THE
CLEVELAND - CLIFFS IRON CO.
MINING DEPARTMENT

AGENT'S ANNUAL REPORTS
FOR
YEAR ENDING
DECEMBER 31ST, 1910

MS 86-100
2093

#2093

RECEIVED
MAR 18 1911
Aok..... Ans.....

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12805

IRON CLIFFS COMPANY

ISHPEMING, MICHIGAN.

A G E N T ' S A N N U A L R E P O R T

F O R

YEAR ENDING DECEMBER 31ST, 1910.

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I N D E X

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RECEIVED
MAR 18 1911
Ack..... Ans.....

IRON CLIFFS COMPANY.

Ishpeming, Michigan,
1st January, 1911.

Mr. Wm. G. Mather, President,

Cleveland, Ohio.

Dear Sir:

I beg to submit the following report of the Operation and present condition of the Mines of this Company.

The reports on the Underground condition of these properties were prepared by Mr. Lucien Eaton, Superintendent.

The maps, statements and inventories forming a part of this report, have already been sent you.

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CLIFFS SHAFT MINE .

PRODUCTION.

The Cliffs Shaft Mine worked 297 days in 1910, and produced 103,732 tons of lump ore, and 143,329 tons of crushed ore and screenings, making a total of 247,061 tons. This does not include any over-run from the stock-pile. The average hoist per day was 832 tons.

HOIST BY LEVELS FOR THE YEAR 1910.

LEVEL	"A"SHAFT	"B"SHAFT	BOTH SHAFTS
First	5716	11834	17550
Second	44		44
Third	22021	7232	29255
Fourth	12858	2246	15104
Fifth	15691	15310	31001
Sixth	13057	32800	45857
Seventh	15150	27916	43066
Eighth	12717	6033	18750
Ninth	20657	6582	27239
Tenth	7249	11946	19195
TOTAL	125160	121901	247061

ESTIMATE OF ORE DEVELOPED .

	"A"SHAFT	"B"SHAFT	TOTAL
Pillars	895000	541000	1436000
Floors	1258000	752000	2010000
Backs	72000	30000	102000
TOTAL	2225000	1323000	3548000
Partly Dev.	578000	125000	703000
TOTAL	2803000	1448000	4251000

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Less 10%	280000	145000	425000
Net Total	2523000	1303000	3826000
To support surface	1092000	567000	1659000
Available for mining 1911	1431000	736000	2167000
Available for mining 1910	601000	575000	1176000
Gain in 1910	830000	161000	991000

UNDERGROUND .

CHANGES IN SHAFTS .

The north compartments of both shafts have been cleaned out, and dividings and runners put in for the counter-weights in "A" shaft from surface to the bottom of the shaft, and in "B" shaft down to the ninth level. Work was stopped at the ninth level on account of sinking operations in this shaft.

A six inch air-line has also been put in "A" shaft from the fourth to the tenth levels, and another one in "B" shaft from the ninth nearly to surface.

A new ladder-road has been built in "B" shaft from the fifth level to surface and in "A" shaft from the first to the fifth levels, so that now both shafts have good ladders from top to bottom.

"A" shaft has been sunk 48 feet and "B" shaft 147 feet during the year.

ORE BODIES IN "A" SHAFT.

To avoid confusion the ore-bodies in "A" shaft will be referred to as in previous years, the names given them being as follows:

MAIN EAST VEIN: Due east from the shaft from 500 to 1500 feet.

SOUTH LENS: 300 feet to 1000 feet southeast of the shaft. This is not really a lens of ore, but a "U" shaped deposit lying in the bottom of the trough.

NORTH LENS: 500 feet to 1200 feet northeast of the shaft.

SMALL BODY: 300 feet northeast of the shaft.

NORTHEAST LENS: A new ore-body about 300 feet east of the North Lens and possibly connected with it.

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ORE-BODIES IN "B" SHAFT.

The same names will be given the ore-bodies in "B" shaft as in previous years, namely:

MAIN VEIN: Striking northeast and southwest and extending from a point 400 feet northeast of the shaft on the upper levels to a point approximately 1300 feet southwest of the shaft on the tenth level.

NORTH DEPOSIT: 300 to 800 feet northwest of the shaft on the fifth, sixth and seventh levels, including all ore north of the main east and west fault.

EXPLORATION AND DEVELOPMENT.

In addition to the diamond drill, which has been in use underground throughout the year, a drill has been working on surface nearly all the time. Twenty-two holes have been drilled on surface, two on Section 10 and twenty on Section 9. Hole No. 16 on Section 9, which was started last year west of the Carp River reached the ore-formation about 100 feet below the tenth level. It passed through 30 feet of second class ore and 18 feet of first class, passing then into the jasper foot-wall.

Four holes were drilled south of the stock-pile grounds, two on Section10 and two on Section 9 to test the connection between the ore found in the four holes drilled further south on the anticline and the ore on the first level in "B" shaft. They all found ore in paying quantities. The remaining holes on Section 9 have been put down to follow the westward extension of this same anticline, and further west, that of the Barnum trough, and have been unsuccessful in finding ore for 4000 feet west of "B" shaft. At this point No. 31 found 19 feet of good ore, and 300 feet further northwest No.34 found 36 feet of very good ore. No. 36 is now drilling 200 feet further northwest.

Underground drilling has been very successful, especially in "A" shaft. 24 holes have been drilled, 13 in "A" shaft and 11 in "B" shaft. In "A" shaft four holes below the tenth level 1200 feet east of the shaft

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defined the cross-section of the ore-body at this point; a hole south across the anticline on the fourth level passed through a large amount of ore; another on the sixth level to the north had ore of varying grade nearly all the way to the boundary, and two holes to the southeast on the seventh level proved the existence of considerable ore, at the east end of the Main East Vein, the end of which was supposed to have been reached. Two short holes on the south side of the South Lens on the seventh level and four on the first level were blank.

In "B" shaft a little ore was found on the ninth level, but it didn't amount to much when reached by a drift, and one hole on the third level to the north was blank. Ore was found on the fifth level at the west end under the hanging-wall to the north, but another hole further east and one on the fourth level, both drilled to the hanging-wall to see that no ore had been missed in the development of the levels, were both blank. A hole to the south to test the foot-wall on the tenth level had a like result, but a hole drilled to the south on the eighth level near the west end of the Main Vein passed through 64 feet of good ore and one on the sixth level drilled north across the North Vein had two runs of 31 and 20 feet in ore. At present the drill is starting a hole on the ninth level in "A" shaft.

Development stopes in the Main East Vein have been driven on the first, seventh and eighth levels, and in the North Lens and Northeast Lens on the fourth, fifth, sixth and seventh levels in "A" shaft. The Main East Vein and the South Lens have been developed by drifts and cross-cut stopes on the ninth and tenth levels in "A" shaft.

In "B" shaft a cross-cut 250 feet long was driven in the anticline southeast of the shaft, and a raise put up 100 feet to the ore found in hole No. 7 on Section 10. 600 feet further east this same ore-body is being developed by two stopes from the top of another raise, which was put up in ore in 1909.

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In the North Deposit development stopes have been driven on the fifth, sixth and seventh levels, and in the Main Vein drifts and stopes have followed the ore on the seventh, eighth, ninth and tenth levels. On the sixth level the west drift has been driven 380 feet in rock, ore being developed at the end, and a long cross-cut has been driven to the north opening three small ore-bodies.

CONDITION OF "A" SHAFT .

The third level has been the largest producer during the year, with the ninth a close second. The latter will probably be the largest next year. The ore-bodies on this level and on the tenth level in the Main East Vein have proved to be larger than were expected. In addition to the drifts and cross-cuts on the levels, four diamond drill-holes were put down below the tenth level, satisfactorily proving the section of the ore-body at this point. The cross-section at this point - 1200 feet east of "A" shaft - shows 4,000 tons of ore practically untouched below the eighth level for every foot of advance towards the east. As both drill-holes No. 1 and No. 4 on Section 10 showed considerable ore at this elevation, there is no reason to fear serious diminution in the size of the ore-body to the east. The end of the Main East Vein has not yet been reached on the seventh and eighth levels, and the known extent of the Northeast Lens has been much enlarged by stopes and drill-holes on the fourth, fifth and sixth levels.

Developments on the first level 600 feet east of the shaft, have shown that the ore developed in 1909 lies on the top of an anti-cline on the north side of the axis. The south side of the axis has been developed for a length of 165 feet, but the ore is only about 12 feet wide. This ore is the top of the Main East Vein, and has not been mined on the second level.

All the ore in the back of the stope at the east end of the third level has been mined. In the North Lens the floors between the second and third levels near the boundary have been finished, and two

more raises have been put up from the fourth level under the hanging-wall in preparation for taking the third level floors. South of the shaft the ore discovered last year in drill-holes Nos. 155 and 156 has been nearly all mined, and was disappointingly small.

On the fourth level the development of the ore found in drill-hole No. 159, 1000 feet east of the shaft, was disappointing, as it did not extend far enough above the level to permit stoping. This ore is now being developed by a raise from the fifth level. In the North Lens two raises have been put up to the third level under the hanging-wall. South of the shaft several runs of ore were cut by drill-hole No. 175, drilled across the nose of the anticline, and development of this ore has already been started.

Development stopes have been driven in the North Lens, 800 feet from the shaft, on the fifth level, proving the width of the ore near the boundary to be approximately 80 feet. 400 feet further east a stope has been driven east 165 feet in ore, following the main fault, and having good ore both above and below it all the way.

On the sixth level development stopes have opened the ore near the boundary 1200 feet northeast of the shaft, and have proved that here it is at least 200 feet long and 100 feet wide. Further extensions are being made, and drill-hole No. 183, 150 feet further east, was in ore for nearly 300 feet; but the grade of the ore has been very irregular, and there has been many rock seams cutting across the ore-body, all of which detracts materially from the value of this deposit. However, the last two months have shown up better ore than heretofore, and prospects for more and better ore are very good.

Comparatively little has been done on the seventh level. One gang has stoped in the back of the South Lens Deposit 500 feet east of the shaft, and another has been stoping north of the Main East Vein in an irregular ore-body, which is apparently the eastern extension of that just described on the sixth level. Another gang has just started to develope the eastern end of the Main East Vein, the limits of which

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were supposed to have been reached in former years.

On the eighth level the Main East Vein has been followed east 160 feet and the end has not yet been reached. The Vein is continuous, as already developed, for over 1000 feet. Some stoping has been done in the South Lens Deposit, and a cross-cut was driven 125 feet across the trough to the foot-wall on the south side, where a narrow vein of ore was followed east for over 100 feet. On the ninth level this south foot-wall has also been followed for a distance of 250 feet, but with rather discouraging results, the ore being very narrow and irregular. The western part of the South Lens Deposit has been found to be very irregular as it was on the upper levels, but 1000 feet from the shaft it has been cross-cut and proved to be over 200 feet wide. In the Main East Vein the east drift under the hanging-wall has been advanced 400 feet, all in ore except two small crossings of jasper. There is jasper again in the breast, but it will probably not amount to much. The vein as already developed on this level is nearly 700 feet long and has increased in width from 40 to 80 feet.

The main east drift on the tenth level was continued 90 feet in ore, but was stopped when it reached the hanging-wall, 1200 feet east of the shaft. Two cross-cuts have been driven north and two south, and from the two furthest east drifts are being driven to develope the Main East Vein and the south side of the South Lens Deposit. In addition, a raise has been put up to the ninth level. The north drift is being driven in ore and is 14 feet wide for double track. From it, raises will be put up to the upper levels, and all ore, if possible, transferred from the stopes below the fifth level to the tenth level, which is planned for motor-haulage.

"A" shaft has been sunk 48 feet below the tenth level in diorite.

As a whole the developments in "A" shaft during the year have been very successful, and ore reserves are being rapidly blocked

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out on the lower levels. Longitudinal and cross-sections indicate that the ore will probably extend at its greatest depth nearly 250 feet below the tenth level, and the drilling from surface on Section 10 indicated an eastern extension of over 600 feet from the end of present developments.

CONDITION OF "B" SHAFT .

Developments in "B" shaft have not been as successful as in "A" shaft, except on the first level. Here several drill-holes from surface have found a large ore-body on top of the anticline south of the shaft. Estimating from the drilling this deposit contains over 200,000 tons, most of which is of high grade. Stopes have been started from raises southwest and southeast of the shaft and 600 feet apart at an elevation of 100 feet above the level. The raise southwest of the shaft was put up on the foot-wall in ore and was nearly completed last year. Two gangs of miners are stoping southeast from the top of this raise following foot and hanging-walls, and have proved the ore for a width of 100 feet. It is all slate ore. The eastern raise was put up from a rock cross-cut driven 250 feet during the year, and is nearly all in rock. A stope has been started to the west. The ore here is a little over 20 feet wide.

Good ore-bodies have been opened on the sixth and seventh levels in the North Vein, and in the Main Vein on the seventh level; but the eighth, ninth and tenth levels have found little ore in their western drifts since the first part of the year. Work has been stopped at the west end of the eighth and ninth levels. On the tenth level the ore-body north of the main drift has been thoroughly opened up and has proved to be 280 feet long and 150 feet wide on this level. Nothing has been done south of the main drift. One more cut on the north side under the hanging-wall will finish that deposit, except for taking floors and backs.

No. work has been done on the second level except taking floors. A little ore was mined in this way early in the year, and during the summer a small piece was taken out near the shaft to make a rock dump.

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Early in the year a little ore was scrammed off the foot-wall, 200 feet northeast of the shaft on the third level. No other work has been done except the preparations for a rock dump from the second level.

Mining on the fourth level has been confined to taking floors at the extreme west end, where a large amount of ore has been broken. At the end of the year a raise was put up to the third level under the hanging.

On the fifth level one party worked a few months under Lake Bancroft but were stopped when they approached the provisional boundary line. The only other mining has been at the west end, where a small deposit 100 feet long and 50 feet wide has been developed under the hanging-wall. The end of this deposit has been reached on the west, but there is still a good chance toward the east. A raise was also put up from the sixth level in ore 950 feet west of the shaft, affording better ventilation for the sixth level.

An ore-body 85 feet wide has been developed on the sixth level under Lake Bancroft for a length of 120 feet and what is apparently its western extension was cut by a drill-hole 150 feet further west. The west drift was driven 380 feet in rock and a stope opened out at the end in good ore. This stope is now being continued to the west. A raise was put up from this drift to the fifth level during the fall. About 400 feet west of the shaft the ore has been mined from the back of the two stopes south of the main drift and a raise has been put up to the north in ore to an elevation above the fifth level. Three separate bunches of ore have been developed and mined from the cross-cut following a drill-hole to the north, but the last one gives promise of a larger ore-body.

On the seventh level there have been two stopes in the North Vein, one under Lake Bancroft and the other 300 feet further west, both following the jasper foot-wall towards the east. Neither place looks promising at the end of the year. At the west end of the level the south

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stope was continued south 70 feet to the foot wall and 120 feet along the contact, opening an ore-body 140 feet long and about 60 feet wide. A drift was also driven west under the hanging-wall 70 feet, where another ore-body was found, which has been followed 150 feet. Its limits are as yet undetermined.

The west stope on the eighth level was driven ahead 190 feet, but the ore pinched out early in December. The ore is only 15 feet wide in this part of the vein, so that the tonnage developed in back and floor is comparatively small.

On the ninth level the west drift was advanced 200 feet in eight months, the first 140 feet being in ore, but the vein was very narrow, and finally pinched out altogether. A stope was also driven east 100 feet into the foot-wall following a "dropper" from the level above. The only work now being done on the level is in this stope, where the back is being mined.

On the tenth level the west drift has followed the contact for 400 feet without finding ore in paying quantities. It is still being driven ahead following a narrow vein. North of the main drift the main stope was advanced 90 feet to the hanging and then 60 feet to the north, and two cross-cuts were driven through the pillar. The ore-body here has an area of approximately 32,000 square feet, which is about 4,000 tons for every foot of depth. This ore has been cut further to the west in two drill-holes at depths of 27 and 145 feet, which would indicate a large tonnage, if the size of the ore-body remains the same.

"B" shaft has been sunk 146 feet and is still sinking, a pentice having been left 50 feet below the tenth level.

The ore-bodies in "B" shaft have become much simplified in depth, and as a consequence have limited their possibilities to a large extent. The future of this shaft lies in the ore above the first level, in that in the North Vein between the fifth and eighth

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levels, and in the Main Vein below the tenth level, and in all these places the prospects are good. In the rest of this half of the mine the ore is already well defined.

FIRST LEVEL "A" SHAFT .

520 feet east of the shaft #12 continued their cross-cut stope south 20 feet to the hanging. This contract was discontinued in February, as more ore was being broken in "A" shaft than could be hoisted. In April No. 17 came to this stope and started a narrow stope to the east, following the vein between the slate and jasper for a distance of 160 feet, till foot and hanging came together. The ore was good, but averaged only about 12 feet in width. In October they drove a short cross-cut stope to the south from the side of the main stope 480 feet east of the shaft, and in November started stoping in the back towards the east. The ore goes up about 15 feet above the back of the original stope at this point. They are still back stoping now at a point 550 feet east of the shaft. Between January and April they holed two cross-cut stopes together under the hanging-wall on the south side 150 feet east of the place where they are now working.

