The Cleveland - Cliffs Iron Company

Mining Department

Annual Report of General Manager

For Year ending December 31st. 1929

#2000

1931

152

THE CLEVELAND-CLIFFS IRON COMPANY

MINE DEPARTMENT

MANAGER'S ANNUAL REPORT
YEAR 1929
INDEX

THE CLEVELAND-CLIFFS IRON COMPANY
MINE DEPARTMENT

MANAGER'S ANNUAL REPORT
YEAR 1929
INDEX

Sheet #2

THE CLEVELAND-CLIFFS IRON COMPANY
MINE DEPARTMENT

MANAGER'S ANNUAL REPORT
YEAR 1929
INDEX

Sheet #3

CH:MMM.
3-27-30

THE CLEVELAND-CLIFFS IRON COMPANY

MINE DEPARTMENT - MANAGER'S ANNUAL REPORT
CROSS INDEX BY MINES
YEAR 1929

		CLIFFS SHAFT	HOLMES	MORRIS LLOYD	TILDEN
ISHPEMING DISTRICT:-					
1.	General	10	38	62	91
2.	Production Shipments & Inventories	10-13	38-40	62-65	91-95
3.	Analysis	13-14	41	66	95
4.	Estimate of Ore Reserves	14-15	41-42	66-68	95-96
5.	Labor and Wages	16-17	42-44	68-70	96
6.	Surface	17-18	44-45	71	
7.	Underground (and Open Pit)	18-25	45-50	71-78	97-104
8.	Cost of Operating	26-34	50-59	78-87	105-106
9.	Explorations & Future Explorations	35	60	87	106
10.	Taxes	36	60	88-89	107
11.	Accidents & Personal Injury	37	60	89	107-108
12.	New Construction & Proposed new Construction				108-109 111-113
13.	Equipment & Proposed Equipment ..	37		90	109-110
14.	Maintenance and Repairs			90	114
16.	Water Supply			90	
17.	Mine Location - Condition of Premises			90	
18	Nationality of Employees	37	61	90	114

		NEGAUNEE	MAAS	ATHENS	NORTH JACKSON	SOUTH JACKSON	LUCY
NEGAUNEE DISTRICT:-							
1.	General	115-116	148	190	218	219	221
2.	Prod. Shipments & Inventories ...	116-118	148-151	190-192			
3.	Analysis	118	151	192			
4.	Estimate of Ore Reserves	118-119	151-152	193		219	
5.	Labor and Wages	119-120	152-153	193-194			
6.	Surface	120-121	153-154	195-196	218		221
7.	Underground	121-130	154-166	196-203			
8.	Cost of Operating	130-140	166-176	204-214		219	
9.	Explorations & Future Explorations	140	177	214			
10.	Taxes	141	177	214-215	218	220	221
11.	Accidents & Personal Injury	141-142	177-179	215			
12.	New Construction & Proposed New Construction	142-145	179-186	215			
13.	Equipment & Proposed Equipment ..	146	187	216			
14.	Maintenance and Repairs	146	187	216		220	
15.	Power	146	188	216			
17.	Mine Location - Condition of Premises	147	188	216			
18.	Nationality of Employees	147	188	217			
19.	Maas Crusher		188-189				

CH:MMM.
3-24-30

THE CLEVELAND-CLIFFS IRON COMPANY
MINE DEPARTMENT - MANAGER'S ANNUAL REPORT
CROSS INDEX BY MINES
YEAR 1929

	AUSTIN	STEPHENSON	PRINCETON	GARDNER MACKINAW	FRANCIS	GWINN DISTRICT
GWINN DISTRICT:						
1. General	222	224	227	230	259	261
2. Production Shipmts. & Invtys.	222	224-225	227	230-232	259	
3. Analysis	222	225	228	232	259	
4. Estimate of Ore Reserves			228	233		
5. Labor and Wages				233-235-		261
6. Surface	222	225-226	229	235		
7. Underground				236-245		
8. Cost of Operating	223	226	229	245-255	260	
9. Explorations & Fut. Explts.				255		
10. Taxes	223	226	229	255	260	262-263
11. Accidents & Personal Injury				256		
12. New Construction and Proposed New Construction				256-257		
13. Equipment and Proposed Equipt.				257		
14. Maintenance and Repairs				257		
15. Power				257		
16. Water Supply						264
17. Mine Location-Condition of Premises				257		264-265
18. Nationality of Employees				258		
19. Gwinn Association, Hotel, County Park						265-266

	REPUBLIC	SPIES VIRGIL	WADE	HILL TRUMBULL	HOLMAN CLIFFS	CANISTEO-CLIFFS
OTHER MICHIGAN MINES AND MINNESOTA MINES:-						
1. General	267	273	302	312	338	349
2. Production Shpmts. & Invtys.	267-268	273-277	302-303	312-314		
3. Analysis	268	277-278	303-304	315		
4. Estimate of Ore Reserves		278-279	305	316-317	339	
5. Labor and Wages		279-280	305-306	317-318	340	
6. Surface	269-270	281-282	306	318-319	340-342	
7. Underground (and Open Pit)		282-287	307-309	319-324	342-344	
8. Cost of Operating		295-301	310-311	325-327		
9. Explorations & Fut. Explts.		288-289		328	344	350
10. Taxes	271	290-291	311	329	345	
11. Accidents & Personal Injury	271-272	291-292		329-331	344-346	
12. New Construction & Proposed New Construction		292		331	346	
13. Equipment & Proposed Equipt.		293	311	332	346	
14. Maintenance & Repairs		293-294		332-335		
17. Mine Location - Condition of Premises		294				
18. Nationality of Employees		294	311	336	347	
19. Washing Plant				336-337	347-348	

CH:MMM.
3-24-30
-2-

Ishpeming, Michigan,
January, 31st, 1930

Mr. Wm. G. Mather, President,
Cleveland, Ohio

Dear Sir:-

I beg to submit the report of the operations of the Mining Department for the year 1929.

The inventories, maps and statements relative to the 1929 report have gone forward to you under separate cover.

The colored portions of the maps show the work for the year. The reports of the different mines of the Company were made by the Superintendents in charge and the reports of the Engineering, Mechanical, Electrical, Geological, Safety and Welfare Departments by the heads of these Departments.

In 1926 a lease was taken on the Holman Brown property, a wash ore pit located near the Village of Taconite on the west end of the Mesaba. This mine will go into operation in 1930. It is owned by the Holman Cliffs Mining Company and operated by the Cleveland-Cliffs Iron Company. The Bingham and North Star which are Mesaba Cliffs properties, will be worked in conjunction with the Holman Brown.

During the year a lease was taken on the Canisteo pit, the holding company being known as the Canisteo Cliffs Mining Company and the operating company being the Cleveland-Cliffs Iron Company. This pit is now being pumped out and mining operations will start in 1931.

In October a revision of the terms for Wade Mine underground ore was obtained and preparations were immediately started to reopen this property which has been idle since 1921. It will be in full production early in 1930 and our aim will be to get the red figure from the previous operation off our books.

In the latter part of 1929 the Company took an option on the Dean Mine, an old property located a short distance to the west of the Village of Kinney. The lease, however, was not signed until January 23rd, 1930. This is a combination open pit and underground proposition.

During the present year the Tilden open pit went into operation and made a shipment of 441,769 tons. In the latter part of the year we started drilling operations on the base of Summit Mountain which is about one half mile to the east of the Tilden. We are endeavoring to prove up siliceous ore with a low phosphorus content. Up to the present time drilling has been favorable and there is every reason to assume that there is a very large tonnage of siliceous ore somewhat lower in iron than the present Tilden but very low in phosphorus.

The following statement shows a comparison of all of the Company's mines for the years 1928 and 1929. In figuring the Tons per Man per Day all of the labor under the jurisdiction of the Mining Department has been included. On this basis the Tons per Man per Day shows an increase of .68 in 1929 while the Cost on Cars shows a decrease of .193 in 1929. For further details please consult the statement entitled "Comparison of Total Days Worked and Tons of Ore Mined for Years 1928 and 1929", which will be found in the report.

	TONS	TONS PER MAN PER DAY	COST ON CARS	AVERAGE RATE PER DAY	LABOR COST PER TON
1928	3,073,679	4.75	2.145	5.15	1.084
1929	3,694,820	5.43	1.952	5.09	.939
Increase	621,141	.68			
Decrease			.193	.06	.145

Following is shown a comparison of the total number of days worked and the lost time accidents for the past four years:

	1926	1927	1928	1929
Total Days Labor	693,969	650,093	584,565	651,362
Total Lost Time Accidents	347	209	117	85
Percentage of Rduction	0	40%	66½%	75½%

In comparing the record of 1929 with 1928 it is noticed that in 1929 the days of labor were 11.1% greater than in 1928. The record for 1929 shows a reduction in the number of accidents from 11928 of $27.6%. It therefore can be assumed that the record for 1929 on the basis of the same number of days worked is 38.7% better than it was in 1928.

Although we have made a reduction in our accidents in 1929 as compared with 1928 we are by no means satisfied and are continuing to devote more energy and thought to this very important subject than we have in the past. I will state briefly a few of the high points.

Our entire operation is being standardized and definite rules laid down stating plainly the procedure which must be followed in each important class of work such as the use of explosives, operation of scrapers, tramming, timbering, etc. By the rigid enforcement of these standards, many accidents will be eliminated.

After a great deal of study, on December 15th we put into effect what is known as our Safety Bonus. This scheme was originally worked out to apply to shift bosses but since that time has been extended to other bosses. Instead of a shift boss receiving a flat rate which has been customary in the past, his wage will be figured as follows:

Each shift boss in lieu of his present wage, will receive as his daily wage the average wage of the contract miners under his jurisdiction. In addition a safety bonus of 35¢ per day will be added to this wage for each shift boss having no lost time accident during the two weeks period.

My original thought was to simply raise the daily wage of the shift bosses as our records showed that these bosses were actually receiving a lower rate than the average rate of the contract miners. The scheme which was adopted is a much better plan than paying him a flat rate because he has the added incentive to raise the rate of his contract miners and at the same time work his gangs safely in order that he may participate in the bonus. Linked with this scheme is the regulation that at certain intervals bosses must be shifted from one territory to another. The prime raasons for this is to give every boss the same opportunity as far as wages and working conditions are concerned and to find out the capability of each boss. I am exceedingly enthusiastic about this plan which has been well received by our bosses.

