANTITY.	AVERAGE PRICE.	AMOUNT 1915.	AMOUNT 1914.
40% Powder Gelatin	1,040	.10	104.00	1,837.50
40% " RedCross	94,600	.09½	9,023.75	8,157.75
50% " "	15,750	.10½	1,665.50	583.25
60% " Gelatin	600	.12	72.00	
80% " Giant	11,750	.14	1,645.00	506.00
80% " Gelatin	0		0	0
Total Powder	123,740	.101	12,510.25	11084.50
Fuse	321,450	4.48	1,442.52	1,037.49
Caps	64,900	8.21	533.86	375.85
Cap Crimpers	30	.25	7.50	12.15
Connecting Wire	1		.27	.30
Total Fuse, Etc.			1,984.15	1,425.79
Total Explosives			14,494.40	12510.29
Product			221,585	192,145
Pounds Powder per ton ore			.5584	.5893
Cost per ton for powder			.0564	.058
" Fuse, Caps, Etc.			.0089	.007
" All Explosives			.0654	.065
Avg. Price per lb. for Powder			.10	.0975

NORTH LAKE DISTRICT.

SECTION 2, PETERSON OPTION.

The drilling of 1914 on this option had shown a small amount of hard ore on the contact in the N.W. corner of the option. The drilling done here in 1914 indicated that this ore was merely a narrow seam under the quartzite, also that the contact here was either faulted to the North at depth, or was very irregular.

At the close of the year 1914, hole No. 70 was being drilled in order to further prove up this ore, and determine if it would be advisable to retain this option any longer. The hole was started Dec. 15th, and at the end of the year was down to a depth of 262 ft., or 45 ft. below ledge in slate. In 1915 this hole was drilled 456 ft. deeper, and passed through slate, graywacke, quartzite, conglomerate jasper, and stopped in hard ore jasper at a depth of 718 ft. As this hole failed to prove up any ore, this option was formally surrendered on May 12th, 1915.

BARNES & HECKER, LEASE NO. 31. SEC.2.

Early in 1914 it was decided to put down several holes on this lease in order to prove if the ore found here was continuous between the old drill holes. The work done during 1914 was not successful in proving that the ore body was continuous, but it had not yet been completed at the close of the year.

Hole No. 68 was started on July 8th, 1914, and on Dec. 31st, was down 835 ft. in soft ore jasper. The hole was stopped on Feb. 13th at a depth of 1165 ft. in soft ore jasper. It was in dike from a depth of 1088 ft. to 1,111 ft., but failed to show any ore.

Hole No. 69 was started Sept. 24th, 1914, and on Dec. 31st was down 514 ft. in soft ore jasper. It was stopped on Feb. 5th at a depth of 891 ft., the last 116 ft. being in paint rock dike. It showed lean silicious ore, with some good ore between depths of 605 ft. and 775 ft. Analyses of this hole is as follows:

NORTH LAKE DISTRICT.

DEPTH.			IRON	PHOS.
605 ft. to 665 ft.	60 ft.		46.00	.040
675	705	30	52.80	.099
705	715	10	57.60	.117
715	720	5	54.20	.137
720	775	55	46.24	.113

The results of these holes were very disappointing, and with the other holes which were drilled here in 1914, proved conclusively that the ore body on this lease was not continuous; it also disproved the theory that the ore encountered in the old drill holes represented the tops of ore chimneys coming up from the South. It then seemed that the only chance of finding an ore body here that would warrant opening a mine, would be in the territory adjacent to the fault with a S.W. strike, which had been found in several drill holes put down through the ice on North Lake. This fault passed several hundred feet South of the ore found West of the Lake, and at this point it would require a very deep hole to strike the crotch of the fault. It was decided to drill a hole on North Lake that would strike the crotch of the fault at a depth not to exceed 700 ft. This hole was located on the S.E. quarter of the N.E. quarter of Section 2, about 200 ft. North of the South shore of the lake. It was started on March 31st, and completed on June 5th at a depth of 683 ft. It showed 124 ft. of surface, and was drilled 559 ft. in soft ore jasper, with some runs of lean ore, and was stopped in slate. Results of this hole were disappointing, as it was hoped that ore would be found here. No further drilling for ore has been done during 1915 here. Following is a summary of the work done on the Barnes & Hecker Lease in 1915.