SECOND LEVEL "A" SHAFT .

During the first half of October #12 drove a short rock drift on the south side of the shaft to prepare for dumping rock when the new skips are put in use. This is the only work that has been done on the second level during the year.

THIRD LEVEL "A" SHAFT .

In the North Lens No. 26 beat down the floor of their raise 550 feet northeast of the shaft and drove the stope ahead to the south 25 feet, leaving jasper in the floor of the second level above them. They also squared down the bench of the west raise and drove the next north stope ahead 5 feet almost to the boundary line. In May No. 26 moved south 80 feet, and put up two raises on the jasper. These raises were holed together and one of them broke through to the second level. They

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were finished in November and No. 26 moved to the fifth level in the Northeast Lens. In July and September No. 36 holed raises from the fourth level to the floor of the third level close under the hanging-wall and east of No. 26's stopes.

At the east end of the level No. 21 worked all but the last two weeks of the year in the back of the stope at the end of the Main East Vein, and broke a large tonnage of good ore. They are now cross-cutting in rock towards the northeast 840 feet from the shaft to reach a small body of ore found in an old drill-hole.

300 feet south of the shaft No. 15 continued their drift southeast 75 feet in ore, and then turned east for 65 feet in rock till they reached the ore found in drill-hole No. 55. They followed this ore 40 feet east and 70 feet north till it pinched out. There is ore in the bottom, but little in the back. In July they moved back to the end of the ore in the drift, stoped for a month in good ore on the south side, and then moved back to the other end of the ore in the drift, and opened a stope on the south side, following the rock towards the southeast till it came back to the side of the drift. In October they started again on the north side of the drift at the end of the ore nearest the shaft, and have stoped to the northeast 65 feet with rock on one side or the other at all times. The ore in this territory is extremely irregular.

FOURTH LEVEL "A" SHAFT .

During the first six months of the year No. 36 put up two raises, one to the west and one to the south, in the North Lens, 600 feet northeast of the shaft, following the hanging as they went up, and later beating down all the ore left in the bench. The more northerly raise they holed to the third level in July, and then moved to the next raise to the north, which they started last year, and put it up to the third level, holing close to the hanging-wall in September. Since then they have been mining the ore in the bottom of the raise.

At the east end of the level No. 3 in January reached the ore found in drill-hole No. 159, and followed it east 40 feet, till the

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hanging came down too low. They then followed the drill-hole 50 feet to the north, having ore in the bottom half of the drift only, and then turned west for 60 feet, following the highest part of the ore. Work was discontinued here in the latter part of August, as it is evident that this ore will have to be mined from the fifth level.

200 feet south east of the shaft No. 9 put down long holes in the floor of the stope in August, and broke through to the fifth level. They mined a piece of the floor 40 feet long and 16 feet wide, and then moved 140 feet further south, where they started across-cut, following drill-hole No. 157. They are dumping their rock down to the fifth level through the hole made in the floor. They have cross-cut south 55 feet, partly in ore and partly in rock, a slate band, about 3 feet thick, and lying very flat, being in the breast all the way. At the end of the year they had a clean breast of ore.

FIFTH LEVEL "A" SHAFT .

In the North Lens 750 feet northeast of the shaft No. 24 have worked during the entire year. They first drove a cross-cut stope 55 feet south from their north stope, holing into the south stope of this deposit 100 feet from the west end. From this stope they raised to the west on the jasper, holing to the back of the next cross-cut and then raised straight up to the fourth level, where they holed in July. Since then they have driven two cross-cut stopes north to the boundary from their north stope, and are now stoping west to connect the two. The ore has been fairly good at all times.

In the North East Lens 1150 feet northeast of the shaft No. 7 and No. 39 were working at the beginning of the year, both driving stopes to the east and leaving a 30 foot pillar between. No. 39 was in the north stope and No. 7 in the south one. No. 7 continued their stope 30 feet, till the grade became too poor, and in February moved to the eighth level to work with No. 11. No. 39 continued their stope to the east for 160 feet, following the slate on the left and with jasper on the right for the last half of the distance. At the end of the year

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they have slate in the back in the breast.

In November #26 started raising at the west end of No. 39's stope to develope the ore in which No. 3 worked on the fourth level, and have good ore, the grade being best on the north side. They are up 30 feet.

SIXTH LEVEL "A" SHAFT .

At the beginning of the year No. 20 and No. 5 were both stoping to the north in the northeast Lens, No. 20 being in the west stope, and No. 5 in the east. No. 5 continued their stope 70 feet to the north to the boundary, and then turned east along the line for 60 feet, till the ore was cut off by slate in the breast. They moved south, leaving a 25 foot pillar, and drove another cut to the east, going in 35 feet, but reached a full breast of jasper. Leaving another pillar they moved south again, and started another cut to the east, in which they are now working. The breast is in 40 feet from the side of the main stope, and the ore is clean and of fair grade. All during the year in this stope, and in No. 20's until October, the ore has been rather poor, and has been further injured by having small slate bands crossing it. No. 20 drove their stope 110 feet north until they reached the jasper foot-wall, and then came back to the south end, and, leaving a 30 foot pillar on the south side, started a stope to the east. After going in 15 feet, this place was stopped on account of the poor grade, and a cut was driven to the west on the opposite side of the stope. The ore here extended 35 feet. From the end of this stope a drift was driven 10 feet through the jasper, ore being found inside. They have been stoping to the west in this ore, which is of better grade for three months without finding any rock. It is hoped that on this level this deposit will connect with the North Lens.

SEVENTH LEVEL "A" SHAFT .

There are three contracts working on the seventh level. No. 29 have been working all the year in the back of the stope farthest north in the South Lens, 500 feet east of the shaft, and have followed the ore up on the jasper at the west end of the stope, till they reached the sixth level, to which they have broken through in two placed. In December they

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raised from the west end of the stope next to them on the south, and holed about 20 feet above the level. The remaining ore in the back and some of the floors of the sixth level will be taken down this way to save tramming and rehandling.

At the east end of the Main East Vein 1250 feet east of the shaft, No. 3 started in October, driving a small stope close to the hanging. The stope was kept about 12 feet wide as the ore on the left was poor, but in December the grade improved, and a full sized stope is being opened.

160 feet north of No. 3's stope No. 8 have continued their stope to the east for 140 feet, following the ore found in drill-hole No. 154. During the first part of the year the ore was comparatively small with jasper on the left and in the back, and slate on the right; but during the last four months the jasper has fallen back and the only rock in the stope is on the right.

EIGHTH LEVEL "A" SHAFT .

At the east end of the Main East Vein 1300 feet from the shaft No. 27 drifted east 5o feet, following the end of the ore between two bands of slate. Then they cut out on the hanging side 30 feet back in their stope, and drove a cross-cut stope 135 feet southeast, till they were stopped by a bunch of jasper in the breast. They have stoped to the northeast around this jasper, and are now going ahead to the east again. Thie ore is good.

800 feet southeast of the shaft No. 11 drove a cross-cut across the South Lens basin to reach the south foot-wall. They passed through 110 feet of lean ore, and then cut a vein of good ore 12 feet wide lying on the foot-wall, which they followed east for 100 feet till it was cut out by foot and hanging coming together.

At the beginning of the year No. 22 were working at the end of the stope 480 feet southeast of the shaft, cleaning out the last of the ore. After finishing here they drove a cross-cut stope to the south 110 feet further east and then moved to "B" shaft.

No. 4 continued in their old stope, 600 feet southeast of

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the shaft in the South Lens, for one month and then moved to No. 10's old stope which was 320 feet further east in the same deposit and immediately south of the Main East Vein. They drove a stope to the east here for 50 feet holing to an old cross-cut stope South from the Main East Vein. They then moved west again 120 feet, and followed the same ore to the west 45 feet, till it pinched out. In August they moved to the Ninth Level.

NINTH LEVEL "A" SHAFT .

1000 feet east of the shaft No. 25 drove their cross-cut stope south 45 feet in good ore to the slate band that separates the Main East Vein from the south Lens. They drove a cross-cut through this slate for 75 feet opening out in the ore on the south side? The contact on the south side of the slate is very flat, the ore coming in gradually in the back as the cross-cut advanced. Their stope was continued 90 feet further south, across the vein, the ore getting better as they advanced. In December they reached a jasper foot-wall dipping 45° to the north; and have started to follow the contact to the west.

No. 31 were 900 feet east of the shaft at the beginning of the year, following a 20 foot vein of ore between two walls of slate. They followed this ore to the east for 70 feet, till the slate on the north turned them around to the south, and finally cut off the ore entirely 60 feet further south. A cross-cut was driven through this rock from the end of the stope for 30 feet.

No. 18 continued their stope to the south, 850 feet east of the shaft, for 40 feet in good ore, and then continued as a drift for 60 feet in slate and mixed ore, till they reached a ten foot vein of ore lying on the foot-wall. This ore was followed east along the contact with the diorite for 120 feet growing gradually smaller, until it finally pinched out altogehter. This drift has been continued 130 feet further on lines to reach the ore on drill-hole No. 1 on Section 10 and in December had reached a three foot vein, of ore lying on the diorite.

No. 34 drove the main drift ahead 400 feet to the east, all but

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the last 10 feet and two small crossings of slate and jasper being in ore and in addition cut out on the north side to start two cross-cut stopes 1100 and 1200 feet east of the shaft. The breast of the drift is in jasper, which, apparently is only a bunch.

TENTH LEVEL "A" SHAFT .

The main drift was driven ahead by No. 41 due east 90 feet, till it reached the hanging-wall. Forty feet from the breast slate came in from the left, gradually crossing the drift till the breast was all in rock. A cross-cut was then driven to the south for 105 feet in ore. No.work was done here for some time, till No. 16 started in the middle of October. They continued the cross-cut for 25 feet in ore and 60 feet in rock and then turned to the east on a fifty-foot radius curve to develope the vein further to the east. They are in 50 feet from the corner, and are headed for the ore found in drill-hole No. 1 on Section 10, which is 420 feet away. Half the drift is in ore.

Meanwhile No. 41 drove one cross-cut 90 feet north of the main drift, 35 feet in ore and the balance in jasper and siderite, 1000 feet from the shaft and raised to the ninth level, holing to No. 25's stope near the main drift. They also drove another cross-cut south 50 feet from the main drift 20 feet in ore and 30 feet in jasper, 50 feet further east. They next drove another cross-cut north from the main drift, 50 feet further inside, for 135 feet, which was all in ore except a 5 foot band of slate and jasper. From the end of this cross-cut they have drifted east 103 feet, carrying the drift 14 feet wide and 8 feet high for double track motor haulage. They advanced 55 feet in December all in ore.

FIRST LEVEL "B" SHAFT .

Starting at the end of the old cross-cut 650 feet southeast of the shaft No. 42 cross-cut south 250 feet in jasper and diorite, and

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raised 100 feet to the 100 foot sub-level, where they turned off a stope in the ore discovered in drill-hole No. 7 on Section 10. They cross-cut south 35 feet to the hanging-wall, and have followed the foot-wall 30 feet to the west. As there is a good deal of water running down through the chute, and as it is impossible to keep a ladder in the upper part of the raise, a branch raise, has been started from the west side, which will hole to the stope on top early next month.

300 feet southwest of the shaft No. 30 broke through from the second into the first raise about 50 feet above the level in January, and then beat back the floor of the first raise almost to the top, so that the ore would not run down too rapidly. In April they started stoping to the south from the top of the raise. At the first they worked double shift, but in June both gangs were put on day shift. One gang has driven a stope south across the vein 120 feet to the jasper foot-wall, which they are following to the southeast. The other gang cut out on the east side, 30 feet from the top of the raise, until they reached the hanging-wall, which they are following to the south-east. They are in 65 feet from the turn. Both stopes are in fine slate ore.

SECOND LEVEL "B" SHAFT .

At the beginning of the year No. 23 were taking floors 1230 feet southwest of the shaft. They worked here during January, leaving a brace across the vein on the west side, and then moved to the third level.

From June until September No. 32 mined a piece of floor left on the second level, 150 feet southwest of the shaft, and stripped off all the ore lying on the foot-wall between the second and third levels on the north side of the stope. This place has been used as a rock dump since October.

THIRD LEVEL "B" SHAFT .

No. 37 worked 300 feet northeast of the shaft until May, and then moved to the sixth level. They drove a small cross-cut into the foot-wall for 15 feet, and raised six feet through siderite in January,

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and stoped back the floor of the old stope into this raise for the next three months, until the ore became badly mixed with jasper.

At the west end of the level No. 23 stoped down some of the back under the second level early in February, and then went down to the fourth level.

FOURTH LEVEL "B" SHAFT .

No. 23 came down in February from the third level and blasted in the floor over the top of No. 1's raise from the fifth level. They beat back the floors around this raise and around another small one that they put up in July nearer the shaft. They finished taking all the floor at present available in the south stope at the end of November, and in December raised from the fourth level to the third under the hanging-wall 1200 feet west of the shaft.

FIFTH LEVEL "B" SHAFT .

550 feet north of the shaft under Lake Bancroft No. 32 continued their stope to the east for 40 feet, and raised in the back, till the stope was about 40 feet high. They took up the bench in March and moved to the first level in April to work with No. 30. There is still ore in the breast, but it is narrow and is close to the provisional boundary line.

At the west end of the level, 1350 feet from the shaft No. 1 cross-cut 20 feet to the north in rock and opened out a stope in the ore discovered in drill-hole No. 167. They drove a cross-cut stope across the vein 65 feet to the hanging-wall, and then followed the foot-wall 75 feet west, until it joined the hanging-wall. For the past three months they have been following the rock to the east, but the contact has been swinging to the north so rapidly that it is probable that the hanging will be reached in another month. All the ore in this deposit has been good.

950 feet west of the shaft No. 11 holed a raise from the sixth level in November, but no stoping has been done on this level.

SIXTH LEVEL "B" SHAFT .

450 feet north of the shaft in the north deposit under Lake

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Bancroft No. 13 continued their stope to the north in ore for 80 feet, till they reached the jasper foot-wall and then turned east along the contact for 80 feet more. The ore has not been as good in the east stope, as it was in the cross-cut, and is now badly spotted in the breast. In the middle of February No. 7 started a stope to the east from No. 13's cross-cut, following the contact on the south side of the ore. They went in 105 feet, till they reached the provisional boundary line, and then cross-cut north till they broke through into No. 13's room. They are now cross-cutting through the middle of the pillar between the two stopes. The ore has been hard and dry at all times, and has decreased in value to the east.

500 feet northwest of the shaft No. 16 were drifting to the northwest at the beginning of the year following a narrow vein of ore. This soon pinched out, and they drifted 45 feet through slate to the first body of ore found in drill-hole No. 157. This ore proved to be small, and after mining it all out, the contract was discontinued. In May No. 37 started here and followed the drill-hole to the north. After cross-cutting through 25 feet of crystalline siderite and slate, they opened another small body of ore, which they mined out in three months. 20 feet further north they opened another ore-body, which has proved larger than the others. They have followed it for 20 feet on each side of the cross-cut, and have ore in both breasts.

In the next stope on the south side of the main drift No. 22 worked in the back for four months, taking everything up to the slate, and then raised on the north side, following a flat vein of ore between two walls of slate. The ore was narrow at first, but is now over 20 feet thick. The back of the raise is up above the fifth level. In September it was found necessary to put up a small raise from the south side of the main drift to prevent re-handling the material in No. 22's raising stope.

In the next stope on the west side of the main drift No. 10 worked in the back until the middle of February and then moved to the seventh level.

No. 38 drove the west drift 375 feet in rock with occasional

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narrow veins of ore. In November and December they drove a cross-cut stope south from the end of the drift 40 feet to the foot-wall, and are now stoping west in this ore, following the hanging. They are 1000 feet west of the shaft.

100 feet further east No. 11 put up a raise in ore to the fifth level in October, and since then have been taking up the bench and trimming the sides. The ore is good, but badly broken by small slips.

SEVENTH LEVEL "B" SHAFT .

400 feet north of the shaft No. 10 started a cross-cut to the northeast in rock about the middle of February. After advancing 10 feet, they opened out in ore, which they followed east for 90 feet. In September they started to cross-cut to the north to get under No. 13's stope, but reached rock after going 12 feet. They cross-cut to the north 45 feet in jasper during November and December, and then went back to the stope, where they have resumed mining on the east side.

At the beginning of the year No. 2 had just reached the foot-wall, 680 feet northwest of the shaft. They stoped 15 feet to the west along the contact, and then cut out on the east side. They have followed the ore east for 185 feet, with jasper on the north and slate on the south, the ore being about 20 feet wide. There is no change in the grade of the ore in the breast, which has been about 57% all along.