Since mines were first opened up on the Marquette Range, smoking has been permitted underground. In fact with very few exceptions, it is a common practice throughout the entire Lake Superior District. After intensive propaganda work, starting with the Superintendents and working down through the Captains and shift bosses, who in turn passed the information on to the miners, notices were posted that effective January 1st, 1930, smoking would be prohibited underground, in shaft houses, and timber tunnels.Not a single complaint due to this regulation has reached me as it had been throughly explained to every man that the rule was adopted for their protection.

As a means of showing the appreciation of the Company for the splendid co-operation of our employees in safety, a picnic for them and their families was held on Labor Day, September 2nd, at Union Park, which is midway between Ishpeming and Negaunee. This was a conspicuous success and it is impossible to extimate it's real value to the Company but I am confident that the money expended will be returned to the company many fold. The principal addresses of the day were made by the President, Mr. Wm. G. Mather, and Mr. Wm. P. Belden. To our own employees, their families and a few invited guests, we served 8,362 lunches. Each of these 8,362 of our people was given a book with six coupons, good for ice cream, candy, pop, a ride on a merry-go-round and chair-o-plane, etc. The American Legions of Ishpeming and Negaunee had the concession for serving refreshments and a few figures may be of interest. They served 28,080 bottles of pop; 6,000 bottles of near beer; 425 gallons of ice cream; a large number of bags of candy, chewing gum, etc. There were over 5,000 rides on the merry-go-round and chair-o-plane. In addition to our own people, it is estimated that about 4,000 others attended the picnic. There was not a drunk, fight, accident, or any rowdyism during the day. The task of feeding, transporting, amusing such a large crowd was a bid undertaking but had been organized so thoroughly by the splendid Committee on Arrangements that everything went off without a hitch. Employees of the Negaunee, Morris Lloyd, Holmes, Spies Virgil and Maas Mines of their own free will, without the slightest suggestion from any official drafted splendid resolutions of appreciation which were signed by all employees and sent to this office. I feel confident that at least a part of the betterment in our cost during 1929 is directly attributed to the good will of our employees. It is a well known fact that contented workmen are good workmen.

In January you authorized physical examinations for employees. This work was immediately started and completed as rapidly as possible. In a number of cases it was necessary to change the occupation of certain of our old employees who were found to be in poor physical condition, but it has been unnecessary to discharge any employee. It was also necessary to require certain men to be operated upon for hernia and to have bad teeth or tonsils removed. In the employment of new men we have been exceedingly careful to see that they are physically fit. The reason for the physical examination was carefully explained to all employees and the fact that no one has been discharged for disability has convinced them that the rule was put into effect largely for their own protection.

In the latter part of the year, after much study, a rule was established requiring the use of fore-poles with cross lagging in all drifts, cross-cuts or slices going under new ground. Formerly this was left to the judgment of the Captains and Shift Bosses but now this work must be done immediately after blasting. The question of judgment is eliminated and by the strict enforcement of this rule it is expected that practically all accidents due to falls of ground from the back will be eliminated.

The only outstanding lease is the Empire Iron Company covering the SW$\frac{1}{4}$ of Section 19,47-26. This property has been sub-let to Clement K. Quinn & Company. It was idle during 1929.

Respectfully submitted.

S. R. Elliott

Manager

SRE:DP

COMPARISON OF TOTAL DAYS WORKED AND TONS OF ORE MINED FOR YEARS 1928 and 1929

	1928 DAYS	1929 DAYS	1928 DAYS	1929 DAYS
Reopening Gardner-Mackinaw	3,071			
Stephenson (Production)	863¾	792		
Princeton	334¾	362		
Austin (Production)	280¾	596¼		
Miscellaneous Payroll	11,044⅕	10,556		
Shops & Storehouse	13,299¾	17,624½		
Opening & Equipping Tilden	6,201½	4,711½		
Francis	25⅕	68		
Negaunee Miscel. & General	7,625¾	8,146¼		
Athens, " " "	3,107	2,174¾		
C.C.Iron Co. " "	61,042½	57,377¾		
Cliffs Power & Light Co.	20,939	12,800¼		
Mesaba Cliffs Iron Mining Co.	22,516	24,190¼		
Republic		4,668		
Reopening Wade		3,585½		
Holman Cliffs Miscel.& Gen.		2,008		
Canisteo Cliffs, " "		342¾		
Total	150,350¾	150,003¾		
G Grand Total all Operations	584,565¾	651,362¾		
Net for Operating Mines	434,215	501,359	434,215	501,359
Total Tons - exclusive of Wade	2,775,542	3,534,754		
Tons per Man per Day	6.39	7.05		
Increase		.66		
OPEN PIT PRODUCTION				
Ogden	116,415		1,702	
Tilden		441,769		13,102¼
Hill Trumbull	488,897	521,845	15,292¼	20,322½
	605,312	963,614	16,994¼	33,424¾
Net U.G. Days			417,220¾	467,934¼
Net U.G.Production	2,170,230	2,571,140		
U. G. Tons per Man per Day	5.201	5.495		
Increase		.294		
% Open Pit Production to Total Production	21.91	27.26		
Increase		5.45		

JSM:DP

STATEMENT SHOWING COMPARATIVE COST FOR ALL EXPLOSIVES USED AT HARD ORE MINES

	1926	1927	1928	1929
Product	394,972	466,382	413,994	421,314
POWDER				
Lbs. 50%	326,406	314,961	141,390	262,100
60%	46,150	49,550	49,400	140,900
#2-#3-#4 Special.....		22,250	133,900	14,700
E.P. 23			21,350	4,250
Total Lbs.	372,556	386,761	346,040	421,950
Total Cost	$53,625.27	$54,763.92	$47,860.12	$55,207.66
Fuse - Feet.....	538,355	600,440	511,350	593,500
Caps - Number.....	113,406	102,345	116,445	125,900
Cap Crimpers	44	27	24	10
Tamping Bags	22,830	3,370		
Ignitors	1,200			
Elec. Exploders.....	50			
Connecting Wire.....	26			
Leading Wire.....	500			
Fuse and Cap Containers.....				100
Total Cost Fuse, etc.	482,948	469,164	424,342	504,355
Total Cost All Explosives	$58,454.75	$59,455.56	$52,103.54	$60,251.21
Avg. Price per Lb. Powder.....	.1439	.1416	.1383	.1308
Cost Per Ton Powder	.1358	.1174	.1156	.1310
" " " Fuse, Caps, etc.....	.0122	.0100	.0102	.0120
Cost Per Ton All Explosives.....	.1480	.1274	.1258	.1430
Lbs. Powder per Ton of Ore.....	.9432	.8293	.8358	1.0015

Open pit mines not included.
Decrease in average price per pound for powder due to decrease in cost of powder April, 1928.
The 1929 cost per ton for all explosives increased .0172 due to 95,000 lbs. powder used for rock development.

JSMCN:DP

STATEMENT SHOWING COMPARATIVE COST FOR ALL EXPLOSIVES USED AT SOFT ORE MINES

	1926	1927	1928	1929
Product	2,052,255	1,835,406	1,756,236	2,149,826
POWDER				
Lbs. 30%	2,900			
35%	76,150			
40%	186,445	113,075	158,650	137,066
50%	315,420	339,950	318,950	449,850
55%				21,382
60%	251,800	325,350	338,725	469,981
80%	2,300			
#2-#3-#4 Special.....		3,250	55,600	
Total Lbs.	835,015	781,625	871,925	1,078,279
Total Cost	$119,487.81	$113,557.94	$123,312.40	$144,456.48
Fuse - Feet.....	2,322,700	2,364,900	2,529,868	3,086,716
Caps - Number.....	499,476	423,907	425,099	534,829
Electric Explosives.....	76	15		
Connecting Wire.....	18#	2#		18#
Tamping Bags.....	132,230	112,459	118,930	93,400
Crimpers.....	140	178	173	31
Sealing Compound - pints.....				9
Powder Bags.....				93
Fuse and cap containers.....				81
Total Cost Fuse, etc.	$22,709.73	$19,051.53	$20,090.82	$25,205.15
Total Cost all Explosives	$142,197.54	$132,609.47	$143,403.22	$169,661.63
Average Price per Lb.Powder.....	.1431	.1453	.1414	.1339
Cost per Ton Powder.....	.0582	.0619	.0702	.0672
" " " Fuse, caps, etc.....	.0111	.0104	.0114	.0117
Cost per Ton all Explosives	.0693	.0723	.0816	.0789
Pounds Powder per Ton of Ore.....	.4068	.4259	.4964	.5015

Open pit mines not included

Decrease in average price per lb. for powder due to decrease in cost of powder effective April, 1928.