NO. OF HOLES DRILLED,	(3)
FT. STANDPIPING,	124
FT. DRILLING,	<u>1266</u>
TOTAL,	1390 ft.

In 1914 it was decided that it would be advisable to locate the fault further West in order that one or more deep holes might be put down to strike the intersection of the fault and slate footwall,

NORTH LAKE DISTRICT.

where there was a good chance of finding ore. The first four stand-pipes were put down near the center line of the section on the Moore-Chase Lease No. 28. These holes were not successful, and later in the year other stand pipes were put down further West, half way across the forty, which succeeded in locating the fault. Holes 71 to 74 inclusive, were put down further West on this same forty. The following is a summary of the standpining and drilling on the Chase Lease, No. 28:

NO. OF HOLES DRILLED,	(10)
FEET STANDPIPING,	1,715
FEET DRILLED IN ROCK,	<u>978</u>
TOTAL,	2,693

All the drilling and standpining of 1915 on Section 2, both on the Barnes & Hecker Lease and Chase Lease No. 28, was done in an effort to prove up the ore body at the West end of North Lake on the Barnes & Hecker lease. No positive results were obtained from this work, and it is probable that it will require at least another year to reach some definite conclusion in regard to opening a mine here.

SECTION 3, CHASE MINE.

All the work done on the South half of the N.E. quarter, or in the territory adjacent to the Chase Mine, will be reported under this heading. This is the land under lease from the Barnes Land Co., covered by Lease No. 32. In 1914 there was a total of eleven holes put down, in one of which 17 ft. of high grade ore was found. At the end of 1914 a hole was being put down to locate the contact at a point 300 ft. to the East of the hole which found ore. This hole, No. 63, struck ledge on Jan. 4th at a depth of 160 ft., and was finished on Feb. 24th, at a depth of 253 ft. It passed through slate, quartzite, and into hard ore jasper, in which it was stopped.

Hole No. 64 was drilled along the supposed line of the contact, about 75 ft. West of the hole which had found ore. It was started on Feb. 8th, and completed on March 11th. It struck ledge at 106

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ft., and was drilled to a depth of 210 ft. This hole started in conglomerate jasper, and was stopped in hard ore jasper.

Hole No. 67 was located South of the hole where ore had been encountered, and was planned to strike the ore body at greater depth. It was started on March 12th, and completed on April 10th at a depth of 208 ft. It struck ledge at 168 ft., and was drilled 40 ft. through quartzite and hard ore jasper, but no ore was found.

One more hole, No. 69, was drilled further East on the 16th line. It started on April 12th, and finished May 20th, at a depth of 320 ft. This hole struck ledge at 185 ft., and was drilled 135 ft., through graywhacke, quartzite and hard ore jasper. No further work was done in this territory, as there was apparently no ore here on the hard ore contact. The following is a summary of the work done here in 1915.

NO. OF HOLES DRILLED	(4)
FEET STANDPIPING,	520
FEET DRILLING,	<u>482</u>
TOTAL,	1002

SECTION 3, BARNES LAND CO.

All exploring work done on the South half of the N.W. quarter, appears under this heading. A total of seven holes were put down here West of the old Dexter Mine, and some ore was found on the contact at one point, but not enough to warrant further explorations.

The first hole, No. 65, was located about 900 ft. West of the Dexter shaft; it was started on Feb. 6th, and was finished March 5th at a depth of 145 ft. This hole struck ledge at a depth of 80 ft., and was drilled 65 ft. in dike.

Hole No. 66 was located about 100 ft. South of hole No. 65. It started on March 6th, and was completed on March 29th at a depth of 163 ft. It struck ledge at 92 ft., and was drilled 71 ft. through quartzite, 10½ ft. of second class ore, and was stopped in dike.

Hole No. 68 was next drilled about 100 ft. East of hole No.