At the west end of the level, 930 feet from the shaft, No. 14 continued their stope to the south in good ore for 65 feet to the foot-wall, and turned west along the contact. They had good ore, though very hard, for 60 feet, but were then cut off by a band of jasper. They broke through this band and opened out in the ore again, following a 12 foot vein of steel ore for 60 feet with jasper on the right and diorite on the left.

At the beginning of the year No. 28 started a drift to the west from the north end of No. 14's stope to reach the hanging, and drifted 70 feet in jasper and ten feet in ore before they reached the

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slate. They have stoped to the southwest in this ore since April following the hanging-wall on the right side, and have advanced 140 feet. In November they had a low brow of lean jasperconglomerate in the back, but the ore has gone up again behind this. There has been no rock on the southeast side of the stope at any time.

EIGHTH LEVEL "B" SHAFT .

No. 19 have been the only gang working on the eighth level during the year. They have followed the ore in the Main Vein west for 185 feet from a point 900 feet west of the shaft, which was their breast at the beginning of the year. The ore has been from 15 to 20 feet wide for the full distance, until December, when it pinched out entirely, and progress west was stopped, temporarily at least. No. 19 moved back 200 feet, and started a cross-cut to the south to reach the downward extension of No. 14's ore. They are just starting in hard jasper.

NINTH LEVEL "B" SHAFT .

At the beginning of the year No. 6 were stoping to the east, 840 feet from the shaft,following a small body of steel ore between two walls of jasper. They followed this ore for 10 months, until it pinched out and then went back to the west end of the stope 980 feet from the shaft, and mined the ore in the back right up to the jasper. As the hanging is very flat, they have been temporarily stopped on this side and are starting to stope west.

No. 35 drifted west 150 feet, following a narrow vein of ore on the contact between the foot-wall and hanging to a point 1120 feet west of the shaft. Here the ore was cut out by a fault. This fault was followed southwest for 60 feet, and another narrow vein discovered. Work was stopped here in August, pending developments on the tenth level in the west drift.

760 feet west of the shaft No. 9 drifted northeast for two months following drill-hole No. 166 for 40 feet. As the ore cut in the drill-hole was found to extend only three feet above the floor of the

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drift, work was discontinued here and the men went to the tenth level at the end of February.

TENTH LEVEL "B" SHAFT .

The west drift, No. 40, has followed the contact west for 400 feet. They had ore 10 feet wide for 75 feet at one time, but during the rest of the time there has been no ore at all, or else a narrow vein less than the drift in size. At the end of the year there was three feet of slate ore in the breast, the best indication there has been for several months.

No. 33 continued their stope along the diorite on the north side of the ore-body, 800 feet west of the shaft for 35 feet, till it reached a bunch of slate in the back. They cut in to the north for 20 feet to see if they could get round this slate, and then cross-cut south 65 feet to the main drift. In August they moved back north again, and started a cut to the west just south of the slate that they had found in the back. This was driven 50 feet to the true hanging, and has been driven north again along the contact for 50 feet more.

In January No. 9 finished their cut through the pillar, 640 feet west of the shaft, jasper coming down in the back to within 4 feet of the floor and went to the ninth level. At the end of February they came back again, and started another cross-cut stope to the south, 25 feet west of their old one, and holed to the main drift early in April.

SHAFT SINKING .

Sinking was started in "A" shaft at the end of February and the shaft was sunk and timbered for 48 feet and the pentice removed by the middle of May. "B" shaft was then sunk 50 feet and timbered, a pentice being left 50 feet down, and the upper one removed. The shaft has been sunk 147 feet during the year and is timbered for a depth of 100 feet. A tank has been put under the pentice to catch the water that runs down the shaft, and the bottom of the shaft is by this means kept fairly dry, but little pumping being necessary in the bottom. "A" shaft is in diorite below the tenth level, and "B" shaft is in siderite for 75 feet and below that depth in diorite.

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DELAYS AND ACCIDENTS TO EQUIPMENTS .

There have been several minor delays due to damage to the catches in the shafts at different times. On Monday, the 10th of October, a crank on the compressor, driving the circulation pump, broke, necessitating a shut down till Wednesday morning. The crank has been repaired, and there has been no further trouble with it.

There have been no fatal accidents during the year.

SURFACE .

NEW CONSTRUCTION .

A steel crusher building has been erected just east of the old railroad pocket and between the railroad tracks, and one No. 8 and two No. 5 Gyratory Crushers, two revolving screens with their motors, have been installed in it. The floors, chutes and pockets are nearly completed, and the drum for the top-tram haulage in is place. Steel trestles from both shafts to this buildinghave been erected, and that on the east side has its floor and part of the rails laid. The west trestle has not been riveted yet.

Pulley-stands for the counter-weight ropes from the engine-house to both shafts have been built and all but two are in place.

Connections have been made with the transmission line and a motor installed in the shops. The underground lighting also, is now being done with this same power.

REPAIRS TO BUILDINGS AND LAND IMPROVEMENT .

An extension was built on the west end of the carriage room at the barn, during the summer, to provide for the increasing number of carriages. New fences were also built around the lots in the location in front of the barn and three of the houses were shingled.

The Barmum house was moved about 100 feet further east by the L. S. & I. Ry. Co. on account of the new railway enbankment, which crosses Division Street at this point, and a new road was built along side of the enbankment to connect with the old one from the mine.

The roof of the coal dock was repaired and painted, and that

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portion of the dock that was destroyed and injured by the fire in the coal in December 1909 and January 1910 has been repaired.

The roofs of the boiler-house, engine-house and part of the shop-building have also been repaired and painted.

REPAIRS TO MACHINERY .

No. 2 boiler in the boiler-house had a complete new set of flues put in early in the fall, and the feed water heater was almost entirely rebuilt immediately afterwards. The economizer was also repaired in the spring, two sections of pipes having cracked off near the east end. Everything in the boiler-house is now in good condition.

On January 1, 1910 a new crank was shrunk on the hoisting engine to replace that which was cracked last year, as described in the report for 1909.

On October 1910, the crank driving the circulation pump on the compressor broke, causing a shut-down of 24 hours, and was repaired by shrinking on a strap all the way around it. As it is apparently as strong as when new, it has not been replaced.

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CLIFFs SHAFT MINE.

COMPARATIVE ANALYSIS OF COST SHEETS.

The Cliffs Shaft Mine produced 247,061 tons during the year, an average of 832 tons per day. The average daily hoist for 1909 was 819 tons per day, the increase for 1910 amounting to 1.6%. Other conditions being the same, a decrease of approximately this amount would be expected in fixed charges, but there was a 7% increase of wages on April 1st, which for nine months is equivalent to an average increase of 5% during the year.

In "General Expense" there was a decrease in all the items except "Personal Injuries", the total decrease being $.007.

In "Maintenance" there were slight decreases in "Docks, Trestles & Pockets", because the stock-pile trestle was not taken down in 1910; in "Buildings"; in "Cornish and Steam Pumps" because the old Cornish pump was taken out of "B" Shaft in 1909; IN "underground Tracks and Cars" because no new cars were built in 1910; and in "Crushing and Screening" on account of the increase in screening. The increases were in "Shop Machinery" on account of the purchase of a drill sharpener, a power hack-saw and an air drill in 1910; in "Boilers" on account of new flues in one boiler and repairs to the economizer and feed-water heater; in "Hoisting Machinery" on account of a new crank; in "Compressors, Receivers and Air Pipes" on account of new drills purchased in 1910; in "Top Tram Engines and Cars " on account of increased repairs to stock-pile cars; and in "Skips and Skip Roads" on account of new ladder-roads in "A" Shaft and "B" Shaft. The increases and decreases just balance for the year, "Maintenance" charges haveing been $.070 per ton for each year.

In "Mining Expense" there has been a total increase of $.039 per ton. This is also the total amount of the increase in "Breaking Ore" and "Tramming and Skip Tending" The other charges balance each other. There has been a slight increase in "Air Pipes" on account of the new 6" lines in both shafts. The charges for "Compressors" are 65% greater than last year because in 1909 air was furnished to North Lake for only three and one-half months and in 1910 for the full year. Operating charges for the compressor have more than doubled since North Lake started receiving air. The operating charges for "Hoisting" decreased $.003 and in "Pumping" $.007. There was no sinking done in 1909, the charge in 1910 being $.049 per ton. On the other hand the cost for rock-drifting

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was $.131 in 1909 and $.091 in 1910, a decrease of $.040 per ton in 1910. This decrease is due not to a decreased amount of drifting done, but to the fact that most of the drifting on the lower levels has been done in ore in 1910, and hence is charged to "Breaking Ore." "Breaking Ore" being done by contract, the increased production does not offset the increase in wages. The increase amounts to $.020 and is due to the drifts on the 9th and 10th levels in "A" Shafts, in which the cost of "Breaking Ore" is over twice that in the stopes and to the increase in wages. The increasein Tramming costs amounting to $.019 is due to the increase in wages, the double handling of ore from the sub-levels in "B" shaft, the greater distance of the stopes from the shaft and to the high cost of tramming and loading on the 10th level in "A" shaft. This is now a long tram and the track is laid with 40 lb., rails on a flat grade for mechanical haulage.

There was a decrease of $.004 in "Filling". Slight decreases in "Dry House", "Top Land and Tramming" and "Sorting Ore" were also made. "Crushing" costs decreased $.010 and "Screening" increased $.007 due to screening on "B" shaft side during the winter.

There was an increase of $.028 in "Exploratory" on account of the surface Diamond Drilling in 1910.

Shipping costs were not as high in 1910 on account of the smaller tonnage shipped from stock-pile.

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CLIFFS SHAFT MINE.

AVERAGE MINE ANALYSIS ON STRAIGNT CARGOES

1910.

GRADE	IRON	PHOS.
Cliffs Shaft Crushed	58.89	.106
Cliffs Shaft Lump	58.96	.103

AVERAGE MINE ANALYSIS OF OUTPUT.

GRADE	IRON	PHOS.
Cliffs Shaft Crushed	58.24	.106
Cliffs Shaft Lump	58.89	.100

ORE STATEMENT FOR DECEMBER 31ST.

	LUMP	CRUSHED	TOTAL	TOTAL LAST YEAR 13 MOS.
On hand January 1st, 1910	771	21,131	21,902	116,272
Output for Year	103,732	143,329	247,061	257,537
Stockpile Overrun applying on (previous years				8,292
Total	104,503	164,460	268,963	382,101
Shipments	91,959	128,723	220,682	360,199
Balance on Hand	12,544	35,737	48,281	21,902
Decrease in output corresponding 12 months			1,193	
Increase in Ore on hand			26,379	

SHIPMENTS FOR 1910.

	POCKET	STOCKPILE	TOTAL	TOTAL LAST YEAR
Lump Cliffs Shaft	73,479	18,480	91,959	71,520
Crushed Cliffs Shaft	69,938	58,785	128,723	288,679
Total	143,417	77,265	220,682	360,199
Total last year	133,013	227,186	360,199	
Decrease - 39%			139,517	

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CLIFFS SHAFT MINE.

SCREENING PLANT.

The following statement shows the cost of operating the Screening Plant from January 1st, 1910, to January 1st, 1911.

	OPERATING COST		REPAIR COST		TOTAL COST.		
	Amount	Per ton	Amount	Per ton	Amount	Per ton '10	Per ton '09
Screens	881.07	.005	275.61	.002	1156.68	.007	.006
Tram	4134.26	.023	325.86	.002	4460.12	.025	.025
Total	5015.33	.028	601.47	.004	5616.80	.032	.031
Labor Cost	3735.35	.021	368.47	.002	4103.82	.023	.021
Supply Cost	1279.98	.007	233.00	.002	1512.98	.009	.010
Total	5015.38	.028	601.47	.004	5616.80	.032	.031
Per cent.	.893		.107		100		
Number of men employed						6	3
Number of tons per man per day						100	115
Tons screened						174408	119556

	1910	1909
Tons screened	174,408	119,556
Lump	103,732	72,291
Fine	70,676	47,265

CRUSHING PLANT.

The following statement shows the cost of operating the Crushing Plant for the past twelve months, and a comparison of the work of the previous year.

CRUSHED '10 - 72,653 CRUSHED '09 - 146,273	OPERATING COST		REPAIR COST		TOTAL COST.		
	Amount	Per ton	Amount	Per ton	Amount	Per ton '10	Per ton '09
Operating Engines	1113.17	.016	37.57	.001	1150.74	.017	.013
Operating Crusher	959.77	.014	138.70	.002	1098.47	.016	.016
Total	2072.94	.030	176.27	.003	2249.21	.033	.029
Tramm'g to R R Pockets	648.71	.009	262.39	.004	911.10	.013	.011
Total	2721.65	.039	438.66	.007	3160.31	.046	.045
Total 1909	4549.56	.031	1266.31	.009	5815.87	.040	.048
Labor Cost	1734.07	.025	206.06	.003	1940.13	.028	.025
Supply Cost	987.58	.014	232.60	.004	1220.18	.018	.015
Total	2721.65	.039	438.66	.007	3160.31	.046	.040
Percent.	.861		.139		100		
Number of men employed						2	4
Tons per man per day - 724 days						96	96

	1910	1909
Tons Crushed	72,653	146,273
Product	247,061	265,829

CLIFFS SHAFT MINE.

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CLIFFS SHAFT MINE.

COMPARATIVE AVERAGE WAGES AND PRODUCT.

PRODUCT '10 - 247,061	SURFACE		UNDERGROUND		T O T A L	
PRODUCT '09 - 257,537	1910	13 mos. 1909	1910	13 mos. 1909	1910	13 mos. 1909
Avg. no. men working	52	55	186	183	238	238
Avg. wages per day	2.34	2.24	2.76	2.60	2.66	2.52
Avg. wages per mo. 25 days	58.50	56.00	69.00	65.00	66.50	63.00
Avg. prod. per man per day	14.87	13.84	4.42	4.34	3.41	3.30
Labor cost per ton	.156	.162	.626	.600	.782	.762
Diff. in labor cost per ton	-.006	-.018	*.026	-.049	*.020	-.067
Avg. product brg & tramming			6.38	6.48		
Avg. wages for miners contract			2.79	2.59		
Average wages for trammers contract			2.77	2.65		
Total average wages for contract			2.79	2.61		

Average wages three months to March 31st, $2.53)
(Average for year $2.66.
Average wages nine months to December 31st, 2.69)

Increase in wages of 6.3% - Increase in product per man per day 3.3%.

STATEMENT OF COMPARATIVE WAGES.

	1 9 1 0 12 months.	1 9 0 9 13 months.	INCREASE	DECREASE
SURFACE				
Total Number of days	16614½	18615½		550¾
Average Rate	2.32	2.24	.08	
Amount	38484.63	41634.11		3149.48
UNDERGROUND				
Total Number of days	55901¼	59393½	1245¾	
Average Rate	2.76	2.60	.16	
Amount	154511.91	154572.73		60.82
Total days	72516	78009	695	
Average rate	2.66	2.52	.14	
Total Amount	192996.54	196206.84		3210.30
Labor cost per ton	.782	.762	.020	

For comparison of number of days for twelve months, December, 1909 is omitted.

- minus * plus.

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CLIFFS SHAFT MINE.

COMPARATIVE MINING COST FOR YEAR.

	12 mos. 1910	13 mos. 1909	INCREASE	DECREASE
Product	247,061	257,537		10,476
General Expense	.046	.053		.007
Maintenance	.070	.070		
Mining Expense	.960	.921	.039	
Cost of Production	1.076	1.044	.032	
Exploratory	.085	.056	.029	
DEPRECIATION.				
Inventory	.003	.002	.001	
Improvement	.003	.051		.048
New Construction (a)	.052		.052	
Plant - Old Crusher Parts	.006		.006	
Total	.064	.053	.011	
Less credits (b)	.012	.001	.011	
Total depreciation	.052	.052		
Taxes	.084	.097		.013
Central Office	.048	.052		.004
Cost on Stockpile	1.345	1.301	.044	
Loading and shipping	.019	.024		.005
Total cost on cars	1.364	1.325	.039	
Number of days operating	298	324½		
Number of shifts and hours	1-10-hr	1-10 hr.		
Avg. Daily Product	829	794		
COST OF PRODUCTION.				
Labor	.765	.740	.025	
Supplies	.311	.304	.007	
Total	1.076	1.044	.032	

(a) New Crusher Plant is .050 of this total.

(b) Earnings Compressor Plant for Air furnished North Lake.

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CLIFFS SHAFT MINE.

STATEMENT OF EXPLOSIVES USED FOR BREAKING ORE.