JSM:DP

STATEMENT SHOWING COMPARATIVE COST FOR ALL MINE TIMBER USED AT SOFT ORE MINES

	1926	1927	1928	1929
Product - - - - - - - - - - - -	2,052,255	1,835,406	1,756,236	2,149,826
TIMBER				
Feet 4 to 6 - - - - - - - - - -	45,294			
6 to 8 - - - - - - - - - -	543,275	484,217	515,639	607,310
8 to 10 - - - - - - - - -	471,550	372,289	319,807	448,870
10 to 12 - - - - - - - - -	269,767	268,634	193,780	244,916
12 to 14 - - - - - - - - -	85,282	104,591	93,890	97,467
14 to 16 - - - - - - - - -	5,939	16,511	108	1,443
7 to 9 - - - - - - - - - -	76,442		14,291	
9 to 12 - - - - - - - - -	146,312			
Total Feet - - - - - - - - -	1,643,861	1,246,242	1,137,515	1,400,006
Total Cost	$115,102.94	$79,754.35	$75,578.00	$ 93,115.35
LAGGING				
Feet 5' - - - - - - - - - - - -	2,348,612	1,553,163	1,202,025	1,388,900
6' - - - - - - - - - - - -	747,840	173,500	95,000	
7' - - - - - - - - - - - -	2,869,971	3,434,969	3,220,789	3,969,698
8' - - - - - - - - - - - -	1,009,672	1,076,343	598,784	644,744
Total Feet	6,976,095	6,237,975	5,116,598	6,003,342
Total Cost	$52,292.53	$45,264.93	$37,679.62	$44,669.80
Covering Boards - Feet - - - -	798,527	165,106	163,397	105,247
Total Cost	$11,960.39	$3,649.89	$3,230.13	$1,998.12
Poles - Feet- - - - - - - - -	2,493,741	1,544,937	2,053,550	2,734,607
Total Cost	$29,585.21	$21,748.28	$31,760.23	$41,178.44
Average Cost Per Foot - Timber-	.0700	.0640	.0642	.0665
" " "100 Ft.-Lagging -	.7496	.7288	.7361	.744
" " "100 Ft.-Cover Bds.	1.5409	1.8472	1.977	1.898
" " "100 Ft.-Poles - -	1.1615	1.4077	1.547	1.510
Feet Timber Per Ton of Ore - -	.801	.679	.6478	.6512
" Lagging " " " - -	3.399	3.398	2.913	2.792
" Poles " " " - -	1.215	.842	1.169	1.272
Cost Per Ton for Timber - - - -	.0561	.0434	.0430	.0433
" " " " Lagging - - -	.0255	.0247	.0214	.0208
" " " " Poles - - - -	.0144	.0118	.0181	.0192
" " " " Cover.Brds.- -	.0058	.0017	.0018	.0009
" " " " All	.1018	.0816	.0843 T	.0842
Total Cost for All Timber	$208,941.07	$149,817.45	$148,247.98	$181,001.71

Open Pit Mines not Included.

JSMCN:DP

STATEMENT SHOWING TOTAL COST FOR SUPPLIES CHARGED TO
"COST OF ORE AT MINES"

SOFT ORE MINES

YEAR	1926		1927		1928		1929	
PRODUCT	2,052,255		1,835,406		1,756,236		2,149,826	
CLASSIFICATION	AMOUNT	PER TON	AMOUNT	PER TON	AMOUNT	PER TON	AMOUNT	PER TON
General	93,473.76	.0455	85,520.88	.0465	92,928.84	.0529	107,893.25	.0502
Iron & Steel	31,656.04	.0154	28,956.99	.0157	31,679.66	.0180	38,877.35	.0181
Machinery	126,562.61	.0616	85,936.53	.0468	117,816.27	.0670	137,101.96	.0638
Explosives	166,713.88	.0812	151,669.06	.0826	161,089.99	.0917	177,543.73	.0826
Lumber & Timber	238,095.23	.1160	180,515.49	.0983	182,139.31	.1037	211,095.62	.0982
Fuel	47,348.57	.0230	34,728.59	.0189	30,550.11	.0174	30,389.23	.0141
Electric Power	364,360.25	.1775	361,104.77	.1967	363,365.39	.2068	434,631.89	.2021
Miscellaneous	79,162.37	.0385	56,414.20	.0307	31,071.56	.0177	33,943.70	.0158
TOTAL	1,147,372.71	.5590	984,846.51	.5365	1,010,641.13	.5750	1,171,476.73	.5449

HARD ORE MINES

YEAR	1926		1927		1928		1929	
PRODUCT	336,882		467,510		413,994		421,314	
CLASSIFICATION	AMOUNT	PER TON	AMOUNT	PER TON	AMOUNT	PER TON	AMOUNT	PER TON
General	35,756.69	.0974	29,726.59	.0635	41,435.40	.1001	43,232.11	.103
Iron & Steel	18,051.52	.0492	13,079.36	.0279	16,024.76	.0387	20,364.82	.048
Machinery	36,827.06	.1003	32,525.13	.0695	37,849.48	.0914	55,344.08	.132
Explosives	67,362.55	.1836	74,384.99	.1591	61,290.29	.1480	60,275.62	.143
Lumber & Timber	12,995.23	.0354	9,431.02	.0201	7,065.76	.0171	7,052.74	.017
Fuel	21,497.48	.0585	14,371.32	.0307	12,449.56	.0301	5,422.23	.013
Electric Power	77,042.33	.2099	84,106.40	.1798	80,072.05	.1936	78,560.22	.186
Miscellaneous	7,461.34	.0203	8,269.92	.0176	7,364.12	.0178	5,575.37	.013
TOTAL	276,994.20	.7549	266,254.73	.5694	263,551.42	.6368	275,827.19	.655

Soft Ore Mines:
The 1929 unit cost is .0301 less than 1928 due mostly to increased production.

Hard Ore Mines:
The 1929 unit cost is .0182 increase over 1928 - approximately all in machinery classification, more underground scraper equipment.

More detail of these supply costs will be found in the Analysis of Cost Sheets for the various mines.

JSM:DP

LABOR SUMMARY - ALL COMPANIES

PRODUCT	1926		1927		1928		1929	
	3,336,557		3,358,640		2,775,542		3,534,754	
	DAYS	AMOUNT	DAYS	AMOUNT	DAYS	AMOUNT	DAYS	AMOUNT
Surface	220,589¾	998,311.45	208,281¾	945,048.09	207,047¼	946,889.42	236,998¾	1,084,390.09
Cost per Ton		.2965		.2813		.3441		.3067
Underground	420,686	2,136,173.30	392,984¼	2,008,260.19	328,222¾	1,670,341.35	365,484	1,856,635.99
Cost per Ton		.6345		.5979		.6017		.5254
Supt. and Gen. Roll	52,694	423,770.23	48,827½	403,457.86	49,295¾	391,671.46	48,880	377,465.05
Cost per Ton		.1259		.1201		.1411		.1069
Grand Total	693,969¾	3,558,245.98	650,093½	3,356,766.14	584,565¾	3,008,902.23	651,362¾	3,318,491.13
Cost per Ton		1.0569		.9993		1.084		.939
Average Rate per Day		5.13		5.16		5.15		5.09
Tons per Man per Day		4.85		5.166		4.75		5.43

Note:

Above is totalnof all wages and salaries for all employees of the Mining Department including the Cliffs Power & Light Company.

Superintendent and General Roll Days and Amounts shown in all of the General Payroll except Mine Clerks and Captains which are included in surface and underground.

Wade Mine not included - Contract mining by the A. Guthrie Company.

Previous years stockpile overruns not included in 1929 total product.

JSM:DP

CLIFFS SHAFT MINE

ANNUAL REPORT

YEAR 1929.

1. **GENERAL:**

Production for 1929 was the largest in the history of the mine. Stockpiles were all cleaned up and accumulated overruns from previous years shipped.

The increase in production was made possible by the installation of new scrapers and slides. A large number of new drilling machines were also put into service and all of the underground equipment put into first class condition.

Several new ore lenses were discovered and opened up during the year. With the exception of one stope on the thirteenth level "B" shaft, all of the new areas were developed in "A" shaft territory, that is, east of the shaft or between the two shafts.

Changes were made underground, permitting us to take "A" shaft ore over to "B" shaft to balance the hoisting on the fifth, as well as on the tenth and fifteenth levels.

2. **PRODUCTION, SHIPMENTS & INVENTORIES:**

a. **Production by Grades:**

Grade	Product Tons	Stockpile Overrun Tons	Total Tons
Cliffs Shaft Lump	252,225	35,007	287,232
Cliffs Shaft Crushed	103,200	9,933	113,133
Total Cliffs Shaft	355,425	44,940	400,365
Bancroft Lump	43,375		43,375
Bancroft Crushed	22,514		22,514
Total Bancroft	65,889		65,889
Total Ore	421,314	44,940	466,254
Rock			29,980

Production averaged 1400 tons per day.

The proportion of lumps and fines as produced from the shafts was as follows:-

Lump Ore	295,600 Tons	70.1%
Fine Ore	125,714 "	29.9%
Total	421,314 "	100.0%

The production each year by grades since 1926 is as follows:-

Year	Lump Ore Tons	Fine Ore Tons	Total Tons	% Of Lump
1926	240,396	99,857	340,253	70.7
1927	288,804	113,728	402,532	71.7
1928	275,018	116,844	391,862	70.2
1929	295,600	125,714	421,314	70.1

CLIFFS SHAFT MINE
ANNUAL REPORT
YEAR 1929.

2. PRODUCTION, SHIPMENTS & INVENTORIES: (Continued)

b. Shipments:

Shipments as forwarded from pockets and stockpiles for 1929 were as follows:-

Grade	Pocket Tons	Stockpile Tons	Total Tons	Total Last Year
Cliffs Shaft Lump	188,710	116,568	305,278	267,291
Cliffs Shaft Crushed	70,613	62,820	133,433	93,078
Total Cliffs Shaft	259,323	179,388	438,711	360,369
Bancroft Lump	32,587	10,885	43,472	20,049
Bancroft Crushed	16,031	12,716	28,747	8,315
Total Bancroft	48,618	23,601	72,219	28,364
Grand Total	307,941	202,989	510,930	388,733
Total Last Year	218,554	170,179	388,733	
Increase in Shipments	89,387	32,810	122,197	

The following table shows the proportion of ore shipped to the Docks and that going all rail to various steel companies.

L.S. & I. Dock	425,555 Tons
C. & N.W. Dock	39,899 "
All Rail	45,476 "
Total	510,930 "

Shipments for the past four years follow:-

	CLIFFS SHAFT		BANCROFT		
Year	Lump Tons	Crushed Tons	Lump Tons	Crushed Tons	Total Tons
1926	235,872	89,424	22,812	9,914	358,022
1927	240,781	98,848	22,051	4,639	366,319
1928	267,291	93,078	20,049	8,315	388,733
1929	305,278	133,433	43,472	28,747	510,930

c. Stockpile Inventories:

The amount of ore in stock on Dec. 31st, 1929 was very small, being only the ore produced since shipments to the docks stopped. A small amount was moved all rail in December. The balance on hand by grades follows:-

Grade	Tons
Cliffs Shaft Lump	18,444
Bancroft Lump	3,085
Total Lump	21,529
Cliffs Shaft Crushed	8,772
Bancroft Crushed	1,658
Total Crushed	10,430
Total Ore	31,959

CLIFFS SHAFT MINE
ANNUAL REPORT
YEAR 1929.

2. PRODUCTION, SHIPMENTS & INVENTORIES: (Continued)

c. Stockpile Inventories: (Continued)

The stockpile balances for previous years were as follows:-

Ore on Hand	- Dec. 31, 1925	- 55,063	Tons
Ore on Hand	- Dec. 31, 1926	- 37,294	"
Ore on Hand	- Dec. 31, 1927	- 73,507	"
Ore on Hand	- Dec. 31, 1928	- 76,634	"
Ore on Hand	- Dec. 31, 1929	- 31,959	"

d. Division of Product by Levels:

Level	"A" Shaft Tons	"B" Shaft Tons	Total Tons
First	22,384	40,087	62,471
Second	15,023		15,023
Third	21,545		21,545
Fourth	10,674		10,674
Fifth	28,738		28,738
Sixth	58,638	9,681	68,319
Seventh	27,055	21,573	48,628
Eighth	34,544	11,721	46,265
Ninth	36,393	4,424	40,817
Tenth	14,124	6,614	20,738
Eleventh	13,707	8,533	22,240
Twelfth		5,150	5,150
Thirteenth		30,706	30,706
Total Ore	282,825	138,489	421,314
Rock			29,980
Total Ore and Rock			451,294

e. Production by Months:

Month	Days	C.S. Lump	C.S. Crushed	Banc. Lump	Banc. Crushed	Total Ore	Rock
January	26	16,873	7,185	4,198	1,746	30,002	3,176
February	23	15,482	6,569	3,592	1,519	27,162	2,590
March	25	17,067	7,075	4,529	1,950	30,621	3,012
April	25	19,746	7,974	5,257	2,000	34,977	2,842
May	26	19,889	8,159	5,720	2,415	36,183	2,456
June	24	18,959	8,142	4,753	2,160	34,014	2,460
July	26	20,441	8,716	4,507	2,339	36,003	2,438
August	27	24,405	10,901	4,909	1,986	42,201	2,432
September	24	21,202	9,210	4,578	2,208	37,198	1,996
October	27	24,629	11,121	5,401	2,300	43,451	2,526
November	24	20,898	9,135	4,453	1,714	36,200	1,928
December	24	19,494	8,259	4,034	1,515	33,302	2,124
Total	301	239,085	102,446	55,931	23,852	421,314	29,980
Transfers		13,140	754	12,556	1,338		
Year	301	252,225	103,200	43,375	22,514	421,314	29,980

CLIFFS SHAFT MINE
ANNUAL REPORT
YEAR 1929.

2. **PRODUCTION, SHIPMENTS & INVENTORIES:** (Continued)

f. **Ore Statement:**

	C.S. Lump	C.S. Crushed	Ban. Lump	Ban. Crushed	Total Tons	Total Last Year
On Hand Jan. 1, 1929.	36,490	29,072	3,182	7,891	76,635	73,507
Output for Year	239,238	102,446	55,778	23,852	421,314	390,986
Stockpile Overruns	35,007	9,933			44,940	876
Transferred	12,987	754	12,403	1,338		
Total	323,722	142,205	46,557	30,405	542,889	465,369
Shipments	305,278	133,433	43,472	28,747	510,930	388,734
Balance on Hand	18,444	8,772	3,085	1,658	31,959	76,635
Increase in Production					77,520	

g. **Delays:**

Date	Hours Delay	Cause	Tons Lost
Jan. 7	1½	Trouble in crusher building.	200
Feb. 20	1½	Gate broke on 1st level "B" shaft.	200
April 15	2	Spider broke on No. 8 crusher.	300
May 15	1¾	No current.	300
June 4	1	Gate broke on 7th level "B" shaft.	100
June 7	3½	"A" shaft skip stuck in rock-dump.	300
June 10	2½	No current.	375
June 15	2	Rotor burned out on hoist motor.	200
July 17	½	"A" shaft pocket blocked with chunks.	100
July 23	2	"A" shaft skip pulled out 7th level gate.	175
July 26	1	Repairing top-tram air-lift.	150
Aug. 17	1	No railroad cars.	150
Sept. 28	3	Hoist motor burnt out.	250
Oct. 25	1½	No railroad cars.	200
Nov. 29	2	Changing chutes for stocking ore.	300
Year	26¾		3300

3. **ANALYSIS:**

a. **Average Mine Analysis on Output for Year 1929:**

Grade	Iron	Phos.	Silica
Cliffs Shaft Lump	59.23	.102	7.23
Cliffs Shaft Crushed	56.93	.102	9.72
Bancroft Lump	60.41	.094	6.27
Bancroft Crushed	57.97	.097	7.95

b. **Average Analysis on Straight Cargoes:**

	Mine		Lake Erie		
Grade	Iron	Phos.	Iron	Phos.	Moisture
Cliffs Shaft Lump	60.35	.099	60.00	.095	.55

CLIFFS SHAFT MINE
ANNUAL REPORT
YEAR 1929.

3. ANALYSIS:
(Continued)

Average Mine Analysis for Year 1929:
Ores in Stock Dec. 31, 1929:

		Iron	Phos.	Silica	Moist.
Bancroft Lump	Dried	60.48	.110	6.05	
	Natural	59.88	.109	5.99	.95
Bancroft Crushed	Dried	57.66	.089	9.10	
	Natural	56.74	.087	8.95	1.60
Cliffs Shaft Lump	Dried	59.78	.107	7.20	
	Natural	59.44	.106	7.16	.60
Cliffs Shaft Crushed	Dried	56.33	.102	10.30	
	Natural	55.01	.100	10.07	2.35

Ores Shipped in 1929:

	Iron	Phos.	Sil.	Alum.	Mang.	Lime	Mag.	Sul.	Loss	Moist.
Bancroft Lump										
Dried	60.00	.093	6.05	2.51	.26	1.59	1.03	.010	2.00	
Natural	59.43	.092	5.99	2.49	.26	1.58	1.02	.010	1.98	.95
Bancroft Crushed										
Dried	58.15	.105	7.35	2.91	.28	1.75	1.21	.010	2.30	
Natural	57.22	.103	7.22	2.86	.28	1.72	1.19	.010	2.26	1.60
Cliffs Shaft Lump										
Dried	59.35	.101	7.15	2.46	.40	1.30	.99	.010	1.90	
Natural	59.00	.100	7.11	2.44	.40	1.29	.98	.010	1.89	.60
Cliffs Shaft Crushed										
Dried	57.25	.105	9.15	2.81	.43	1.36	1.08	.012	2.13	
Natural	55.90	.103	8.94	2.75	.42	1.33	1.06	.012	2.08	2.35

4. ESTIMATE OF ORE RESERVES:

a. Developed Ore - Cliffs Shaft Grade:

	"A" Shaft Tons	"B" Shaft Tons	Total Tons
Pillars	1,557,195	744,780	2,301,975
Floors	1,682,205	786,210	2,468,415
Total	3,239,400	1,530,990	4,770,390
To Support Surface	1,968,520	1,212,300	3,180,820
Available Ore	1,270,880	318,690	1,589,570
Less 10% Rock and 10% for Loss in Mining	241,467	60,551	302,018
Net Total	1,029,413	258,139	1,287,552

SUMMARY:

	Developed Tons	Prospective Tons	Total Tons
Available Ore	1,553,570	36,000	1,589,570
Less 10% Rock and 10% for Loss in Mining	295,178	6,840	302,018
Net Available Ore	1,258,392	29,160	1,287,552

CLIFFS SHAFT MINE
ANNUAL REPORT
YEAR 1929.

4. ESTIMATE OF ORE RESERVES: (Continued)

a. Developed Ore - Bancroft Grade:

Pillars	146,000	Tons
Floors	78,200	"
Total	224,200	"
To Support Surface	99,800	"
Available Ore	124,400	"
Less 10% Rock and 10% for Loss in Mining	23,636	"
Net Total	100,764	"

SUMMARY:

	Developed Tons	Prospective Tons	Total Tons
Available Ore	106,400	18,000	124,400
Less 10% Rock and 10% for Loss in Mining	20,216	3,420	23,636
Net Total	86,184	14,580	100,764

Assumptions:- 8, 9 and 10 cu. ft. equals one ton.
10% deduction for rock.
10% deduction for loss in mining.
Percentage of Bessemer is 0.

The following table shows the ore in sight Jan. 1st; the product for the year; the balance in sight and the new ore developed during the year.

	1927	1928	1929
Estimated Available Ore in Mine Jan. 1st	1,436,000	1,392,000	1,358,000
Production	402,532	391,862	421,314
Balance	1,033,468	1,000,138	936,686
Ore in Mine Dec. 31st	1,392,000	1,358,000	1,388,316
New Ore Developed	358,532	357,862	451,630

Analysis of Ore Reserves:

Run of Mine Ore	Iron	Phos.	Sil.	Mang.	Alum.	Lime	Mag.	Sul.	Ign.	Moist.
Dried	58.30	.100	6.71	.593	2.45	1.69	1.33	.010	2.66	
Natural	57.02	.098	6.56	.580	2.40	1.65	1.30	.010	2.60	2.20

CLIFFS SHAFT MINE
ANNUAL REPORT
YEAR 1929.

5. LABOR AND WAGES:

a. Comments:

(1) Labor:

Labor conditions were most satisfactory during the year, good men being available at any time. However, as is common in all our mines, a great many men leave in November to go deer hunting.

b. Comparative Statement of Wages and Product:

	1929	1928	Increase	Decrease
PRODUCT	421,314	391,862	29,452	
No. of Shifts & Hours	1-8	1-8		
No. of Days Operated	301	300	1	
AVG. NO. OF MEN WORKING:				
Surface	64	61	3	
Underground	234	224	10	
Total	298	285	13	

Year	Surface	Underground	Total
1927	57	220	277
1928	61	224	285
1929	64	234	298

	1929	1928	Increase	Decrease
AVERAGE WAGES PER DAY:				
Surface	4.39	4.40		.01
Underground	4.95	5.00		.05
Total	4.83	4.86		.03
WAGES PER MO. OF 25 DAYS:				
Surface	109.75	110.00		.25
Underground	123.75	125.00		1.25
Total	120.75	121.50		.75
PRODUCT PER MAN PER DAY:				
Surface	20.67	20.53	.14	
Underground	5.86	5.80	.06	
Total	4.56	4.52	.04	

Year	Surface	Underground	Total
1925	18.32	5.91	4.47
1926	19.37	5.91	4.53
1927	22.00	6.19	4.85
1928	20.53	5.80	4.52
1929	20.67	5.86	4.56

	1929	1928	Increase	Decrease
LABOR COST PER TON:				
Surface	.213	.214		.001
Underground	.843	.861		.018
Total	1.056	1.075		.019

CLIFFS SHAFT MINE
ANNUAL REPORT
YEAR 1929.