KIND	QUANTITY	AVERAGE PRICES	12 mos. 1910 AMOUNT	13 mos. 1909 AMOUNT
50% Straight Dynamite				20463.41
50% Red Cross	167300	.1053	17621.66	
80% Gelatine	25550	.1327	3392.30	
Fuse	249245'	.3783	943.12	883.94
Caps	38750	5.07	196.28	306.10
Connecting wire	2	.30	.60	
Crimpers	9	.41	3.67	
Total			22157.63	21653.45
Product			247,061	257,537
Pounds powder per ton of ore			.780	.737
Cost per ton for explosives			.09	.085
Average cost per pound powder			.10896	.1078

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SALISBURY MINE.

PRODUCTION.

The Salisbury Mine worked 297 days during the year 1910, and produced 94,890 tons of ore, an average of 320 tons per day. The statement of ore and rock hoisted from the different levels during the year is as follows:

LEVEL	BESSEMER	CLINTON	SILICA	TOTAL
First	2816		2976	5792
Second	3578		6594	10172
Third	4894		4432	9326
Fourth	3526		4216	8742
Fifth	98		1634	1732
Eight			390	390
Ninth	664		8104	8768
Tenth	746	816	7682	9244
Twelfth			4338	4338
Thirteenth	1346		20788	22134
Fourteenth	1512		1814	3326
Sixteenth	334	3296	8296	11926
Total Ore	19514	4112	71264	94890

LEVEL	ROCK	
First	416	
Second	648	
Third	1070	
Fourth	1046	
Fifth	1452	
Eight	256	
Ninth	268	
Tenth	1076	
Twelfth	726	
Thirteenth	3028	
Fourteenth	1462	
Sixteenth	2958	
Total Rock	14426	14426

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Total Ore and Rock Hoisted			109,316 tons.
Tons Bessemer Ore	19,514	Tons per day	66
Tons Clinton	4,112	Tons per day	14
Tons Silica Ore	71,264	Tons per day	240
Total	94,890	Total per day	320

ESTIMATED TONNAGE OF ORE DEVELOPED JANUARY 1ST, 1911.

LEVEL	CLINTON SILICA	CLINTON	BESSEMER	TOTAL
First			5000	5000
Second	2500		46000	48500
Third	25000		21000	46000
Fourth		15000	25000	40000
Fifth	53500		47000	100500
Seventh	46000			46000
Eight	41500		60500	102000
Ninth	14000	4500	2500	21000
Tenth	13000	9000		22000
Eleventh	20000	4000		24000
Twelfth	7500	7500		15000
Thirteenth	3000		16000	19000
Fourteenth	22000	10000	12000	44000
Sixteenth	32000	9000	10000	51000
Total	280000	59000	245000	584000
Ore developed January 1st, 1910				456000
Gain in Reserves in 1911				128000

SURFACE.

No surface work outside of the general routine was done during the first part of the year. In March and April, drainage ditches were dug all along the side-hill on the North side of the valley to catch the run-off from the hill. This water was carried across the old caves in a launder to the surface pump on the South side. Not only has this disposal of the water prevented a great deal of expense and inconvenience in theworking of the soft ore at the East end of the Bessemer deposit, but it has also caused an important dimin-

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ution in the amount of water that has to be handled by the Cornish pump. All during last year and in previous years the pump has been run at three or more strokes per minute, but since the ditches have been dug on the surface, the speed has been reduced to one and three-quarters strokes per minute.

During July, August and September, all the houses in the location were reshingled or had their roofs patched, and had such other minor repairs made as were necessary. If they can be painted in the coming summer, they will be in very good condition.

In September, four test pits were put down to ledge in the Eastern part of the valley to explore the eastern end of the North and South veins. All were bottomed in diorite. A fifth pit was started, but was drowned out at a depth of fourteen feet.

New trestles were built on both sides of the shaft house in October and November, replacing the old ones which had become very rotten. They are an immense improvement, both in design and construction.

FATAL ACCIDENT.

On Friday, August 19th, at 8:30 P. M., Donato Carso, and Italian Miner, working in No. 9 contract on the fourth level in the Bessemer deposit, was killed by a fall of ground from the side of the stope, while in the act of hoisting a piece of timber. The shift boss, John Wren, was with him at the time and sustained slight injuries. The mine was ide from Friday night until the following Tuesday night, entailing a loss of product of about 800 tons.

UNDERGROUND.

GENERAL CONDITIONS.

In order to avoid confusion and to facilitate the description of the work, in the several ore bodies of the mine, the same names have been used this year as last. The ore in the mine occurs in three distinct veins or lenses, lying in troughs between walls of diorite. The two more Northern veins are very much elongated in an East and West direction and are nearly parallel, lying in narrow troughs pitching gently to the West, with foot-walls on the North side dipping South about 45° and hanging-walls of diorite dipping South about 70°.

SALISBURY MINE.

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Between the walls of diorite the ore is overlain by a jasper capping. These two veins have been called the North vein and the South vein. The third deposit of ore lies in a spoon-shaped trough, also pitching to the Southwest, both foot and hanging-wall being flatter than in the other two veins. This has been called the Southwest deposit and lies to the South and West of the other two veins. A fourth vein is being prospected to the South and East of the South vein, but as yet no ore has been found in it underground. The ore in the Southwest deposit and in the South vein is entirely in or about the old workings, but in the North vein two deposits of ore have been developed, one of Silica ore lying on or near the foot-wall, and called the Foot-wall deposit, and one at the East end of the trough along the hanging wall, called the Bessemer deposit. These two deposits are almost entirely in new ground.

In the North vein in the Foot-wall deposit 500 feet East of the Shaft, little new ore was developed, and nearly everything has been mined above the old second level. Further East a little ore was developed by drifts parallel to the foot-wall on the fourth and fifth levels, but it doesn't amount to much. The best developments have been the Bessemer deposit at the East end of the vein. At the beginning of the year, the fourth level was practically blocked out and a little work had been done on the third level. During the year both these levels were completed, the ore being followed to its limits, and three other sub-levels, corresponding to the second, and first levels and an intermediate sub-level, were fully opened out and the ore followed up to the sand. More than half the ore above the first level has been mined, and the level will probably be caved early in 1911. A raise was put up from this level to surface, greatly facilitating the handling of timber and improving the ventilation. On the fourth level the ore immediately under the jasper capping has been mined all the way across the vein for a length of 100 feet, a maximum height of three sets being obtained in the room. The ore is being taken now under the capping along the East end of this room on a sub-level between the third and fourth levels, the excavation being kept as low as possible. By undercutting the capping over a large area with a room of moderate height, it is hoped that the capping can be made to cave with a minimum of danger and inconvenience. On the eight level the East end of the basin was reached at the beginning of the year, and a raise

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WAS put up to the fifth level all in ore. On the ninth and tenth levels some development was done in the old workings, but this ore could not be mined, as it was under the eight level.

In the South vein a little drifting and raising was done on the fifth level from the South crosscut early in the year, but no ore was found. On the ninth and tenth levels at the East end of the trough ore has been mined in and adjacent to the old workings, but the new developments have about equalled the extraction. In that part of the vein just East of Old No. 4 Shaft, however, a body of low grade ore is being opened that looks very promising.

In the Southwest deposit the greatest activity has been on the thirteenth level. Drifts have been driven connecting the two raises and a third raise has been put up from the fourteenth level. Al the ore on the East and South sides of the East raise has been mined, a large part of it being high grade Bessemer ore. Between the raises, a good tonnage of Silica ore has been mined in the old workings on the foot-wall to the North, and about 13,000 tons of Bessemer ore have been developed on the South side close to the hanging wall.

There has been no work on the fourteenth level, and on the sixteenth level, developments have been confined to the West drift along the foot-wall, and to the narrow vein of high phosphorous ore in the hanging-wall. This has been followed for a length of 150 feet and a height of 85 feet and has been mined down to the sub-level 50 feet above the sixteenth level. The ore was very narrow in the upper sub-levels, and a larger tonnage will be won from the block now remaining. The drift West along the foot-wall has been driven over 400 feet, mostly in lean ore and raises and small rooms have been put up on the foot-wall four and five sets high, near the West end. As yet only a very small tonnage has been developed here.

There has been no work below the sixteenth level.

DETAILS BY CONTRACTS.

FIRST LEVEL - 215 FOOT SUB-LEVEL.

The first level is opened only in the Bessemer deposit. In August, No. 4, after holeing their raise to surface, 1400 feet East of the Shaft, cut out on the first level on the North side of the raise, and crosscut North in fine ore

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for 20 feet. Here they reached the jasper and turned east along the contact for 15 feet, at which point they reached a diorite dyke, which they followed to the Southeast for 60 feet to the hanging wall. Here they cut through the dyke, which was small, and drifted East along the hanging-wall in fine ore for 95 feet until the ore pinched out. Meanwhile in September, No. 5 had come up to this level and crosscut Southeast from the raise 40 feet in fine ore to the hanging-wall, which they reached at the same point as No. 4. After timbering their drift, where it holed into No. 4's, No. 5 drove a crosscut North across the vein for 65 feet in fine ore just East of the diorite dyke. They have mined out all the ore on the West side of this crosscut as far as the dyke and up to the capping, which is only fourteen feet above the level at this point, leaving only a small pillar to protect the hanging wall drift. In December they moved to the end of No. 4's drift and raised on the diorite two sets wide, taking the ore from wall to wall. They still had ore in the back at the end of the year. No. 16 came up in November and started a crosscut to the North 40 feet East of No. 5's. As soon as No. 4 finished the main drift, they took No. 16's place in the crosscut, which was driven 35 feet in good ore and was driven 20 feet in mixed ore and jasper. They turned West along the contact with the jasper, till they holed into No. 5's crosscut, and then opened a stope on the South side of this drift, making a room three sets wide and 35 feet long. They took all the ore up to the capping, which is very flat here and lies about two sets above the level. They left a pillar two sets wide to protect the hanging-wall drift and moved to the 485 foot sub-level, between the third and fourth levels, late in December. No. 16 raised on the foot-wall to the East of No. 4's crosscut four sets high and two sets wide in good ore up to the sand. There is a two set pillar between their stope and No. 5. At the end of the year, they moved down 12 feet below the first level in the raise, and started cutting out for another sub-level. In December No. 8 came up to the first level and drifted East 30 feet in rock from the East end of the level, and crosscut North twelve feet to prove that the end of the ore had been reached. They are now crosscutting to the South at the end of the level to make sure that the limits have been reached in that direction.

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240 FOOT SUB-LEVEL.

The 240 foot sub-level is between the first and second levels. It was developed from the same raise as the first level and from another raise as the first level and from another raise 50 feet further West. It was opened first from the West raise by No. 5 in April. They drifted West thirty feet until they reached the capping, and then came back close to the raise and cross-cut to the North in fine ore for 80 feet to the jasper. They followed the contact East for 25 feet, holing into the end of a cross-cut which No. 16 had driven from the next raise. They then moved back to the West side of their cross-cut and followed the jasper West to the capping and then followed the capping to their first drift. No. 16 after finishing their crosscut North to the Jasper from the next raise to the East, moved back 40 feet from the breast and drifted West to No. 5's crosscut. From this drift No. 8 put up a raise to the first level to provide a safer manway. No. 16 drifted East five feet through a small dyke and 85 feet in ore to the foot-wall, determining the limits of the ore on the North side by two short crosscuts. They came back 30 feet from the end of this drift and crosscut South 50 feet in fine ore to the hanging, which they followed East for 65 feet in fine ore until the foot and hanging-wall came together.

SECOND LEVEL.

In the Bessemer deposit this level was opened by No. 4 in February from a raise from the third level 1250 feet East of the Shaft. They drifted East in jasper for 30 feet, and then turned to the Southeast in fine ore for 60 feet until they reached the hanging-wall. They followed the contact to the East for 130 feet, until the ore was cut off by a diorite dyke. Meanwhile, No. 8 and No. 5 had put up a three compartment raise from the fifth level, 45 feet East of No. 4's raise and No. 8 had driven three cross-cuts to the foot-wall at 50 foot intervals on the North side of the main drift. From the most easterly of these crosscuts No. 4 drove a short drift East to the dyke and then raised. This is the raise from which the first level was opened and which was carried to surface. In May No. 5 raised to the 240 foot sub-level from the South side of the main drift and No. 8 took No. 4's place at the East end of the level. They drifted 15 feet through the dyke and 50 feet further in ore to the end of the

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VEIN. Here they raised three sets high and five sets long, until the ore pinched out above them, and then moved back in the drift 20 feet, and drove a crosscut 20 feet to the Northwest on the East side of the dyke, following the contact until the ore was cut off by the jasper which lies on the foot-wall. In August and September, No. 5 and No. 8 followed the jasper contact on the North side of the ore body on this level, for 110 feet, connecting all three crosscuts.

In the foot-wall deposit 500 feet West of the Shaft at the beginning of the year, No. 11 raised on the foot-wall at the end of the long crosscut, 38 feet in lean ore, and stopped when the diorite turned completely over the back of the raise. They came down to the level and drifted East along the contact for 80 feet, but the ore was poor and much cut up by small diorite dykes and they left the contact and followed the best of the ore for 40 feet further to the Southeast. At the beginning of the year No. 21 holed into the bottom of an old drift 100 feet West of the crosscut. This drift was the old second level from No. 2 shaft and was open for 40 feet beyond the place where No. 21 holed into it. After building a chute, No. 21 continued the drift 30 feet to the West until they came to an old caved room, and then drove a short crosscut to the South in lean ore. They mined back all the ore above this old level as far east as their chute, and in May put up a raise on the opposite side of their foot-wall drift, 70 feet West of the crosscut. At the same time, No. 11 raised on the foot-wall 35 feet further East for 15 feet and then turned their raise to the West and put it up very flat, until it holed to the top of No. 21's raise 30 feet above the level. No. 11 then mined out all the ore above the second level on the West side of their raise, 35 feet West of the crosscut. No. 21 moved to the East drift, which they drove ahead 30 feet to the East and 30 feet to the North, all in jasper, until they reached the diorite foot-wall. They mined out what little ore there was on both sides of the drift on the East side of the crosscut and moved down 25 feet in the raise, where they have cut out on the West side, and are starting a drift at the elevation of the old third level. No. 11 finished mining on the foot-wall in November and started a drift to the West 35 feet North of the chute. They drifted 25 feet in pretty good ore and holed to the top of the old shaft, which was found a year ago. They are now starting on the foot-wall again, just West of the crosscut.

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THIRD LEVEL.

At the beginning of the year in the Bessemer Deposit this level was opened by a crosscut under the capping and by a drift 40 feet long, driven to the Northeast in the ore. No. 16 continued this drift 30 feet East and 50 feet North, following the best of the ore until they reached the jasper that lies on the foot-wall. They came back to the turn and drifted East for 35 feet, and then turned to the Southeast in Silica ore for 40 feet. Just West of this turn, No. 8 crosscut out from their big raise 35 feet in good ore and holed to No. 16's drift. No. 16 crosscut South from their breast 20 feet to the hanging-wall, but found only two feet of good ore. They went back to their drift again and drifted East 40 feet and Southeast 20 feet to the hanging wall, all in rock and Silica ore. They were stopped here and moved back 150 feet where they opened a room two sets wide and 30 feet long close to the foot-wall and then crosscut through the pillar 23 feet to this room from the main drift, where the breast had been at the beginning of the year. They went to the 240 foot sub-level in the latter part of May. In March, No. 9 drifted East 30 feet from the West raise under the hanging in dirorite and ore, but the contact swung too far to the North to allow the drift to be continued without endangering the pillar. They moved to the fourth level.

In September and October, No. 8 worked on this level and starting from the last turn in the main drift, 70 feet East of the big raise, drifted Northeast 15 feet to the diorite and 60 feet along the contact, nearly all the way in good ore, until the foot and hanging came together.

325 FOOT SUB-LEVEL.

In the Bessemer deposit in March and April, No. 15 drifted West along the hanging-wall from the raise 1250 feet East of the shaft and stoped out the ore in the back of the drift for 30 feet back from the breat 30 feet high and 15 feet wide and went down to the fourth level in May. They came back to the 325' sub-level in September and crosscut North in good ore 60 feet from the raise to the jasper on the foot-wall. Turning East, they followed the jasper for 60 feet and put up a small raise to the third level. They drifted Southeast again from this raise 60 feet in fine ore, reaching the big raise at the end of the year. In the latter part of December, No. 4 came down from the first level

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and started scramming out the ore under the capping on the West side of No. 15's North crosscut. They are close to the edge of the room mined on the fourth level and will break through all along the top of the pillar.

FOURTH LEVEL.

In the Bessemer deposit at the beginning of the year, there were two contracts working at the Southeast in ore and rock, 1300 feet East of the Shaft, and then crosscut Northeast through the pillar to No. 9's drift, after which they went to the third level to raise. No. 9 drifted East 120 feet in ore, until the foot-wall and hanging came together, and went up to thie third level in March. They came back in April and drifted East along the foot-wall from the first to the second raises on the North side of the ore body. From this drift, No. 15 crosscut South across the ore body to the hanging and followed the contact East until they holed into the main raise. Leaving a pillar ten feet wide on the West side of the crosscut north from this raise, No. 9 and No. 15 stoped out all the ore on the West until the capping came down to the level, a distance of 100 feet, taking the ore on square sets. A large part of this timber has been recovered as the back has not caved in, only slabs having come off as yet. In September No. 15 went to the 325 foot sub-level. In October No. 9 went down 12 feet in the West raise, cut out for a new sub level, and crosscut across the ore body to the hanging.