5. LABOR AND WAGES: (Continued)

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

	1929	1928	Increase	Decrease
AVG. PRODUCT STOPING & TRAM'G	9.64	9.24	.40	
AVG. WAGES CONTRACT MINERS	5.35	5.41		.06
AVG. WAGES CONTRACT LABOR	5.37	5.40		.03
TOTAL NUMBER OF DAYS:				
Surface	20,384	19,076 1/4	1,307 3/4	
Underground	71,838 3/4	67,526 2/4	4,312 1/4	
Total	92,222 3/4	86,602 3/4	5,620	
AMOUNT FOR LABOR:				
Surface	89,551.55	84,025.77	5,525.78	
Underground	355,385.51	337,263.24	18,122.27	
Total	444,937.06	421,289.01	23,648.05	

PROPORTION OF SURFACE TO UNDERGROUND MEN:

1924 - 1 to 3.19	1-8 Hr. Shift 5 Days per Week from July 30th.
1925 - 1 to 3.41	1-8 Hr. Shift 5 Days per Week.
1926 - 1 to 3.89	1-8 Hr. Shift 5 Days per Week from Jan. 1st to Oct. 1st. 1-8 Hr. Shift 6 Days per Week Oct. 1st to Dec. 1st. 1-8 Hr. Shift 5 Days per Week Dec. 1st to Dec. 31st.
1927 - 1 to 3.86	1-8 Hr. Shift 5 Days per Week Jan. 1st to April 30th. 1-8 Hr. Shift 6 Days per Week April 30th to Dec. 31st.
1928 - 1 to 3.67	1-8 Hr. Shift 6 Days per Week.
1929 - 1 to 3.66	1-8 Hr. Shift 6 Days per Week.

6. SURFACE:

a. Buildings and Repairs:

Dry:
An extension was built at the dry to house the fuse cutter. The dry was thoroughly cleaned, the vermin exterminated and the interior painted.

Shop:
A new drill puncher was purchased for the drill shop.

Warehouse:
A concrete platform was built in front of the warehouse and an elevated runway for repairing trucks and automobiles was finished near the storage warehouse.

Coal Dock:
Another section of the coal dock roof was repaired.

Gravel Pit:
Late in the fall considerable stripping was done on both sides of the gravel pit, and a large yardage of gravel is now available for next season.

CLIFFS SHAFT MINE
ANNUAL REPORT
YEAR 1929.

6. SURFACE:
(Continued)

b. Stockpiles:

All the piles were cleaned up, including an old pile, that was accumulated when Captain Sedgwick was in charge of operations.

7. UNDERGROUND:

b. Development:

As new ore can only be added to the ore reserves by speeding up development work, three portable scraper-slides were purchased to be used on motor haulage levels. Also scrapers are used wherever possible in the advancing stopes.

The average classification of contracts for the past year follows:-

Developing New Ore	27	Contracts
Mining Known Reserves	31	"
Rock	10	"
Total	68	"

Another way to classify these same contracts is to show what kind of mining they were doing, viz:-

Mining Floors	23	Contracts
Stoping	26	"
Drifting and Raising	19	"
Total	68	"

Bancroft Vein:

First Level "A" Shaft:

Contract No. 34 drove two headings of stoping width east parallel to the south boundary of the Bancroft Lease. The south stope followed the boundary on the right rib and indications are favorable that the ore will continue east to Diamond-Drill Hole No. 1010. The north stope is separated from the other by a horse of rock, and near the end of the year jasper began to show up on the north side of the breast, throwing the ore further south.

Second Level "A" Shaft:

500 feet northeast of the shaft, No. 34 stoped northeast, following along the line of Diamond-Drill Hole No. 373. The stope extended about 150 feet, the contact on the left side being a dike. On the right side they followed the mixed ore and dike shown in the drill-hole. The ore pinched out at the 1150 east coordinate line, and the contract drifted east through slate and dike and encountered a small bunch of ore. The last two months in the year, the drift was turned north, going through slate and dike, looking for the upward extension of No. 29's and No. 30's ore on the third level.

Directly north of "A" shaft, a small drift was driven north, to provide room for a raise and chute for No. 34's stope on the first level.

CLIFFS SHAFT MINE
ANNUAL REPORT
YEAR 1929.

7. UNDERGROUND:
(Continued)

b. Development: (Continued)

Bancroft Vein:

Third Level "A" Shaft:

A good sized territory was opened up in 1929 700 feet northeast of "A" shaft. Two gangs, No. 29 and No. 30, developed a block of ore, 200 feet east and west, and 100 feet north and south. Farther north a drift was driven close to the 1200 east coordinate line. This drift, 175 feet in length, developed three new lenses of ore.

Fourth Level "A" Shaft:

The only work done in the Bancroft territory consisted of a small stope, close to the 1300 east coordinate line, which was opened by No. 22 for the purpose of providing room for two or three new raises to come up under No. 29 and No. 30 on the third level.

Fifth Level "A" Shaft:

A short exploratory drift was driven northeast from the end of the rock drift that runs parallel to the south boundary line. The drift found nothing but slate.

Sixth Level "A" Shaft:

Between the 1800 and 2000 east coordinate lines, No. 54 drove west, taking a full 25 ft. width, and then turned two stopes to the south, stopping at the boundary, and leaving adequate pillars to support the hanging.

In the southeast corner of the Bancroft Lease, No. 52 connected the old Cliffs Shaft workings with the Bancroft Lens. A little farther east, a short drift was driven north in ore, from the end of which a raise was put up to the east by No. 61, to enable us to take out the ore above the fifth level.

Seventh Level "A" Shaft:

In the west end of the Bancroft Lens, two raises were holed from the eighth to the seventh level by No. 51. In the central portion of the deposit, No. 16 opened up a nice sub above the sill floor. A little east of No. 16, No. 54 extended the limits of their sub west towards Diamond-Drill Hole No. 384. In the east end, three small new areas were added onto the north side of the Bancroft Lens.

Eighth Level "A" Shaft:

This level has been somewhat of a disappointment, because Diamond-Drill Holes No. 380, No. 381, No. 385, No. 386 and No. 396 showed what was apparently a strong lens 1000 feet long, but the development work to date in four different areas has shown the lens to be disconnected. In the extreme west end, No. 61 found a nice stope, but it had no continuity with that 250 feet farther east. No. 10, exploring near Diamond-Drill Hole No. 386, could only trace the ore to the east, while No. 66, 300 feet still farther east, has found but a small stoping area to date.

CLIFFS SHAFT MINE
ANNUAL REPORT
YEAR 1929.

7. UNDERGROUND:
(Continued)

b. Development: (Continued)

Bancroft Vein:

Tenth Level "A" Shaft:

Although the eighth level showed but little ore, the tenth level cross-cut was started north from the old workings in the North Vein. The drift, following the 2200 east coordinate line approximately, went north through dike and several small stringers of ore for 400 feet before cutting the main Bancroft Lens. By the end of the year a nice stope about 50 feet long had been opened up. The ore seems to be widest in the sill floor, being 65 feet from foot to hanging.

North Vein:

Fifth Level "A" Shaft:

600 feet northwest of the shaft, No. 30 contract opened up a fine stope of ore 100 feet long, which we feel sure extends up to the third level and down to the seventh level.

In the extreme northeast corner of the level in Cliffs Shaft territory, just outside the Bancroft Lease, No. 32 and No. 51 have developed a very fine body of ore. The ore has been explored 250 feet east and west and 200 feet north and south.

Sixth Level "A" Shaft:

Quite an extensive area was rigorously developed in the northeast corner of the level. Close to the fault on the 400 south coordinate line, No. 8 opened up a stope 200 feet long. Northwest of them, No. 23 followed an inclined lens, which looked the best at the close of the year. A little farther to the east, several small lenses were discovered, and later, No. 28 drifted north to find the ore cut in Diamond-Drill Hole No. 406.

Eighth Level "A" Shaft:

2200 feet east of "A" shaft, No. 44 drove their stope east. The ore was mixed, but was fairly clean on the north side of the stope. This lens is in line with the old No. 3 Mine workings and conditions are favorable for developing a good tonnage in this area.

Ninth Level "A" Shaft:

2000 feet east of "A" shaft, a narrow lens of ore was followed northeast for 75 feet. Drifting was continued east and southeast, looking for No. 44's ore developed on the eighth level.

South East Lens:

Fifth Level "A" Shaft:

Drifting in rock was started late in the year along the hanging in the southeast corner of the level, but no ore had been found by the end of the year.

CLIFFS SHAFT MINE
ANNUAL REPORT
YEAR 1929.

7. UNDERGROUND:
(Continued)

b. Development: (Continued)

South East Lens:

Eighth Level "A" Shaft:

No. 41, 1000 feet southeast of "A" shaft, has found what promises to be a fine lens of ore. They started in the spring to follow a leader and after many discouragements finally cut a lens over 50 feet wide of very good ore. We know nothing of its lateral extent.

In the extreme east end of the Southeast Lens, a short cross-cut was driven in ore from the south to the north branch of the lens.

Tenth Level "A" Shaft:

The limits of the stope, 1800 feet southeast of the shaft, were extended west and northwest.

Eleventh Level "A" Shaft:

After the ore had been found by diamond-drilling, No. 3 started to drift southeast from the old workings, 1600 feet east of "A" shaft. After driving 250 feet in dike, the ore was found and a nice stope was started late in the year.