In the foot-wall deposit 820 feet East of the Shaft, No. 12 raised 50 feet in Silica ore from the fifth level to the fourth in February, and crosscut 25 feet North to the foot-wall. In March No. 17 put up another raise 50 feet East of No. 12, but had poor ground. They came up to the fourth level and drifted East 50 feet and South 30 feet to the top of their raise, following the best of the ore all the way. They had rock in the bottom all the way. No. 17 drifted West 35 feet along the foot-wall and then crosscut South 65 feet to the hanging wall, taking the ore 12 feet wide. They had jasper on both sides of the drift.

FIFTH LEVEL.

In February No. 8 holed their raise from the eight level on the West side of the long crosscut to the Southeast and then went to the east end of the level, where they put up a third compartment in No. 8's raise to the second level.

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During January and February, No. 17 drifted West 140 feet along the foot-wall from the third crosscut, 860 feet East of the shaft to the second crosscut, having Silica ore all the way. They then raised to the fourth level from the back of the third crosscut, as has been noted above.

At the beginning of the year, No. 13 had driven their crosscut 400 feet South from the turn, had crossed the South vein and were 30 feet in the diorite hanging-wall of that vein. They went back and drifted 30 feet East and 30 feet West along the contact, having a little ore most of the time. They then raised 40 feet in jasper on the West side of the drift, and drifted 40 feet East in jasper and mixed ore on the sub-level, till they found drill hole No. V2. This hole was along the contact of the jasper with a narrow vein of ore lying on the diorite. After finishing on the sub-level, they went back in the cross-cut and drove it ahead again 205 feet in diorite. Here they cut out on the East side and have raised 120 feet in diorite. The rock has been softer near the top of the raise, and there has been much water running down. At the end of the year, they have started to cut our for a sub-level 120 feet above the main level.

SEVENTH LEVEL.

At the West end of the seventh level, 700 feet East of the Shaft, No. 12 continued their drift West in the old workings during January, but came too close under the floor of the sub-level just above, and were sent up to the fifth level.

EIGHT LEVEL.

At the East end of the North vein, No. 5 drifted East 20 feet to the end of the trough and then raised to the fifth level in ore, as has been described above.

In the South vein No. 15 finished scramming the ore in the East drift at the South end of the cross-cut and moved back into their old drift on the West side. Here they crosscut North 70 feet. They were in jasper and mixed ore all the way, but the ground was getting richer as they advanced. However, the ground became very much cracked at the same time, and the crosscut was stopped on account of an old room standing open beneath it. Twenty five feet back from the breat No. 15 drifted West 25 feet, but had rock all the way, and were sent up to the 525 foot-sub-level in the Bessemer deposit.

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NINTH LEVEL.

In the North vein of old No. 4 Shaft, No. 19 at the beginning of the year, were drifting to the East through the old workings, and were about 30 feet East of their crosscut. They continued to drift East for 50 feet and then 25 feet back from the breast, drove a crosscut North to the foot-wall 40 feet, having good ore most of the way. From this crosscut they drifted West 30 feet in ore, but came to an old room filled with rock. On the opposite side of the crosscut they drifted East 15 feet, but broke into the side of their main drift. They then drove the main drift ahead 55 feet in caved ground, and crosscut north 50 feet to the foot-wall. There was no ore directly on the foot-wall, but they followed a small leader of it 30 feet further East until they were cut out entirely by rock. They then moved back to the first drift on the East side of the main crosscut just North of old No. 4 shaft and drove this drift ahead to the East 110 feet along the foot-wall of the south vein; 35 feet back from the breast of this drift they crosscut South 45 feet towards the hanging, but found only mixed ore and jasper. On the north side of the drift, they mined out the ore in the back for a length of 40 feet - 40 feet high and 20 feet West of this room, raised to the top of it and drifted over to it in the ore to give the men a safe traveling road. At the end of the year they were mining in the back of the room.

At the East end of the South vein, No. 3 and No. 20 were working on the dyke at the beginning of the year. No. 3 drove their drift 30 feet in ore to the Northwest, but the ore became very flat and narrow and the men were sent to the thirteenth level. No. 20 put up two short raises on the foot-wall towards the Northeast, but the ore here also played out and they were sent to the fourth-eenth level.

TENTH LEVEL.

In the North vein, north of No. 4 Shaft, No. 2 had just reached the foot-wall 250 feet North of the shaft at the first of the year, and had ore 20 feet wide. They turned East in the ore and drifted 50 feet but were stopped by a caved room full of rock. By crosscutting North 10 feet, and drifting in the steel ore on the contact, they were able to geat ahead again for 80 feet and

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holed into the end of their old crosscut from the East end of the hanging-wall drift. They were moved from here in May to the South vein 400 feet East of old No. 4 Shaft, where they drove two short cross-cuts South from the East-and-West drift to the old open room, and scrammed out the side of the pillar between them. On the North side of this drift rear their chute they drifted Northwest 60 feet following a vein of ore one set wide, and mined the ore in the back four sets high. In September they went down in their raise and cut out for another sub-level on the North side.

In May also, No. 17 came to the tenth level and started in the same pillar with No. 2 on the North side of the old open room, but 50 feet further West. They crosscut South 35 feet through the pillar to the old room, where they mined a large amount of loose ore. From this crosscut they drifted West and holed to No. 2's first crosscut, and mined out everything to the South, leaving only a seven foot pillar to protect the drift. On the opposite side of the crosscut they drifted East 35 feet through the pillar to the East end of the old square-set room and crosscut South from this drift to the old room again. They have also put up a raise from the drift on the West side of their first crosscut to the side of the old room 20 feet up, to enable them to follow the ore upward to the North without danger. From the East drift also they raised to the old room higher in the pillar, and then continued the raise to the East at a flat angle till it holed into the side of the square-set raise 40 feet further East. From this raise they will be able to mine a large amount of ore on the North side of the big room, increasing the "swing" enough so that it will probably cave.

At the East end of the level on the 575 foot sub-level No. 12 started in June in mining the pillar left on the foot-wall on the North side of the drift. They have taken this ore on square sets, two and three sets wide and five sets high, for a length of 70 feet. It has been good ore of Clinton grade most of the time. At the end of the year, they were just finishing the ore at the West end of the room. The back is diorite on the North side and jasper on the South, and appears very strong.

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ELEVENTH LEVEL.

In September, No. 2 came down in their raise, 360 feet East of old No. 4 Shaft, and started a drift West on the 618 foot sub-level, 30 feet above the eleventh level. They drifted West 45 feet and holed into the back of a square-set raise, put upon the foot-wall two years ago. Moving back 15 feet to the East, they crosscut North 60 feet to the foot-wall, which they followed West for 40 feet, holing a second time into the square-set room on the foot-wall. This room was retimbered, and the drift carried through it, following the foot-wall. They still have ore on the foot-wall breast and the grade is good although the phosphorous is high.

TWELFTH LEVEL.

The main drift on the twelfth level has been retimbered for 400 feet East from old No. 4 Shaft and the crosscut South to the timber raise from the thirteenth level has been retimbered for a length of 200 feet and is nearly finished.

During the first six months of the year, No. 24 working one shift only, scrammed out a large amount of Silica ore from the old workings 160 feet South of Old No. 4 shaft. The ore was narrow and extremely irregular and was taken on square sets. No. 24 have been timbering during the last half year.

THIRTEENTH LEVEL.

At the beginning of the year No. 6 and No. 7 had each opened a small sub-level at the top of their raise. Their raises are 230 feet apart and each had drifted about 30 feet. They drifted toward each other, following the best of the ore as much as possible, and made connections in February. No. 7 then drifted Southeast of their raise, just finishing at the end of the year. They have been about ten feet below the floor of the old Thirteenth level and this part of the ground has been mostly high grade Bessemer ore; but above the old Thirteenth level, the ore was poorer. However, they mined a large amount of Silica ore from the old workings at little expense.

After making connection with No. 7 in the main drift No. 6 went back to their raise and put it up 50 feet in lean and mixed ore. They opened a a small sub-level 40 feet up on the East side of the raise, but found only lean stuff. Another small sub 20 feet lower was in the same kind of rock and further

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exploration was abandoned. This end of the level seems to be too far in the hanging. No. 6 came down to the level at the end of April, and, during the first half of the month of May, mined some good ore under the hanging-wall just West of No. 7. Since then they have been repairing and stemming in other contracts.

In February, No. 3 came up from the thirteenth level and drifted West 30 feet in lean ore from No. 6's chute to an old caved room. The ore was too poor to mine profitably. Fifty feet East of the West raise, they crosscut North 55 feet in lean ore of very variably analysis and 40 feet in pretty good Silica ore, and then moved 60 feet further East and drove another crosscut to the Northeast. They went in 80 feet in low grade ore and then took out a room three sets square on the East side. This was weakening the main drift too much, however, and they drove their crosscut ahead again through ten feet of dyke and 15 feet of ore to the diorite foot-wall, which they penetrated for 20 feet. They had here a flat, thin vein of good ore between the foot-wall and a thin dyke. They drifted Northwest in this ore for 50 feet and followed it up for a height of nearly 50 feet with square sets until the dyke and the foot came together. This room has allcaved and they are taking the last of the pillar on the West side of their crosscut. They have mined a large amount of ore, but its analysis has been low on account of the rock inevitably mixed with it.

In March, No. 1 started a crosscut to the South-east from the main drift half way between the two raises and went in 95 feet in ore, until they reached the hanging, where they mined out the ore in a triangular room 50 feet long and 40 feet wide. In the first 50 feet of their crosscut, the upper half of the drift was in caved rock and timber, the bottom being in good ore, which will have to be mined from the next sub-level. After finishing here, No. 1 went to No. 3's first crosscut, 50 feet East of the West raise, and drove it 60 feet north to the foot-wall, 30 feet in rock and 30 feet in lean ore, and then mined out a room on the West side near the breast, 25 feet square. In June, No. 20 holed a raise from the fourteenth level and No. 1 drifted over from their crosscut to the top of this raise 25 feet in lean ore. Since then they have been repairing.

SALISBURY MINE.

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In June No. 20 finished their raise to the thirteenth level, 75 feet East of the West raise, and crosscut South 28 feet to the main drift. They moved down to their raise, and opened a sub-level under the thirteenth. In September, they came back to the thirteenth level, and 50 feet East of the West raise, started a crosscut to the South from the main drift. They passed through 35 feet of caved paint rock and jasper and 35 feet of fine Bessemer ore before they reached the hanging-wall. They have paint rock close at hand on the West side, but they followed the contact East in fine ore for 70 feet and in Silica ore for 30 feet further, until they holed into No. 1's old stope. They have raised in the Bessemer ore 58 feet, 25 feet East of their crosscut and are now cutting out for a sub-level on top. There is ore still above them East of the chute.

FOURTEENTH LEVEL.

750 FOOT SUB-LEVEL: From June until September, No. 20 drifted East from their raise, which is 230 feet Southwest of Old No. 4 Shaft, through bunches of rock and ore for 150 feet to No. 7's raise, and then started to drift West to No. 6's raise; but they had to go under the main drift on the thirteenth level, which was taking a good deal of weight and the frift was stopped. They went to the thirteenth level in September.

On the main level during the first two months of the year, No. 1 followed a narrow vein of ore lying between two walls of paint rock for 120 feet Southwest from the South drift, starting at a point 120 feet West of the main crosscut, and caved it all back, going to the thirteenth level in March.

At the same time, No. 3 drifted 100 feet West in rock from the end of the North drift, to explore the old vein that was mined under the hanging. Apparently this has all been caved below the fourteenth level.

SIXTEENTH LEVEL.

Following the narrow vein of good ore, lying between walls of paint rock next to the hanging-wall on the South side of the deposit, No. 10 drifted East 60 feet until the rock on both sides came together, drove crosscuts North and South at the widest part of the vein to determine the width, and then raised 50 feet to a sub-level corresponding to the fifteenth level. They turned off a sub-level at this elevation, and were joined by No. 14. The ore was opened both ways from the raise for a total length of 140 feet, and the raise continued to

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within 20 feet of the fourteenth level. The ore has been followed East and West to its limits by these two contracts, and mined down to the fifteenth level during the year, with an average length of 150 feet and an average width of about six feet. It is wider below the fifteenth level. In December, No. 10 moved to the main level and started a crosscut on the South side of the foot-wall drift 200 feet West of the Shaft.

During January and February No. 14 drifted West 70 feet in paint rock 420 feet South of the shaft, to explore the old vein under the hanging, followed No. 10's vein of ore to the East for 35 feet until they were entirely cut out by the rock, and then moved to the fifteenth level with No. 10.

The breast of the West drift along the foot-wall at the beginning of the year, was in 40 feet from the crosscut. No. 23 continued this drift 60 feet in good ore, but were stopped by an offset in the diorite. Going back 40 feet they crosscut Southwest in lean ore for 30 feet, and then turned Northwest again, reaching the foot-wall about 60 feet in and following it for 150 feet further in lean material, some of which could be hoisted as ore. Here the foot turned across the breast, and they went back 30 feet and drifted due West for 100 feet until the ore was cut off entirely by a fault. Twenty feet North of this drift, they drove another one 80 feet West to the same fault, having better ore. During the last four months, they have been mining this ore on square-sets to a height of 32 feet, leaving the leanest of it for pillars. The ore is very lean and indications for a large tonnage are poor.

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SALISBURY MINE.

COMPARATIVE ANALYSIS OF COST SHEETS.

The Salisbury mine worked 297 days in 1910, and produced 94,890 tons, an average of 320 tons a day. The average in 1909 was 246 tons a day, an increase in 1910 of 74 tons or 30%. Consequently there should be a corresponding decrease in fixed charges, other conditions remaining the same. There was an increase of 7% in wages on April 1st, which, for nine months is equivalent to 5% for the year. This reduces the percentage of decrease in fixed charges to be expected, to 25%. The actual decrease in General Expense was $.020 - from $.086 to $.066, or 23.3%, there being reductions in all the items.

Under "Maintenance" the only increases were $.029 in "Docks, Trestles & Pockets", due to the new trestles at the Shaft, $.005 in "Shop Machinery" on account of the drill-sharpener, and $.005 in "Cornish & Steam Pumps" on account of one new pole and new rods. The reductions in the other items, except two, were slight and due to increased production. In "Compressors, Receivers & Air Pipes" the cost was reduced $.012 - from $.016 to $.004 - because of six new drills in 1909 and none in 1910. Charges for "Underground Tracks & Cars" were reduced from $.034 to $.02o, no new main-level cars having been built in 1910. The total cost for "Maintenance" was reduced $.001 - from $.001 to $.117.

All the items of "Mining Expense" were reduced in 1910, the most notable change being in "Drifting", which was $368 per ton in 1909 and $.095 in 1910. In 1909 there were 5,801 feet of rock drifts and raises and in 1910 only 1,726. Most of the drifting in 1909 ha s been in ore. The decrease in the cost per ton in the other items is due to the increased tonnage. "Breaking Ore" and "Timbering" are both high, the former because most of the ore has come from drifts and raises, or small square-set rooms, and the latter on account of the crushing of the lower levels, especially the 12th and 13th.

There was an increase in the cost of "Loading and Shipping" from $.001 to $.029, due to the larger percentage of product shipped in 1910 than in 1909.

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SALISBURY MINE.

AVERAGE MINE ANALYSIS OF OUTPUT - YEAR 1910.

GRADE	IRON	PHOS.
Bessemer	61.54	.044
Clinton	59.59	.293
Clinton Silica	51.00	.096

AVERAGE MINE ANALYSIS ON STRAIGHT CARGOES.

GRADE	IRON	PHOS.
Bessemer		(All mixed)
Clinton	60.70	.203
Clinton Silica	50.71	.109

ORE STATEMENT FOR DECEMBER 31St, 1 9 1 0.

	BESSEMER	CLINTON	CLINTON SILICA	TOTAL	TOTAL LAST YEAR
On hand January 1st, 1910	912	39,890	67,295	108,097	34,567
Output for year	20,895	4,112	71,637	96,644	80,225
Total	21,807	44,002	138,932	204,741	114,792
Shipments	19,410	12,349	53,339	85,098	6,695
Balance on Hand	2,397	31,653	85,593	119,643	108,097
Increase in output corresponding 12 months ≠ 33%				23,935	
Increase in Ore on Hand				11,546	

SHIPMENTS FOR YEAR 1910.

	POCKET	STOCKPILE	TOTAL	TOTAL LAST YEAR.
Salisbury Bessemer	16,413	2,997	19,410	2,870
Clinton		12,349	12,349	2,425
Clinton silica	22,605	30,734	53,339	1,400
Total	39,018	46,080	85,098	6,695
Total last year	3,831	2,864	6,695	
Increase			78,403	

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SALISBURY MINE.