South Lens:

First Level "B" Shaft:

Three contracts, Nos. 1, 35 and 63, have developed a fine lens of ore approximately 175 feet square, 1200 feet southeast of "B" shaft.

Third Level "B" Shaft:

We have started drifting south near the 800 east coordinate line to undercut the ore found by Nos. 1, 35 and 63 on the first level.

North Lens:

Sixth Level "B" Shaft:

800 feet northwest of "B" shaft, No. 37 has been following a narrow lens east and west for 100 feet along a dike.

Seventh Level "B" Shaft:

No. 49, working about 500 feet northeast of "B" shaft, drifted northeast for a little over 100 feet through dike and then cut a narrow but fine lens of ore, which they have followed for 75 feet.

Fault Vein:

Ninth Level "B" Shaft:

Contract No. 14 opened up a small stope in the ore found by Diamond-Drill Hole No. 357, 1400 feet southwest of "B" shaft.

In the east end of this vein, No. 38 extended the limits of their stope east over the back of the old main level drift, 800 feet west of "B" shaft.

CLIFFS SHAFT MINE
ANNUAL REPORT
YEAR 1929.

7. UNDERGROUND:
(Continued)

b. Development: (Continued)

Fault Vein:

Thirteenth Level "B" Shaft:

After drifting for months in very hard jasper, No. 48 finally reached the ore found in Diamond-Drill Hole No. 317, and by the end of the year had opened up a stope 60 feet long. The ore pitches very flat to the west and does not run east of the diamond-drill hole.

c. Stoping:

"A" Shaft:

First Level - Main Vein:

600 feet northwest of the shaft, No. 9 and No. 27 mined floors and backs. The latter gang also drove cross-cuts through an old pillar on the second level, close to the 400 east coordinate line.

Fifth Level - North Vein:

800 feet northwest of "A" shaft, No. 42 mined the fifth level floor in the stope parallel to the 200 east coordinate and also took floors for 50 feet farther west in the old stope.

Fifth Level - South-East Lens:

Nos. 2, 4 and 6 pretty well cleaned out the ore left on the sub above the fifth level, parallel and close to the south boundary line. These three contracts worked along the boundary for 1000 feet.

Sixth Level - North Vein:

No. 62 took out the floor to the seventh level in the extreme west end of the vein.

Sixth Level - South-East Lens:

Contract No. 6 started mining the sixth level floor on both sides of the 1800 east coordinate line. 800 feet farther east, No. 45 took out a small piece of floor below the level.

Seventh Level - North Vein:

In the west end of the vein, 900 feet northeast of "A" shaft, No. 20 opened up a sub-level stope nearly 200 feet long east and west and 125 feet north and south.

A short distance northeast of No. 20, No. 59 took out floors.

Seventh Level - Main Vein:

On the south side of the Main Vein close to the 400 south coordinate line, No. 5 took out a piece of floor at least 200 feet long.

Seventh Level - South-East Lens:

No. 45, after holing two raises from the level below, stoped around these raises, 1800 feet southeast of "A" shaft.

CLIFFS SHAFT MINE
ANNUAL REPORT
YEAR 1929.

7. UNDERGROUND:
(Continued)

c. Stoping: (Continued)

"A" Shaft:

Ninth Level - Main Vein:

Five contracts did retreating work during the year in the Main Vein, that is, they mined out known ore-bodies. 900 feet east of "A" shaft, No. 55 extended their sub-level stope south and west. Just to the north, No. 24 took out a section of the ninth level floor. 200 feet farther east, Nos. 39 and 60, mined floors between the 2000 and 2200 east coordinate lines. 1600 feet east of the shaft, No. 50 also took out a part of the ninth level floor, while No. 70, 400 feet still farther east, mined an area 80 feet long and 50 feet wide between the eighth and ninth levels.

Tenth Level - Main Vein:

On the 730 foot sub above the tenth level, 1100 feet east of "A" shaft, No. 7 extended the limits of their sub-level both north and east.

Continuing east we find Nos. 39, 21, 11 and 26, all mining in the Main Vein about 200 feet apart. No. 39 stoped east on a sub towards No. 21. The latter gang is not only extending their stope to the north, but also up an incline to the south, and there is every reason to believe that they will connect their workings with No. 11 to the east. This contract found a nice body of ore on the south side of the main level drift, which they have developed by two parallel inclined stopes. Between the 2600 and 2800 east coordinate lines, No. 26 stoped west on their sub-level above the sill floor. This stope turns out a high grade steel ore.

Eleventh Level - Main Vein:

A small stope was opened up on Diamond-Drill Hole No. 328 and in the extreme northeast corner of the level the main stope was extended a short distance to the east.

"B" Shaft:

First Level - Main Vein:

In the Main Vein on the subs above the sill floor, Nos. 17, 18 and 58 have been taking out known reserves. All of these contracts were mining a short distance south of "B" shaft. 500 feet southeast of the shaft on the first level elevation, No. 35 has been breast stoping.

Sixth Level:

No. 13 contract mined floors 300 feet northwest of "B" shaft, while No. 40, 400 feet northeast of the shaft, stoped around their raise coming up from the eighth level.

Seventh Level:

Contract No. 36, working in opposite ends of the Main Vein tributary to "B" shaft, took out sections of floors at least 400 feet in length along the strike.

Eighth Level:

On this level, 1400 feet southwest of "B" shaft, Nos. 19 and 68 have been taking backs and floors.

CLIFFS SHAFT MINE
ANNUAL REPORT
YEAR 1929.

7. UNDERGROUND:
(Continued)

c. Stoping: (Continued)

"B" Shaft:

Twelfth Level:

No. 31, 1000 feet west of "B" shaft, breasted northeast and southwest on the sub above the level for a distance of 180 feet. 500 feet farther west, all the remaining floor that could be mined in the extreme west end of the level was taken out.

Thirteenth Level:

There were five contracts doing retreating work, that is, mining known ore areas in the Main Vein. Nos. 43, 46, 47 and 33 were scattered from east to west along the south contact. No. 48 took floors in the northeast corner of the deposit.

The tons per man per day stoping for the past few years is given for comparison:-

Year	Tons Per Man Stoping
1929	22.41
1928	21.10
1927	21.63
1926	20.93
1925	20.44
1924	16.30
1923	17.26
1922	16.49
1921	15.26
1920	13.95

As the scraping units were installed the tons per man per day stoping increased.

e. Drifting and Raising:

The drifting and raising done for the past four years follows:-

Year	Rock Drifting	Ore Drifting	Rock Raising	Ore Raising	Total
1929	4414'	1356'	1029'	1726'	8525'
1928	3595'	695'	1167'	1153'	6610'
1927	3784'	868'	1090'	1626'	7368'
1926	1561'	628'	1490'	2279'	5958'

The following table gives detailed comparisons for 1928 and 1929:-

	1929		1928	
	Feet	Cost	Feet	Cost
Rock Drifting	4414	7.38	3595	7.84
Rock Raising	1029	7.69	1167	7.65
Ore Drifting	1356	7.69	695	7.51
Ore Raising	1726	7.65	1153	7.63
Total	8525		6610	

CLIFFS SHAFT MINE
ANNUAL REPORT
YEAR 1929.

7. UNDERGROUND:
(Continued)

f. Explosives, Drilling and Blasting:

Explosives Statement for 1929:

Developing Ore and Stoping:

Kind	Quantity	Average Price	Amount 1929	Amount 1928
50% L.F. Powder	236,100	.1275	30,102.73	15,604.00
60% L.F. Powder	76,810	.1375	10,561.38	7,196.50
Hercomite No. 3	9,800	.1275	1,249.50	18,328.75
E.P. 23	4,250	.1275	541.88	2,882.25
Total Powder	326,960	.1298	42,455.49	44,011.50
Fuse	436,070	5.775	2,518.28	2,655.38
Caps	96,200	11.686	1,124.21	1,180.68
Crimpers	10	.662	6.62	15.35
Fuse Boxes	100	1.40	140.00	
Total Fuse, Etc.			3,789.11	3,851.41
TOTAL EXPLOSIVES			46,244.60	47,862.91
Product			421,314	391,862
Pounds Powder per Ton of Ore			.7760	.8146
Cost per Ton for Powder			.1008	.1123
Cost per Ton for Fuse, Etc.			.0090	.0098
Cost per Ton for All Explosives			.1098	.1221

Rock Development:

50% L.F. Powder	26,000	3,315.03	892.25
60% L.F. Powder	64,090	8,812.38	2,724.00
Hercomite No. 3	4,900	624.76	4,538.25
E.P. 23			189.00
Total Powder	94,990	12,752.17	8,343.50
Fuse	157,430	909.17	772.13
Caps	29,700	345.27	153.38
Crimpers			3.98
Total Fuse, Etc.		1,254.44	929.49
TOTAL EXPLOSIVES - ROCK DEVELOPMENT		14,006.61	9,272.99
TOTAL EXPLOSIVES USED IN MINE		60,251.21	57,135.90
AVERAGE PRICE PER POUND FOR POWDER		.1308	.1383

CLIFFS SHAFT MINE
ANNUAL REPORT
YEAR 1929.

8. COST OF OPERATING:

a. Comparative Mining Costs:

	1929	1928	Increase	Decrease
PRODUCT	421,314	391,862	29,452	
Underground Costs	1.485	1.451	.034	
Surface Costs	.180	.201		.021
General Mine Accounts	.090	.083	.007	
Cost of Production	1.755	1.735	.020	
Depreciation				
Plant & Equipment	.051	.051		
Movable Equipment	.001	.003		.002
Taxes	.303	.276	.027	
Central Office	.098	.116		.018
Welfare, Safety, Hospital, Etc.	.044	.042	.002	
Obsolete Equipment	.001		.001	
Cost on Stockpile	2.254	2.223	.031	
Loading and Shipping	.040	.035	.005	
Total Cost on Cars	2.294	2.258	.036	
No. of Days Operated	301	300	1	
No. of Shifts and Hours	1-8	1-8		
Average Daily Product	1400	1306	94	
COST OF PRODUCTION:				
Labor	1.065	1.085		.020
Supplies	.690	.650	.040	
Total	1.755	1.735	.020	

b. Detailed Cost Comparison:

ACCOUNT
EXPLORING IN MINE:

	Amount	Per Ton
Year 1929	$ 5,757.43	$ .014
Year 1928	9,066.20	.023
Decrease	$ 3,308.77	$ .009

3174 feet of diamond-drill holes drilled at a cost of $ 2.82 per foot in 1928. The footage drilled in 1929 totaled 1805 feet and the cost per unit was $ 3.189.