TIMBER MAKING STATEMENT FOR THE YEAR ENDING DECEMBER 31, '10.

K I N D	LINEAL FEET	AVG. PRICE PER FOOT	AMOUNT 1 9 1 0 12 mos.	AMOUNT 1 9 0 9 13 mos.
4" to 6" timber	1520	.015	22.80	
6" to 8" "	56304	.020	1126.08	1129.33
8" to 10" "	28232	.042	1178.38	1138.22
10" to 12" "	24420	.059	1441.76	1273.76
12" to 14" "	16,634	.082	1363.90	1786.00
Total	127110	.040	5132.92	
Total 1909	130921	.041		5327.31

	LINEAL FEET	PER 100 FT.	AMOUNT 1 9 1 0 12 mos.	AMOUNT 1 9 0 9 13 mos.
5 ft. lagging	302075	.465	1405.00	1572.00
7 ft. lagging	45360	.550	249.47	296.45
Poles	29228	.950	277.67	560.43
Total	376663	.513	1932.14	
Total 1909	451028	.538		2428.88

	1 9 1 0	1 9 0 9
Feet of timber per ton of ore	1.315	1.632
Feet of Lagging per ton of ore	3.590	5.620
Feet of lagging per foot of timber	2.730	2.990
Cost per ton for timber, lagging and poles	.073	.097
Equivalent of Stull timber to board measure	268791	291290
Feet board measure per ton of ore	2.780	3.630
Total Product	96,644	80,225

Total cost of timber and lagging, 1910 - 12 months	7065.06
Total cost of timber and lagging, 1909 - 13 months	7756.19
Total cost of timber and lagging, 1908 - 12 months	7089.14
Total cost of timber and lagging, 1907 - 12 months	6264.14
Total cost of timber and lagging, 1906 - 12 months	6976.67
Total cost of timber and lagging, 1905 - 12 months	6752.55

SALISBURY MINE.

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SALISBURY MINE.

COMPARATIVE MINING COST FOR YEAR.

	1 9 1 0 12 mos.	1 9 0 9 13 mos.	INCREASE	DECREASE
Product	96,644	80,225	16,419	
General Expense	.066	.086		.020
Maintenance	.117	.118		.001
Mining Expense	1.340	1.787		.447
Cost of Production	1.523	1.991		.468
Exploratory	.001	.000	.001	
DEPRECIATION				
Inventory	.002	.001	.001	
Total Depreciation	.002	.001	.001	
Taxes	.081	.077	.004	
Central Office	.071	.097		.026
Cost on Stockpile	1.678	2.166		.488
Loading and Shipping	.029	.001	.028	
Total cost on Cars	1.707	2.167		.460
Number of days operating	298	328		
Number of shifts and hours	2-10-hr.	2-10-hr.		
Average Daily Product	324	245		
COST OF PRODUCTION.				
Labor	1.157	1.469		.312
Supplies	.366	.522		.156
Total	1.523	1.991		.468

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SALISBURY MINE

STATEMENT OF COMPARATIVE WAGES.

	1 9 1 0 12 months	1 9 0 9 13 months	INCREASE	DECREASE
SURFACE				
TOtal number of days	10,719¼	11698¾		106½
Average rate	2.34	2.21	.13	
Amount	25,035.48	25,894.01		858.53
UNDERGROUND				
Total number of days	33,388¾	35,856	487¼	
Average rate	2.61	2.53	.08	
Amount	87,155.28	90,786.50		3631.22
Total days	44,108	47,554¼	380¾	
Average Rate	2.54	2.45	.09	
Total Amount	112,190.76	116,680.51		4489.75
Labor cost per ton	1.161	1.455	.294	

For comparison of number of days for 12 months, December 1909 is omitted.

COMPARATIVE AVERAGE WAGES AND PRODUCT.

PRODUCT '10 @ 96,644 tons	SURFACE		UNDERGROUND		T O T A L	
PRODUCT '09 @ 80,225 "	1910	13 mos 1909	1910	13 mos 1909	1910	13 mos 1909
Average no. men working	36	35	111	111	147	146
Average wages per day	2.34	2.21	2.61	2.53	2.54	2.45
Avg. wages per mo. 25 days	58.40	55.25	65.25	63.25	63.50	61.25
Avg. product per man per day	9.02	6.86	2.90	2.24	2.19	1.69
Labor cost per ton	.259	.323	.902	1.132	1.161	1.455
Diff. in labor cost per ton	-.074	*.074	-.230	*.299	-.294	*.373
Avg. product breaking and tramming			3.97	3.94		
Avg. wages for miners contract			2.66	2.58		
Avg. wages for trammers contract			2.33	2.25		
Total avg. wages for contract			2.60	2.53		

Average wages three months to March 31st, $2.46) Average for year $2.54.
Average wages nine months to December 31st, 2.57) Increase in wages of 4.4%.

Increase in product per man per day 29%.

- Minus * Plus

SALISBURY MINE.

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SALISBURY MINE.

STATEMENT OF EXPLOSIVES USED FOR BREAKING ORE.

KIND	QUANTITY	AVERAGE PRICES	12 mos. 1910 AMOUNT	13 mos. 1909 AMOUNT
40% Powder	2500	.925	231.30	1734.41
50% "	30575	.1025	3133.90	1957.80
Fuse	102000'	.378	385.55	346.07
Caps	31500	.625	196.86	189.38
Total			3947.61	4227.66
Product			96,644	80,225
Pounds powder per ton of ore			.342	.470
Cost per ton for explosives			.041	.053

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OGDEN MINE.

No work was done at this mine during the year.

LEASES.

The only outstanding lease is held by the Empire Iron Company on the East half of the South West quarter of Section 19, 47 - 26.

Respectfully submitted,

W. W. Duncan

Agent.

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CLEVELAND IRON MINING COMPANY.

ISHPEMING, MICHIGAN.

A G E N T ' S A N N U A L R E P O R T

F O R

YEAR ENDING DECEMBER 31ST, 1911.

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CLEVELAND IRON MINING COMPANY.

Ishpeming, Michigan.
1st January, 1911.

Mr. Wm. G. Mather, President,

Cleveland, Ohio.

Dear Sir:

I beg to submit the following report of the operation and present condition of the mines of this Company. The statements, inventories and maps have been sent you.

The report on the operation of the Moro Mine was prepared by Mr. Lucien Eaton, Superintendent, and that of the Lake Mine by Mr. M. H. Barber, of the Engineering Department.

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M O R O M I N E .

PRODUCTION.

The Moro Mine worked 299 days and produced 96,175 tons of ore of all grades, an average of 329 tons per day. The production by grades is as follows:

Scotch	58,961 TONS
Scotch Silica	37,214
Total	96,175

STATEMENT OF ORE HOISTED FROM DIFFERENT LEVELS .

LEVEL	TONS
First	8,973
Third	9,519
Sixth	29,728
Eighth	22,452
Eleventh	9,420
Twelfth	2,764
Thirteenth	12,939
Fourteenth	380
Total	96,175

ESTIMATE OF ORE AVAILABLE FOR MINING JAN. 1, 1911 .

LEVEL	G R A D E . SCOTCH	SILICA	TOTAL
First		4,000 Tons	4,000 Tons
Third			
Sixth	8,000 Tons	6,000	14,000
Eighth	8,000	12,000	20,000
Tenth		5,000	5,000
Eleventh		2,000	2,000
Twelfth		3,000	3,000
Thirteenth	2,000		2,600
TOTAL	18,000	32,000	50.000

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SURFACE .

The stock-pile floor for the Silica ore on the north side of the railroad tracks was extended to the north and east, and part of the approach for the steam-shovel tracks graded, work being carried on intermittently between January and October.

During the latter part of May and the first part of June a sewer-pipe, 440 Ft. long was laid across the stock-pile floor near the west end to dispose of the sewage from the Agent's and Master Mechanic's houses, the old pipe having been crushed.

The stock-pile of lump Scotch ore on the west side of the trestle was nearly all shipped, about one cut remaining on the south side at the end of the season. About 4,000 tons were left on the east side also. The end of this pile was covered with plank, and one bent was erected here in preparation for stocking Silica ore, the north stock-pile being completely filled at the end of the year. Scotch ore is now being stocked on the west side of the trestle, and Silica on the east.

ACCIDENTS TO EQUIPMENT.

On the 21st. of March the counter-balance on the pump-bob on surface broke away, causing the pump to be shut down for a week. On starting the pump again a rod broke between the thirteenth and fourteenth levels, causing the pump to be shut down again. At the same time the relay steam-pump on the thirteenth level also broke down, and before it could be repaired, the small pump on the fourteenth level had been drowned. The water was soon taken out after the Cornish pump had been repaired, and since then there has been no trouble with the pumps. There was little, if any, loss of output on account of these breakdowns.

Early on the morning of the thirtieth of November the skip tore out one of the straps in the dump in the shaft-house, causing the mine to shut down for one shift, with a loss in product of 200 tons. Another delay of 10 hours was caused on the 28th of October by a breakage of one side of the bail of the skip, the skip going off the track at the sixth level. There

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have been other minor delays in the shaft due to the skip going off the track, especially at the knuckle.

UNDERGROUND .

GENERAL CONDITIONS .

All the available ore on the sill floor of the thirteenth level, and a large part of that on the twelfth level has also been mined. This has all been good Scotch ore, and there is about 2,000 tons more to be mined, nearly all of it close to the foot-wall on the north side of the trough. A good deal of ore has been mined from the bottom of the trough, as it rises to the east between the twelfth and tenth levels, but it has been nearly all of Silica grade. There remains about 5,000 tons to be mined at this point.

Between the eighth and tenth levels there remains about 5,000 tons more of Silica ore, 200 feet west of the shaft, and close to the hanging.

The largest body of ore to be mined is that between the sub-level on the eighth level and the third level, about 400 feet northwest of the shaft. On the third level this ore has been developed for a length of nearly 300 feet, and is 27 feet wide. On the sixth level it is only 200 feet long, and averages a little over 30 feet wide. On the sub-level 30 feet above the eighth level it widens out, apparently on account of a fold, and at the same time joins a smaller body of ore on the east, from which it was separated on the sixth level by 60 feet of slate. The ore on the sub-level is irregular in outline and is 160 feet long at the longest point and 180 feet wide at the widest point. The limits of the Silica ore on this level have not been entirely determined. The ore has been developed by a stope 180 feet long, running north and south, with a parallel stope 30 feet further west 60 feet long, and by two parallel stopes driven east, each 110 feet long. The main north-south stope and part of the eastern stopes was in Scotch ore but the balance has been in Silica ore. A raise

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has also been put up from the main level to the north end of the long stope, on the sub-level, and from there to the sixth level. This was in jasper below the sub-level, and in mixed ore most of the way to the sixth level. The development work above the sixth level consists of four raises to the third level, and a sub-level to the east.

Above the first level a raise has been put up 60 feet to the east in ore analysing about 50% iron. This ore seems to be getting larger as the raise goes up, and may be connected with that in the old School-house mine, towards which the raise is advancing.

DETAILS BY CONTRACTS .

FIRST LEVEL .

In June No. 10 holed their raise from the third level, 300 feet north of the shaft, and beat back the floor of the stope, till there was left only enough for the track. They raised on the east side of the stope, following the rock in both floor and hanging. After going up 15 feet the ore nearly pinched out, but then began to get thicker. They have continued raising, following the hanging-wall, and are now 60 feet above the level with ore in the breast, on both sides, and in the foot. Both the appearance and the analysis of the ore have improved.

In December No. 1 came up from the third level, and are taking the back south of No. 10's raise. When the level was opened there was only a drift driven through the lean ore, and this is being enlarged to stope size. All ore on this level is now of Silica grade.

THIRD LEVEL .

At the beginning of the year No. 10 holed a raise from the third level to the first 380 feet northwest of the shaft, and then moved back to the main level, where they put up two raises from the back of the stope further west. The ore in these two raises was soon cut out by slate on both sides, and the men moved back to their first raise, which they enlarged, and then put up two more branch raises from the east side of it to the

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first level, holing the second one to the first level in June, as noted above.

No. 1 continued their stope 440 feet northwest of the shaft for 120 feet in good ore, until slate cut across the breast on both sides, in May. After taking down a little ore in the back, they moved to the sixth level, where they worked in No. 3's raise, holing to the end of the stope on the third level in September. They worked here for two months mining the floor of the level, and then moved to the first level, as noted above, to give the trammers a chance to clean out the ore at the bottom of the raise.

350 feet north of the shaft No. 6 beat down the floor of the old stope for one month, and then went to the sixth level.

SIXTH LEVEL - 375 FOOT SUB-LEVEL .

No. 13 continued their stope to the south, 300 feet northwest of the shaft, for two months, and then drove a small drift through the pillar on the west side to the next raise, where No. 6 had started in February. After finishing this drift, they continued their stope to the south again for a month, holing into the end of No. 5's old raise on the south side of the deposit, and moved to the eleventh level in March. No. 6 drove a stope west from the side of the raise 360 feet northwest of the shaft for 60 feet, holing into No. 3's raise, and also raised to the third level close to the hanging, breaking through in June. They continued working on the sub-level for two months, breaking the ore in the back, and then moved to the top of the next raise, 25 feet further west, where they worked with No. 1 in mining the floor of the third level. In November they moved back to their own raise, and have been mining the floor there till the end of the year.

470 feet north of the shaft No. 12 started taking floors on the 375 foot sub-level in November, and had nearly finished at the end of the year. There is only a small amount of ore here, but it is all Scotch.

In the conglomerate ore body No. 4 drove a cross-cut stope to the northeast, 500 feet from the shaft, for 20 feet in lean ore; but the ore turned to jasper, and they cut their stope down to a drift, which they

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continued for 30 feet in jasper and 30 feet in slate, and went to the eighth level early in March. At the same time No. 5 drove a small stope to the southeast, 350 feet northwest of the shaft, following the eastern extension of the conglomerate ore body. They went in 45 feet, but the ore was very narrow and flat, and the hanging-wall was weak, so that a great deal of rock had to be broken with the ore. They moved to the eighth level in February.

In this same ore body 440 feet northwest of the shaft No. 3 put up the last raise to within 20 feet of the third level, following the hanging-wall all the way, and then moved back into the next raise to the east, where they put in a cut through the pillar between the two raises. They finished this cut in May, and then stoped in the back of the raise, taking all the ore up to the slate hanging-wall, which is very strong over this part of the ore body, and moved to the eighth level in July.

No. 1 came from the third level in June and worked in the last raise inside in the conglomerate ore body, 440 feet northwest of the shaft. They stoped down the ore in the bottom of the raise, proving the width at this point to be over 35 feet, and then put the raise up to the third level, holing in September. They also drove a cut to the west from the near the top of the raise, leaving a pillar under the third level. They are in 30 feet, and have the hanging-wall in the back of the breast. In December they were stoping in the floor of the raise just below the third level.

In the Scotch ore body 520 feet north of the shaft, where it was first opened from the drift, No. 6 put up a small raise to the 400 foot sub-level in August, and mined the floor around the top of the raise for a month. They worked also 120 feet further north in an old raise, whenever the other raise was blocked with ore. They finished here in the latter part of September.

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EIGHTH LEVEL - 490 FOOT SUB-LEVEL .

At the beginning of the year the only contracts working on the sub-level were No. 12 and No. 8. No. 12 were stoping to the north, 350 feet northwest of the shaft, and No. 8 to the west, 60 feet south of No. 12. In January No. 8 had their ore cut out by a slip and turned to the north, leaving a pillar 30 feet thick between their stope and No. 12's. They continued their stope to the north for 50 feet, but the grade of the ore got too poor, and late in March they moved to the main level, taking No. 52s place in the stope 200 feet west of the shaft; but returned to the 490 foot sub-level in May. Here they started a stope to the east 40 feet north of their old stope, and continued it to the east for 110 feet. They had good ore for the first 40 feet, then Silica ore for 30 feet, followed by 8 feet of mixed slate and jasper, which corresponds to the foot-wall of the conglomerate ore body on the sixth level. Inside the slate they have had better ore, but there was jasper in the breast at the end of the year, coming in from the south side.

No. 12 continued their stope to the north in good ore for 70 feet, till it was cut off by a wall of mixed ore and jasper, and then turned to the east, following the contact. They passed through the same band of slate and jasper, as did No. 8, and followed the ore for 40 feet inside; but in October they came back to the turn, and started a raise in the back of the stope, which they continued until the end of the month, when No. 3 holed under them from the main level. No. 12 then moved to the sixth level. Meanwhile, in September and October, No. 4 drove a cut through the pillar between No. 8's and No. 12's stopes, 30 feet from the corner, and moved into No. 12's stope, which they have driven ahead 30 feet in Silica ore. In December they had jasper in the breast, coming in from the left side, which will apparently turn them to the south so that they and No. 8 will come together. The ore is pretty good near the jasper. No. 3 completed the raise started by No. 12 from the back of the sub-level, holing to the sixth level in December.