ACCOUNT
DEVELOPMENT IN ROCK:

	Amount	Per Ton
Year 1929	$ 61,220.13	$ .145
Year 1928	55,480.97	.141
Increase	$ 5,739.16	$ .004

	1929	1928	1927
Development in Rock Feet	5443	4762	4454
Cost per Foot	$ 11.25	$ 11.65	$ 12.32

The cost per foot shows a small decrease in 1929, but the total cost increased because of additional footage driven.

CLIFFS SHAFT MINE
ANNUAL REPORT
YEAR 1929.

8. COST OF OPERATING: (Continued)

ACCOUNT
DEVELOPMENT IN ORE:

	Amount	Per Ton
Year 1929	$ 28,405.36	$ .067
Year 1928	17,774.58	.046
Increase	$ 10,630.78	$ .021

The increase is accounted for by the amount of drifting and raising done in 1929 compared with 1928.

	1929	1928
Ore Drifting	1356'	695'
Ore Raising	1726'	1153'
Total	3082'	1848'

ACCOUNT
STOPING:

	Amount	Per Ton
Year 1929	$ 158,430.55	$ .376
Year 1928	165,333.21	.422
Decrease	$ 6,902.66	$ .046

There were more gangs on ore development in 1929 than in 1928, and as the number of contracts in the mine did not vary much during the year, the number of days stoping for 1929 was 17,416 compared with 17,533 in 1928. The balance of the decrease was in the supplies charged to this account, the amount of repair-parts for drilling machines and the cost for explosives being considerably less for 1929.

Explosives for 1929	$ 37,049.48
Explosives for 1928	43,984.20
Machinery Supplies for 1929	9,531.51
Machinery Supplies for 1928	10,397.59

ACCOUNT
TIMBERING:

	Amount	Per Ton
Year 1929	$ 13,898.86	$ .033
Year 1928	9,787.43	.025
Increase	$ 4,111.43	$ .008

A large number of new chutes were built underground in 1929. By increasing the number of scraping units, we require more raises to scrape the ore into, and each raise must be equipped with a chute and stoppers.

CLIFFS SHAFT MINE
ANNUAL REPORT
YEAR 1929.

8. COST OF OPERATING: (Continued)

ACCOUNT
TRAMMING:

	Amount	Per Ton
Year 1929	$ 156,577.28	$ .372
Year 1928	149,519.12	.382
Increase	$ 7,058.16	
Decrease		$ .010

Cost increased 4%, due to more labor required to handle increased tonnage.

ACCOUNT
PUMPING:

	Amount	Per Ton
Year 1929	$ 30,709.76	$ .073
Year 1928	30,732.56	.078
Decrease	$ 22.80	$ .005

Gallons water pumped in 1929 - 461,403,025.
Gallons water pumped in 1928 - 463,182,750.

The expense for the two years is just about the same, because approximately the same amount of water was pumped.

ACCOUNT
COMPRESSORS & AIR PIPES:

	Amount	Per Ton
Year 1929	$ 40,149.37	$ .095
Year 1928	36,304.23	.093
Increase	$ 3,845.14	$ .002

Cu. ft. of air compressed in 1929 - 853,752,500.
Cu. ft. of air compressed in 1928 - 804,600,000.

The detail for the two years follows:-

	Labor	YEAR 1929 Supplies	Total
Compressors	$ 4,050.55	$ 28,763.35	$ 32,813.90
Air Pipes	3,462.79	3,872.68	7,335.47
Total	$ 7,513.34	$ 32,636.03	$ 40,149.37

	Labor	YEAR 1928 Supplies	Total
Compressors	$ 4,058.82	$ 26,816.74	$ 30,875.56
Air Pipes	2,395.80	3,032.87	5,428.67
Total	$ 6,454.62	$ 29,849.61	$ 36,304.23

More electric power required for compressing air in 1929. Increased extensions to air lines because of additional footage driven in 1929.

CLIFFS SHAFT MINE
ANNUAL REPORT
YEAR 1929.

8. COST OF OPERATING: (Continued)

ACCOUNT
BACK FILLING:

	Amount	Per Ton
Year 1929	$ 11,449.00	$ .027
Year 1928	11,911.00	.030
Decrease	$ 462.00	$ .003

Less labor required in 1929 to handle rock dumped into old stopes on the top levels.

ACCOUNT
UNDERGROUND SUPERINTENDENCE:

	Amount	Per Ton
Year 1929	$ 18,568.34	$ .044
Year 1928	17,833.14	.046
Increase	$ 735.20	
Decrease		$ .002

Increased because of overtime worked by shift-bosses when ore is hoisted between 5:00 P.M. and 7:00 P.M.

ACCOUNT
COMPRESSORS & POWER DRILLS:

	Amount	Per Ton
Year 1929	$ 12,861.90	$ .030
Year 1928	4,072.86	.010
Increase	$ 8,789.04	$ .020

The detail cost follows:-

	1929	1928
Compressors	$ 170.60	$ 221.21
Power Drills	12,691.30	3,851.65
Total	$ 12,861.90	$ 4,072.86

Large increase due to purchasing new drilling machines and discarding old Cleveland D5's and I.R. 248's. In 1928 two Jackhammers, two Stopers and twelve Drifters were charged out. In 1929 six Jackhammers and thirty-three Drifting Machines were purchased.

ACCOUNT
HAND TRAMMING EQUIPMENT:

	Amount	Per Ton
Year 1929	$ 51,494.74	$ .122
Year 1928	35,104.55	.090
Increase	$ 16,390.19	$ .032

The principal supply items making up the increase in the above costs for the past year as compared with 1928 are as follows:-

CLIFFS SHAFT MINE
ANNUAL REPORT
YEAR 1929.

8. COST OF OPERATING: (Continued)

ACCOUNT
HAND TRAMMING EQUIPMENT: (Continued)

	1928	1929
5/8" Wire Rope	$ 4,647.92	$ 5,980.68
Scraper-Hoists	2,352.04	11,481.21
Scraper-Slides		2,570.31
Cable		1,079.37
Total	$ 6,999.96	$ 21,111.57

ACCOUNT
ELECTRIC TRAM EQUIPMENT:

	Amount	Per Ton
Year 1929	$ 34,383.21	$ .082
Year 1928	24,906.02	.063
Increase	$ 9,477.19	$ .019

Following is the detail explaining the increase:-

	1929	1928
Generators	$ 921.86	$ 1,409.53
Locomotives	9,256.46	9,292.68
Wiring	5,120.25	2,805.89
Main Line Tracks	8,428.23	4,507.11
Main Line Cars	10,614.20	6,855.10
Spotting Engines	42.21	35.71
Total	$ 34,383.21	$ 24,906.02

Increase due to extending main motor track from the fifth level in "B" shaft to the fifth level in "A" shaft, purchasing new five-ton cars and bonding rails on the 5th, 8th, 10th and 15th levels.

ACCOUNT
PUMPING MACHINERY:

	Amount	Per Ton
Year 1929	$ 1,592.44	$ .004
Year 1928	894.73	.002
Increase	$ 697.71	$ .002

Purchased new water cylinder and gate valves for fifteenth level pumps in 1929.

ACCOUNT
HOISTING:

	Amount	Per Ton
Year 1929	$ 20,539.85	$ .049
Year 1928	19,128.88	.049
Increase	$ 1,410.97	$ .000

Increase of $ 319 in labor for hoisting engineers and $ 935 more for electric power in 1929, because of hoisting additional tonnage.

8. COST OF OPERATING: (Continued)

ACCOUNT
STOCKING ORE:

		Amount	Per Ton
Year 1929	$	7,863.57	$ .019
Year 1928		9,934.47	.025
Decrease	$	2,070.90	$ .006

Decreased because expense of loading and hauling snow off the stocking grounds was less in 1929.

ACCOUNT
SCREENING-CRUSHING AT MINE:

		Amount	Per Ton
Year 1929	$	15,664.61	$ .037
Year 1928		15,222.67	.039
Increase	$	441.94	
Decrease			$ .002

Increased because of larger tonnage handled by crushing plant.

ACCOUNT
DRY HOUSE:

		Amount	Per Ton
Year 1929	$	8,190.75	$ .019
Year 1928		8,801.85	.022
Decrease	$	611.10	$ .003

Decrease due to less coal burned in boiler plant.

ACCOUNT
GENERAL SURFACE EXPENSE:

		Amount	Per Ton
Year 1929	$	9,630.66	$ .023
Year 1928		9,677.04	.025
Decrease	$	46.38	$ .002

Small decrease for 1929.

ACCOUNT
HOISTING EQUIPMENT:

		Amount	Per Ton
Year 1929	$	6,749.19	$ .016
Year 1928		8,374.40	.021
Decrease	$	1,625.21	$ .005

Approximately $ 1000 was expended repairing hoist motor in 1928. Also a decrease of $ 1355 for wire-rope. These decreases are partially offset by extensive repairs to skips. All three skips were entirely rebuilt and made longer to prevent spillage down the shafts.

8. COST OF OPERATING: (Continued)

ACCOUNT
SHAFT:

		Amount	Per Ton
Year 1929	$	1,823.56	$ .005
Year 1928		1,283.92	.003
Increase	$	539.64	$ .002

In 1929 the cost of the timber for repairing the top portion of "A" shaft was charged out. Also repairs were made on the storage pockets at the shaft on the fifth level both in "A" and "B" shafts.

ACCOUNT
TOP TRAM EQUIPMENT:

		Amount	Per Ton
Year 1929	$	1,325.91	$ .003
Year 1928		1,021.45	.002
Increase	$	304.46	$ .001

Increased because of repairs to top-tram cars.