On the main level No. 5 started working in February 200 feet west of the shaft, where they drove a small stope to the hanging-wall in lean ore

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for 35 feet, and moved to the twelfth level in March, their place being taken by No. 8. No. 8 drove a small stope under the hanging-wall for 18 feet through the pillar, and returned to the sub-level in May. Between July and October No. 3 drove a cross-cut 65 feet to the northeast, 380 feet northwest of the shaft, and raised to the sub-level from the end of it. The cross-cut was in lean ore for the first 20 feet, but after that in jasper and slate. The raise was in jasper and mixed ore.

On the south side of the basin 650 feet west of the shaft No. 4 scrammed out all the ore in the cross-cut to the south, starting in February, and then moved east 100 feet to the old raise from the eleventh level. They beat down the ore around this raise for a maximum depth of 25 feet, taking it out all across the stope for a length of 110 feet. This was all good Scotch ore, and was trammed from the eleventh level. In September they finished here and went to the sub-level.

ELEVENTH LEVEL .

In June No. 5 came to the eleventh level, and drove the old cross-cut stope, 275 feet west of the shaft, north for 25 feet, and holed into the old stope on the north side of the basin. They then moved to the south side of the basin, and mined the floor of the tenth level 220 feet west of the shaft. Here they broke down the back clear across the vein, working towards the north. All their work was in Silica ore.

230 feet west of the shaft No. 13 started in April, and drove a small stope across the vein to the north drift, a distance of 20 feet. The ore was rather lean, but had a vein of slate ore in it about four feet thick, which was blasted separately and hoisted as Scotch. They moved west 120 feet, and drove a cross-cut across the vein again, a distance of 75 feet. They had slate most of the time for the first 35 feet, but the balance was in ore of Silica grade. After finishing this cross-cut, they drove a stope to the west for 40 feet, following the slate, and holed to the old stope where the floor had been taken out. In December they were stoping to the east on the opposite side of their cross-cut, and had ore of Silica grade.

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TWELFTH LEVEL .

In March No. 5 moved to the twelfth level, and drove a cross-cut stope south through the pillar 300 feet west of the shaft. The ore was not very good at first, but improved as they went in. They holed to the old south stope, where part of the floor had been already mined, early in May, and after taking down some of the ore in the back, moved to the eleventh level. In October they returned to the twelfth level and started a raise to the east from the end of the old stope at the end of the trough, 230 feet west of the shaft. This raise has been put up very flat, following the jasper in the foot, and will hole to the bottom of the eleventh level some time early in January, 1911. The ore is pretty good.

In April No. 2 came up from the thirteenth level, and enlarged the hole through the pillar, 340 feet from the shaft, to stope size. They broke down some of the ore in the back, and then mined out the ore in the floor half-way across the stope. They then moved to the old stope on the south side of the basin, and stoped out a large amount of ore left in the floor of the level, working back towards the west to a point 360 feet from the shaft. In August they went down to the thirteenth level to raise under this floor further to the west, and early in October came back to the twelfth level, when their raise had holed, and mined out the rest of the ore left in the bottom of the south stope, and also took most of the floor of No. 5's cross-cut. They were working here at the end of the year in very good ore.

THIRTEENTH LEVEL .

At the beginning of the year No. 2 were working on the remnants of the big pillar that was mined last year on this level and the twelfth. They finished this pillar in March, and moved to the twelfth level, returning in August to put up a raise in the back of the drift 350 feet from the shaft, as noted above. There was no one working on this level at the end of the year.

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MORO MINE.

COMPARATIVE ANALYSIS OF COST SHEETS.

The Moro Mine produced during 1910, 98,449 tons of ore, an average of 329 tons per working day. In 1909 the total production was 98,290, but on account of the larger number of days in the fiscal year, the average per working day at the mine was 306 tons. This is an increase of a little over 7%, and on this account there should be a corresponding decrease in fixed charges both on surface and underground. This decrease, however, cannot be expected in "Tramming" and "Breaking Ore", both of which are done by contract. To offset this 7% decrease in cost of fixed charges per ton, there was a general increase of wages amounting to about 7% which went into effect April 1st Seven percent. fo nine months is approximately 5% for the year, which affects the labor cost above or close to 70% of the mining cost, making a total increase of 3½%. The increase in tramming and mining rates was 7½% on April 1st, or a little over 5½% for the year, and as practically all of the tramming cost and 70% of the cost of "Breaking Ore" is labor, the increase in these two items, other conditions being the same, would be 5½% and 4% respectively.

On comparison of the Cost Sheets for the two years, there is found an increase of $.001 in "General Expense" due to "Analysis" and "Engineering", a decrease of $.038 in "Maintenance" and an increase of $.031 in "Mining Expense", the total decrease in the "Cost of Production" being $.006.

Under "Maintenance" there is a decrease of $.020 for "Docks, Trestles & Pockets" due to the cost of raising the trestles in 1909 and a decrease of .010 in "Hoisting Machinery" due to the accident to the hoisting engine in October, 1909. The other principal decrease is in "Top Tram Engines and Cars", amounting to $.007, which is due to the installation of the auxiliary hoist in the shaft-house in 1909, at the time the trestles were raised.

In "Mining Expense" the principal decreases are in "Drifting", amounting to $.010, and in "Top Landing and Tramming" amounting to $.007. The decrease in "Drifting" is self explanatory. That in "Top Landing and Tramming" is due to the return to the old trestle level in stocking ore.

The increases are principally in "Breaking Ore" and "Tramming". "Breaking Ore" increased from $.441 to $.461 per ton, or $.020. The increase expected would be 4% of $.441 which is $.018. In addition to the increase in wages, there

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was an advantage in 1909 in facilities underground, as a large part of the ore was mined from a big pillar on the 13th level, where a few holes would break hundreds of tons of ore. The increase in tramming cost is $.046 - from $.259 in 1909 to $.293 in 1910. The remaining $.032 is due to several factors. In 1909 tramming was largely concentrated on the 12th and 13th levels. The men had a large pile of ore to work on, a good track, and few delays from waiting for the skip. In 1910 the production came from a number of levels, causing delays at the shaft and a large proportion came from sub-levels and flat raises where the ore had to be handled twice.

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MORO MINE.

ORE STATEMENT FOR DECEMBER 31ST, 1910.

	SCOTCH	SCOTCH SILICA	TOTAL	TOTAL LAST YEAR
On hand January 1st '10	116,175	22,442	138,617	87,401
Output for year	61,235	37,214	98,449	98,290
Total	177,410	59,656	237,066	185,691
Shipments	125,430	0	125,430	47,074
Balance on hand	51,980	59,656	111,636	138,617
Increase in output corresponding 12 months 8%			7,272	
Decrease in ore on hand December 31st			26,981	

SHIPMENTS FOR 1910.

	POCKET	STOCKPILE	TOTAL	TOTAL LAST YEAR
Coarse Scotch				2,647
Fine Scotch	8,594	725	9,319	44,427
Coarse Scotch crushed at South Jackson Crusher	23,633	92,478	116,111	
Total	32,227	93,203	125,430	47,074
Total last year	6,694	40,380	47,074	
Increase - 166%			78,356	

All shipped from dock as Crushed Cliffs Shaft.

AVERAGE MINE ANALYSIS OF OUTPUT.

GRADE	IRON	PHOS.
Scotch - run of mine	58.63	.122
Fine Scotch	56.84	.105
Scotch Silica	52.26	.108
Coarse Scotch	58.66	.108

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MORO MINE.

COMPARATIVE MINING COST FOR THE YEAR.

	1910	1909	INCREASE	DECREASE
PRODUCT	98,449	98,290	159	
General Expense	.066	.065	.001	
Maintenance	.061	.099		.038
Mining Expense	1.061	1.030	.031	
Cost of production	1.188	1.194		.006
Exploratory		.026		.026
DEPRECIATION.				
Inventory		.002		.002
Total		.002		.002
Less credits - improvement		.003		.003
Total Depreciation		.001		.001
Taxes	.050	.050		.050
Central Office	.048	.056		.008
Cost on stockpile	1.286	1.325		.039
Loading and shipping	.229	.011	.218	
Total cost on cars	1.515	1.336	.179	
No. days operating	299	321		
No. shifts and hours	2-10-hr.	2-10-hr.		
Average daily product	329	306		
COST OF PRODUCTION.				
Labor	.842	.831	.011	
Supplies	.346	.363		.017
Total	1.188	1.194	.011	.017

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MORO MINE.

STATEMENT OF COMPARATIVE WAGES.

	12 mos. 1910	13 mos. 1909	INCREASE	DECREASE
SURFACE				
Total number of days	7648¼	8945¼		616¼
Average Rate	2.08	1.99	.09	
Amount	15,888.44	17,781.56		1,893.12
UNDERGROUND				
Total number of days	25139¾	24559¾	2867¼	
Average Rate	2.63	2.60	.03	
Amount	66,080.95	63,961.55	2,119.40	
Total days	32788	33504½	2251	
Average Rate	2.50	2.44	.06	
Total amount	81,969.39	81,743.11	226.28	
Labor cost per ton	.832	.832		

For comparison of days for twelve months, December, 1909, is omitted.

COMPARATIVE AVERAGE WAGES AND PRODUCT.

PRODUCT '10 - 98,449 tons PRODUCT '09 - 98,290 "	SURFACE		UNDERGROUND		T O T A L	
	1910	13 mos. 1909	1910	13 mos. 1909	1910	13 mos. 1909
Avg. No. men working	29	30	84	76	113	106
Avg. wages per day	2.08	1.99	2.63	2.60	2.50	2.44
Avg. wages per month 25 days	52.00	49.75	65.75	65.00	62.50	61.00
Avg. prod. per man per day	12.87	10.99	3.92	4.00	3.00	2.93
Labor cost per ton	.161	.181	.671	.651	.832	.832
Diff. in labor cost per ton	-.020	-.012	*.020	-.157	.000	-.169
Avg. product breakg & tramng			4.72	5.21		
Avg. wages for miners contract			2.67	2.58		
Avg. wages for trammers contract			2.66	2.74		
Total average wages for contract			2.67	2.64		

Average wages three months to March 31st, $2.45) Average for year $2.50
Average wages nine months to December 31st, 2.53) Increase in wages of 3.2%.

Increase in product per man per day - 2.4%.

- minus * plus.

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MORO MINE.

STATEMENT OF EXPLOSIVES USED FOR BREAKING ORE.

KIND	QUANTITY	AVERAGE PRICES	12 mos. 1 9 1 0 AMOUNT	13 mos. 1 9 0 9 AMOUNT
50% Powder	94,700	.1025	9706.81	8815.27
60% "				11.51
Fuse	130,500	3.78	493.33	479.32
Caps	34,500	6.25	215.68	197.54
Total			10415.82	9503.64
Product			98,449	98,290
Pounds powder per ton of ore			.962	.869
Cost per ton for explosives			.105	.097

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L A K E M I N E.

SURFACE.

The year 1910 was very free from accidents of various natures affecting the mine's output; in fact, aside from two fatal accidents, there was nothing to cause a shut-down and there was almost a total absence of the usual minor accidents, causing delays to the mine's operations.

The mine operated on double shift during the entire year.

For convenience, the surface will be considered under the several headings, caving ground, handling and stocking ore, improvements and fatal accidents.

CAVING GROUND.

During the spring of 1910, 17 railway cars of rock were dumped along the tail tracks in the neighborhood of No.1 shaft and the necessary grading done. At the close of shipping season each year these tracks are allowed to settle until after the spring thaw when they are brought up to grade. A gang of two men has been employed here steadily during the past year.

The ground in the vicinity of No.1 shaft of the Lake Superior Iron Company's Hematite mine has settled very little during the past year, and consequently no trouble has been experienced with the main railway tracks leading into the mine.

The ground under the timber tunnel track leading from the timber yard into the shaft has settled considerably during the year and quite a little grading was necessary.

STOCKING ORE.

The West stocking ground was filled by the middle of January, 1910, and all stocking for the balance of the winter was confined to the East pile. The West stocking trestle for the 1910-11 stocking was erected during August and the East trestle during the latter part of November and December. The usual number of legs and stringers had to be replaced in these trestles. Considerable ore was stocked at Presque Isle during the months of November and December.

The steam shovel began loading from the West stockpile April 27th and completed the pile during the fore part of August. The shovel only operated

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here a few days at a time. The steam shovel was then moved to the East pile and operated at irregular intervals until well along in November.

A broken brake chain allowed four loaded C. & N. W. railway cars to run from the shaft pocket some 500' where they smashed into an empty wooden C. & N. W. car which was standing on the shaft side of several loaded cars. The empty car was demolished but the others were not damaged to speak of.

IMPROVEMENTS.

It has been necessary to replace in the neighborhood of thirty sets in the timber tunnel. A number of legs in the coal dock have also been replaced, owing to charring.

An old cage was generally overhauled and installed on Sunday, May 29th, to allow for general repairs on the one in use. These cages are both in good shape now.

The shaft house, shop buildings and the interior of the dry were painted during June.

A transmission pole line was carried from the brownstone engine house to the Lake mine and the current switched on June 6th. This current was used during the balance of the year.

FATAL ACCIDENTS.

Ed Haitanen, working with John Takanen in contract No.48 on the 364' sub-level, was buried under a fall of ground at 9.30 A. M. Monday, July 18th. Takanen was released at 3.30 that afternoon and Haitanen's dead body was recovered an hour later. Takanen, aside from a bruised arm, sustained no injuries to speak of. It was thought that a cap broke, letting down about twenty five tons of ore. The accident caused a delay of a half shift to the mine's operation but a shrinkage of 3,100 tons was charged against it, as only about 25% of the underground force worked from the time of the accident until after the funeral, the afternoon of July 20th. The mine was not operated during the afternoon of the funeral.

Reginald Bohemia, a miner working in contract No.39 on the 3rd level Northwest deposit, was instantly killed by a fall of ore at 1.30 P. M. September 23rd. The drift where the accident occurred was in a hard variety of ore

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necessitating machine drilling. The mine operated right along but the underground force was somewhat reduced and the consequent loss of product was figured at 1,200 tons.

The following table gives the ore and rock hoisted by months during the year 1910:

TABLE I.

HOIST FOR YEAR 1910.

	LAKE ORE.	ROCK.
January	46,910 tons	1,120 tons.
February	42,262 "	1,265 "
March	52,869 "	1,515 "
April	49,296 "	1,510 "
May	54,626 "	1,025 "
June	48,214 "	785 "
July	43,659 "	1,030 "
August	53,031 "	1,285 "
September	44,018 "	2,095 "
October	50,045 "	915 "
November	44,530 "	1,315 "
December	44,842 "	1,490 "
Totals	574,302 "	15,350 "

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The following table gives the ore in sight at the Lake mine January 1st, 1910, considered under the several territories, the ore mined from these territories during the year 1910, the ore in sight January 1st, 1911 and the increase or decrease in the latter figures compared with those of the previous year, deductions being made for the year's product.

A factor of 11 cubic feet per ton was used in these estimates and a deduction of 10% made for rock down to the 4th level in the 1910 estimate and down to the 364' sub-level in the 1911 estimate. A deduction of 15% for rock was made below the 4th level in 1910 and a similar deduction below the 364' sub-level in 1911:

TABLE II.

Territory considered.	Ore in sight Jan.1, 1910.	Ore mined during 1910.	Ore in sight Jan.1, 1911.	Increase.	Decrease.
On & above 308' sub-level	142000 tons.	117146 tons.	18000 tons.		6854 tons.
Between 308' & 325' sub-levels	93000 "	46527 "	52000 "	5527 tons.	
Between 325' sub & 3rd level	392000 "	182527 "	207000 "		2473 "
" 3rd level & 364' sub-level	2894000 "	228102 "	320000 "		50898 "
" 364' sub-level & 4th level			2295000 "		
" 4th & 5th levels	815000 "		815000 "		
Totals	4336000 tons.	574302 tons.	3707000 tons.	5527 tons.	60225 tons.
				Decrease	54698 tons.

The decrease of 50,898 tons for the territory between the 3rd and 4th levels was due to the reduction factor for rock having been increased from 10% to 15%. The factor was increased on account of the increasing number of dikes encountered below the 3rd level.

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UNDERGROUND.

An average force of 69 gangs of miners has been employed throughout the past year, the mine being operated on double shift.

The bulk of the ore has come from the Lake deposit 3rd level (-350'), the 364' sub-level and the shaft pillar deposit (290', 308' and 325' sub-levels). Out of a product of 574,302 tons, nearly 450,000 tons were gained from the above areas. No mining was done in the South side deposit during 1910. The motor drift connecting the Lake and South side deposits has been kept open from a point where it enters the diorite just South of the Lake deposit into the air shaft, located in the South side deposit. A raise was put up from the 4th level, holing to this 3rd level motor drift at the point described above. This makes a good travelling road to surface should anything happen to cut off the shafts. Old No.1 shaft is now badly crushed but the ladderway is still open.

At the beginning of the year a few gangs were employed on the 335' sub Lake deposit, taking pillars, scramming and generally cleaning up. Several large pillars standing over the main motor drift on the 3rd level, to be described later, were left and constitute the only clean ore remaining at this elevation. These few gangs were moved down to the 3rd level early in the year.

The 3rd level has been the scene of great activity during 1910, there having been employed here an average force of 20 gangs, slicing back the deposit from the L. S. I. Company's boundary, scramming and robbing throughout the old square room territory to the South and Southwest of No.1 shaft. Owing to the narrow limits of the unmined ore on the 3rd level, the force has been decreased from time to time until at the end of the year but 15 gangs remain. The output for the 3rd level was in round numbers 140,000 tons.

The 364' sub, 14' below the 3rd level, has been thoroughly opened up and the deposit in the neighborhood of the L. S. I. Company's boundary and under the 3rd level square set room territory mined out during the past year. A maximum force of 20 gangs was employed at this elevation but it has been reduced to 15 gangs as the limits of the ore body available for mining at this time have become more restricted owing to the danger of under-cutting the extensive pillars being attacked on the 3rd level.above. The horse of jasper which has extended throughout the central portion of the Lake deposit, practically from the top work-

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ings of the mine, has about died out at the elevation of the 364' sub and the deposit here is therefore very nearly as extensive as on the 3rd level, even though the footwall is flattening and thus cutting down the lateral limits of the body. The product from the 364' sub was approximately 120,000 tons.

Nineteen feet below the 364' sub, the 383' sub has been partially opened up and slicing and caving are now being inaugurated along the L. S. I. Company's boundary and the South footwall under the old 3rd level square set room territory. The 383' sub cannot be attacked vigorously, excepting in the two localities mentioned above until operations on the 364' sub and 3rd level are nearly completed. Nearly 90,000 tons were gained here.

Several gangs have been employed the last couple of months of the year, cutting out their raises and starting to block out the ore near the L. S. I. Company's boundary, 15' below the 383' sub, or at an elevation of 398'. There will be room for two subs between the 398' sub and the 4th level.

With the exception of a few raises put up from the 4th to the 3rd level, no work was done between the 398' sub and the 5th level.

On the 5th level the rock drift being driven last year was extended under No.4 shaft and the shaft raised and timbered to the bottom of the operating shaft.

In the shaft pillar, mining operations were carried down to the elevation of the 335' sub. The first of the year a couple of gangs were employed scramming on the 271' sub and the mining on the 290' sub was in full blast while operations had barely begun on the 308' sub. At the end of the year the shaft pillar deposit on the 271', 290' and 308' subs has been cleaned up and the 325' sub workings thoroughly opened up. From 15 to 20 gangs have been employed here steadily during the year. The product has been in round numbers 170,000 tons.

A considerable amount of repairing and retimbering has been carried on throughout the 3rd level motor drifts, especially in the Northwest territory and in the neighborhood of No.1 shaft. At present practically all the ore being mined is dumped through and handled on the 4th level, with the exception of that coming from the shaft pillar. It will be necessary to keep the 3rd level motor drift leading into this territory open for several months at least.

The underground contract work will be considered under the several sub and level headings.

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LAKE DEPOSIT.

335 FOOT SUB-LEVEL.

At the beginning of the year, four gangs were employed here, Nos.15 and 35 in the Northwesterly portion of the deposit and Nos. 2 and 32 in the Southeasterly extremity. Nos. 15 and 35 mined out a pillar standing in the old workings 270' in length and having an average width of 40'. No.35 was moved down to the 3rd level June 1st and No.15 on September 1st. Another large pillar approximately 50' X 300' standing over the main South side motor drift on the 3rd level, which had been left so as not to bring too much weight on this drift, was gained by Nos. 7 and 11, No.7 working from February 1st to November 1st and No.11 from February 1st to September 1st. The only ore remaining at present in the Northwesterly portion of the deposit at this elevation is a pillar 100'X 200' standing along the North footwall and immediately over the 3rd level motor drift leading into the shaft pillar workings. This pillar cannot be safely taken until tramming on the 3rd level is discontinued. No work is being done in this territory at present.

In the Southeasterly portion of the deposit, Nos. 2 and 32, reinforced April 1st by No.17, blocked out and mined a body of ore 150'X 180' along the South footwall. These workings have now been blasted in, No.2 having been moved down in its raise in August and Nos. 17 and 32 in October.

THIRD LEVEL, SILL FLOOR.

As stated before, this territory has been the scene of great activity during 1910. For convenience the 3rd level will be considered under the following headings, Northwest deposit, or that area West of the South side motor drift, the square set room area (situated along the South footwall to the East of the above motor drift and South of the horse of jasper) and the central deposit (situated between the horse of jasper and the North footwall).

In the Northwest deposit, 13 gangs, Nos. 6, 16, 19, 25, 30, 38, 39, 43, 50, 54, 55, 70 and 77, were engaged at the beginning of the year, slicing out pillars and caving back towards the East. Nos. 16, 19, 25, 39, 70 and 77 remained in this territory throughout the year; Nos. 6 and 30 until June; No.38 until March; Nos. 43, 50 and 54 until April and No.55 until June. Nos. 35 and 63 were transferred to this elevation in June, No.15 in July, Nos. 11 and 22 in August and Nos. 33, 48 and 60 in September, and with the exception of No.11,

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worked here until the end of the year. The deposit has a width of over 300' and has been mined out and caved back towards the East for 400', or from a point 200' to 600' East of the L. S. I. Company's boundary. At the end of the year the force is attacking the pillars standing along the Western side of the South motor drift. The only body of ore of any size remaining in this immediate vicinity is a large pillar 130'X 160' standing along the North footwall, a goodly portion of which it will be necessary to leave as long as the output from the shaft pillar is trammed on the 3rd level.

In the Southeast deposit, Nos. 26 and 49 have operated all year, No.26 scramming in the square set room territory South of No.1 shaft and No.49 slicing out a 35'X 200' pillar standing along the Eastern side of the South side motor drift, No.18 from May to August, No.44 from June to November, Nos. 2 and 32 from July, Nos. 17 and 41 from August and No.57 from September to the end of the year, were employed scramming, robbing and generally cleaning up throughout the square set room territory to the South and Southeast of No.1 shaft. With the exception of a few pillars standing at the extreme Eastern end of the deposit, there remains no clean ore along the South footwall at this elevation. The five gangs will clean up these pillars during the next few months.

Nos. 8, 27 and 29 were engaged blocking out pillars during the first few months of the year in the central deposit from 300' to 600' West of No.1 shaft. Slicing and caving was then inaugurated, Nos. 27 and 29 finishing here November 1st and No.8 continuing to the end of the year. A pillar averaging 70' in width remains between these workings and the North footwall motor drift and it will be taken as soon as the tramming on this level is discontinued. There are several small pillars standing in the old workings mentioned above which No.8 is engaged in slicing out.

364 FOOT SUB-LEVEL.

This sub, 15' below the 3rd level, had been caved back 200' East of the L. S. I. Company's boundary at the close of 1909 and pillars blocked out along the foot and hanging 200' to the East of this point. The 4th level raises in the Southeast deposit had been connected at this elevation and a number of crosscuts driven to the South and North footwalls.

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First taking up the Northwest deposit, Nos. 12, 23, 31 and 37 were engaged here at the beginning of the year, blocking out pillars. Nos. 12 and 23 were transferred to the 383' sub in May; No.31 in December and No.37 in April. No.38 was moved down to this elevation in April and worked here for the balance of the year. No.35 operated from April to October, No.50 from April, No.43 from May, No.55 from June, No.6 from September and No.54 from December to the end of the year. The deposit had a width of 80' at the boundary, a width of 270', 200' to the East and a width of 350', 600' to the East. With the exception of a strip along the North footwall, which it will be necessary to leave as a support for the 3rd level motor drift, the ore blocked out in this territory can now be sliced out. Gangs will be added from time to time as the ore is gained on the 3rd level.

Six gangs, Nos. 10, 13, 22, 44, 60 and 64, were found in the Southeast deposit January 1st, 1910, slicing out pillars and caving back the ore blocked out the previous year. Nos. 10 and 44 worked here the entire year, No.13 until April, No.64 until September and Nos. 22 and 60 until October. No.26 was engaged in this territory from April until the end of the year, No.48 from May to October, Nos. 14 and 24 from August and No.30 from September to the close of the year. A deposit, which was partly opened up during 1909, has now been mined out and caved 180' in width and 600' in length along the South footwall. No work has been done to date along the North footwall in the Southeast deposit as operations on the 3rd level immediately above have not been completed.

383 FOOT SUB-LEVEL.

NORTHWEST DEPOSIT.

During the latter part of 1909, some 200' of drifting had been done in this territory between the 4th level raises in the vicinity of the North footwall and the L. S. I. Company's boundary. No.3 was engaged here during the entire year, No.9 from January to November, No.49 from January to Decembef, No.37 from April to December, No.18 from September, No.23 from May and No.31 from the 1st of December to the close of the year. A body of ore standing along the North footwall, approximately 100' in width, has been blocked out, sliced and caved to the East from the L. S. I. Company's boundary for 350'. The four gangs, Nos. 3, 18, 23 and 31, are now engaged in outlining the deposit between

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this worked out area and the South footwall. It will be some time yet before the ore standing to the East can be attacked vigorously as operations on the 364' sub immediately above are far from completed.

Separated from the Northwest deposit workings by over 300', the Southeast deposit has been opened up along the South footwall for a distance of over 400' during 1910. The maximum width of these workings is 220' but in places they are very much narrower, being limited on account of mining operations going forward on the 364' sub and the 3rd level. Four gangs, Nos. 26, 36, 42 and 48, started in this territory February 1st, Nos. 26 and 42 working here the entire year, and Nos. 36 and 48 until May. Nos. 12 and 13 operated in this locality from May, No.36 from August, Nos. 5, 10, 54 and 64 from September and No.34 from November during the balance of the year. The horse of jasper situated in the central portion of the deposit in the 3rd level workings and above has entirely died out at this elevation. On the other hand the footwall is cutting down the lateral limits of the deposit appreciably with depth. The dikes encountered are somewhat more numerous than above.

398 FOOT SUB-LEVEL.

Fifteen feet below the 383' sub, two gangs, Nos. 9 and 47, were engaged during the last month of the year cutting out from their raises and starting to block out the ore in the vicinity of the L. S. I. Company's boundary. Several contracts will be added to the force engaged here right away. The deposit will be blocked out into pillars, slicing and caving following as on the subs above. No work has been done to date in the Southeast deposit.

FOURTH LEVEL.

Three raises were put up from the Easterly portion of the East motor loop; No.36 raise was pushed through to the 325' sub (shaft pillar) during March, No.18 raise holed to the 383' sub in August and No.75 raise was started in December and had attained a height of 25' at the end of the year.

No.40 extended the tail room drift (12' wide) to the South of the 5th level winze for 30'. From the breast of this drift a raise was put up to the 3rd level during the latter part of January and February, holing into the South side motor drift along the face of the footwall. This affords a good traveling road for the men should anything happen to cut them off from the shafts and in

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future any ore extracted from the South side deposit will be trammed on the 3rd level to this raise, dumped through and trammed to the shaft on the 4th level. The workings on the 3rd level between this raise and the shaft have been caved for a distance of several hundred feet.

FIFTH LEVEL.

No.45 was engaged during January and February extending the rock drift towards No.4 shaft. The 5th level plat was cut in February and March and the shaft sunk and timbered 40' by the middle of July. The dumping pockets were then built and the work of raising the shaft started. The shaft was carried up full size and timbered. The holing was effected with the bottom of the operating shaft 40' below the 4th level the last of December, necessitating a raising of 80'.

NO.1 SHAFT PILLAR.

271 FOOT SUB-LEVEL.

No.21 spent the first three months of the year in this territory, slicing out several small pillars standing 200' to the West of No.1 shaft; also robbing and cleaning up through the adjacent workings. This constituted the only work at this elevation, finishing the deposit.

290 FOOT SUB-LEVEL.

At the beginning of the year, nine gangs, Nos. 33, 51, 59, 61, 62, 66, 71, 73 and 75, were engaged here, slicing out pillars and caving back through the workings which had been opened during the previous year. Nos. 33, 61 and 75 operated here one month; No.71, two months; No.73, three months; Nos. 51 and 62, four months; No.66, eight months and No.59, nine months. No.52 operated here from February to March, No.21 from April until December. The shaft pillar workings of this sub were approximately 500' in length and varied from a width of 50' at the Eastern end to 200' at the Western. The Westerly workings adjoin the Lake deposit footwall stopes and the Easterly the Southeast Lake deposit rooms. A 30' dike cuts across the deposit in a Northeast-Southwesterly direction just to the East of No.1 shaft. The deposit has now been entirely gained at this elevation.

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308 FOOT SUB-LEVEL.

This shaft pillar sub, 18' below the 290' sub, has been opened up and with the exception of a few pillars at the Western end, mined out during the past year. Aside from having a slightly greater width at the Eastern end, its dimensions are the same as those of the sub above. The 30' dike, mentioned in connection with the 290' sub, cuts across the deposit at the shaft.

Nos. 5, 28, 40, 46, 53 and 56 operated here the first of the year. This force was increased until in April thirteen gangs were employed, the additional gangs being Nos. 33, 61 and 75 added in February, Nos. 58 and 71 in March and Nos. 57 and 73 in April. From April on the force was gradually reduced, Nos. 5, 33, 75 and 57 leaving in May, Nos. 46 and 53 in June, Nos. 56 and 61 in August and Nos. 28 and 71 in November. At the end of the year, six gangs, Nos. 40, 73, 52, 62, 59 and 21, were operating here, No.52 being engaged since June, No.62 since August, No.59 since September and No.21 since December. These gangs sliced out the several pillars standing in the old rooms from the shaft Westward to the Lake deposit footwall workings.

The old 3rd level square set rooms came up to this elevation and the deposit to the East of the shaft was therefore partially mined previous to this year.

325 FOOT SUB-LEVEL.

Most of the ore to the East of No.1 shaft has been gained at this elevation (the 3rd level square set rooms having limited the product from this territory materially). To the West of the shaft the deposit has been partially blocked out but no slicing or caving done as yet as the workings of the 308' sub above would be endangered.

Nos. 1, 4, 17 and 58 were found here January 1st, No.58 leaving in March, No.17 in May, No.1 in September and No.4 in November. No.53 operated on this sub from February to December, No.57 from March to May, No.48 from April to October, Nos. 61 and 75 from May to November, Nos. 33, 56 and 66 from September to November and Nos. 28, 58 and 71 from September until the end of the year. As soon as the pillars remaining on the 308' sub are gained the six gangs employed there will be moved down to this sub and the deposit cleaned up rapidly.

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335 FOOT SUB-LEVEL.

A force of seven gangs has been engaged at this elevation during the last two months of the year, Nos. 1, 33, 46, 56, 61 and 75, opening up the deposit to the East of No.1 shaft and No.4 blocking out the ore along the footwall at the Western end of the shaft pillar. The territory between the shaft and Lake deposit footwall workings will be opened up as soon as the ore immediately above is gained. It will be impossible to keep the 3rd level motor drifts open much longer and a portion of the ore at this elevation will be gained from the 3rd level sill floor and dumped through and trammed on the 4th level.

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L A K E M I N E .

STATEMENT OF COMPARATIVE MAINTENANCE COSTS FOR YEAR ENDING DECEMBER 31ST, 1910.

	1910	1909	INCREASE	DECREASE
Side Tracks	1243.93	929.64	314.29	
Surface	880.87	895.33		14.46
Docks, Trestles and Pockets	790.48	272.77	517.71	
Buildings - Office	52.28	11.15	41.13	
Shops	183.90	6.61	177.29	
Shaft House	241.46	133.49	107.97	
Engine House	16.98	16.57	41	
Dry House	289.02	6.63	282.39	
Miscellaneous	6.09	122.74		116.65
Shop Machinery	412.88		412.88	
Boilers	2216.12	1126.96	1089.16	
Hoisting Machinery	452.59	375.58	77.01	
Compressors, Receivers & Air Pipes	2683.44	1646.16	1037.28	
Steam Pumps	1525.32	251.21	1274.11	
Top Tram Engines & Cars	670.88	373.85	297.03	
Skips & Skip Roads	893.75	916.05		22.30
Underground Tracks & Cars	2114.42	1282.58	831.84	
Electric Engine	15.74	22.30		6.56
Motors	3045.38	2781.63	263.75	
Wiring	924.09	434.55	489.54	
Main Line Tracks & Cars	3223.04	2524.94	698.13	
Sign Boards & Signals	4.84	828.91		824.10
Fire in Coal Pile	16.50		16.50	
Total	21904.00	14959.65	7928.42	984.07
Net Increase			6944.35	

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