ACCOUNT
DOCKS, TRESTLES & POCKETS:

		Amount	Per Ton
Year 1929	$	1,789.87	$ .004
Year 1928		1,372.47	.003
Increase	$	417.40	$ .001

The pockets in the crusher building were lined with manganese plates during the past year.

ACCOUNT
MINE BUILDINGS:

		Amount	Per Ton
Year 1929	$	2,302.87	$ .005
Year 1928		3,899.55	.010
Decrease	$	1,596.68	$ .005

The detailed cost for maintaining the buildings around the mine for the past two years was as follows:-

	1928	1929
Office	$ 197.80	$ 219.51
Warehouse		43.59
Shops	1,159.40	249.59
Shaft-Houses	33.76	80.08
Engine-House	893.63	182.89
Dry-House	672.19	680.43
Coal Dock	441.33	
Miscellaneous	501.44	846.78
Total	$ 3,899.55	$ 2,302.87

8. COST OF OPERATING: (Continued)

ACCOUNT
INSURANCE:

		Amount	Per Ton
Year 1929	$	116.82	$ .000
Year 1928		133.80	.000
Decrease	$	16.98	$ .000

Small decrease.

ACCOUNT
ENGINEERING:

		Amount	Per Ton
Year 1929	$	3,066.40	$ .007
Year 1928		2,518.09	.007
Increase	$	548.31	$ .000

More engineering and geological supervision because surveys of the mine were made at regular intervals.

ACCOUNT
ANALYSIS:

		Amount	Per Ton
Year 1929	$	3,278.24	$ .008
Year 1928		3,275.06	.009
Increase	$	3.18	
Decrease			$ .001

Small increase.

ACCOUNT
PERSONAL INJURY EXPENSE:

		Amount	Per Ton
Year 1929	$	9,234.63	$ .022
Year 1928		8,710.57	.022
Increase	$	524.06	$ .000

Increased because of larger pay-roll in 1929. Two per cent of pay-roll charged to this account each month.

ACCOUNT
SAFETY DEPARTMENT EXPENSE:

		Amount	Per Ton
Year 1929	$	103.79	$ .000
Year 1928		151.11	.000
Decrease	$	47.32	$ .000

A smaller amount of first aid supplies purchased in 1929.

8. COST OF OPERATING: (Continued)

ACCOUNT
TELEPHONES & SAFETY DEVICES:

		Amount	Per Ton
Year 1929	$	5,568.38	$ .013
Year 1928		3,549.17	.009
Increase	$	2,019.21	$ .004

Increase in cost due to charging off gloves, goggles and deficit on hard hats.

ACCOUNT
LOCAL GENERAL WELFARE:

		Amount	Per Ton
Year 1929	$	774.11	$ .002
Year 1928		1,126.18	.003
Decrease	$	352.07	$ .001

Central Office charge.

ACCOUNT
SPECIAL EXPENSES:

		Amount	Per Ton
Year 1929	$	104.89	$ .000
Year 1928		24.38	.000
Increase	$	80.51	$ .000

Central Office charge.

ACCOUNT
MINE OFFICE:

		Amount	Per Ton
Year 1929	$	13,140.81	$ .032
Year 1928		12,983.92	.033
Increase	$	156.89	
Decrease			$ .001

New typewriter purchased in 1929. Oil heater for the office sent to factory for repairs.

ACCOUNT
SAFETY EXPENSE:

		Amount	Per Ton
Year 1929	$	2,351.20	$ .006
Year 1928			
Increase	$	2,351.20	$ .006

The above is a proportion of the Company's Mining Department Labor Day Safety Picnic.

CLIFFS SHAFT MINE
ANNUAL REPORT
YEAR 1929.

9. EXPLORATIONS AND FUTURE EXPLORATIONS:

a. Diamond Drilling:

Twelve holes were drilled during the year for a total of 1805 feet. The drill crew worked at the Holmes Mine part of the year and were brought back to the Cliffs Shaft property to drill holes from the eighth level drift to the sixth level or bottom of old No. 3 Mine. Three holes were drilled through to the old drift and by the end of the year the water in the old No. 3 Mine had been lowered about eighteen feet.

The drift going to Section 3 was started up late in the year, the objective point being 4200 feet from "B" shaft.

The drilling in detail follows:-

Hole No. 398. 7th Level "A" Shaft. Bottomed at 217'. Drilled through siderite and greenstone.

Hole No. 399. 7th Level "A" Shaft. Drilled 221' deep. Cut 16' of ore near collar.

Hole No. 400. 8th Level "A" Shaft. Drilled through 76' of jasper; 35' of mixed ore; 58' of greenstone and 7' of siderite.

Hole No. 401. 8th Level "A" Shaft. Hole drilled 230' in depth. Nothing but lean ore discovered in this hole.

Hole No. 402. 8th Level "A" Shaft. A shallow hole 105' deep, which discovered no ore.

Hole No. 403. 8th Level "A" Shaft. Drilled through six feet of ore.

Hole No. 404. 8th Level "A" Shaft. A short hole showing up five feet of ore.

Hole No. 405. 8th Level "A" Shaft. Drilled 91' deep through mixed ore, dike and siderite.

Hole No. 406. 6th Level "A" Shaft. Drilled through 175' of dike and slate, then cut 55' of high grade ore and bottomed at 306' in slate.

Hole No. 407. 8th Level "A" Shaft. A short hole, 90' deep, finding only siderite, dike and mixed ore and jasper. Drilled for the purpose of draining No. 3 Mine.

Hole No. 408. 8th Level "A" Shaft. A shallow hole cutting no ore. Drilled for the purpose of draining No. 3 Mine.

Hole No. 409. Another hole headed for the bottom level of No. 3 Mine.

CLIFFS SHAFT MINE
ANNUAL REPORT
YEAR 1929.

10. TAXES:

Taxes levied against the Cliffs Shaft Mine for 1929 and 1928 follow:-

	1929		1928	
	Valuation	Taxes	Valuation	Taxes
Realty	$ 2,708,000	$ 102,728.59	$ 2,580,000	$ 86,142.82
Personal	562,000	21,319.60	573,000	19,131.68
Lot 2, Sec. 3	90,000	3,414.17	90,000	3,004.97
Lot 174	100	3.80	100	3.34
South 35.91 Ft. of Lot 179	50	1.90	50	1.67
Total	$ 3,360,150	$ 127,468.06	$ 3,243,150	$ 108,284.48
Taxes per Ton Produced		$ .302		$ .276
Taxes per Ton Shipped		.249		.278

As both the Cliffs Shaft and Holmes Mines are in the corporate limits of the City of Ishpeming, the following table is of interest in showing the money raised by the municipality.

Taxes Levied and Apportioned by City of Ishpeming:

	1929	1928
State Tax	$ 48,603.56	$ 37,572.17
County Tax	85,896.38	74,037.10
County Road Tax	36,811.32	37,415.81
Highway Fund Tax	55,000.00	58,000.00
Library Fund Tax	12,000.00	10,500.00
Fire Fund Tax	10,000.00	10,000.00
School Tax	145,000.00	140,000.00
One Mill Tax	12,755.76	13,601.62
Sewer Fund Tax	4,000.00	3,500.00
Cemetery Fund Tax	4,000.00	4,000.00
City Tax	65,000.00	61,000.00
Rejected Tax	34.68	14.99
Total Tax	$ 479,101.70	$ 449,641.69
Total Tax Paid by Mining Department	$ 177,775.43	$ 163,981.02
Assessed Valuation	$ 12,755,761.00	$ 13,601,620.00
Tax Rate	$ 3.756	$ 3.338

CLIFFS SHAFT MINE
ANNUAL REPORT
YEAR 1929.

11. ACCIDENTS AND PERSONAL INJURY:

The Cliffs Shaft property had a very favorable accident record in 1929, the severity rate being as low as the best rate established by a soft ore property. The rate for the past three years was as follows:-

1927 - 10.4 Days Lost per 1000 Days Worked.
1928 - 9.9 " " " " " " .
1929 - 6.9 " " " " " " .

The number of accidents reported to the Safety Department for 1929 and 1928 can be compared from the following table:-

	1929	1928
No Lost Time Accidents	62	45
Compensable Accidents	17	20
No Compensation Accidents	8	9

13. NEW EQUIPMENT:

a. Scraper-Slides:

Two portable scraper-slides were added during the year for use on the motor haulage levels.

b. Scraper-Hoists:

New scraping units were added to the underground equipment during the year. Ten new 25 H.P. units were put into service in 1929 and five more ordered.

18. NATIONALITY OF EMPLOYEES:

Americans	28
English	42
Irish	10
French	19
Finnish	96
Scandanavians	82
Germans	4
Italians	17
Total	298

CJS:AS

CHARLES J. STAKEL, SUPERINTENDENT.

HOLMES MINE

ANNUAL REPORT

YEAR 1929.

1. GENERAL:

The Holmes Mine was operated five days a week until April 13th, when the six day a week schedule was started which continued on to the end of the year. As a result, production was increased with consequent reduction in costs.

Development work was continued, and, as a result, the fifth level, and the 125 foot sub, halfway between the fourth and fifth levels, were completely developed. A diamond drill campaign was also carried on to determine if there was any ore faulted below the fifth level. The lenses discovered were very small. There were, however, approximately 80,000 tons of new ore added to the ore reserves.

2. PRODUCTION, SHIPMENTS & INVENTORIES:

a. Production by Grades for 1929:

Grade	Tons	Per Cent
Holmes Lump	25,073	12.62
Holmes Crushed	33,521	16.83
Junction Bessemer	44,063	22.15
Junction	96,204	48.40
Total	198,861	100.00

Comparative Statement Showing Production by Years:

Grade	1926	1927	1928	1929
Holmes Lump	16,249	25,083	24,281	25,073
Holmes Crushed	34,286	38,718	33,220	33,521
Holmes Bessemer	11,264		2,446	
Junction Bessemer	40,396	44,332	35,416	44,008
Junction	70,033	68,361	75,833	96,259
Total	172,228	176,494	171,196	198,861

b. Shipments:

Grade		
Holmes Lump	38,150	Tons
Holmes Crushed	57,345	"
Junction Bessemer	46,020	"
Junction	211,907	"
Total	353,422	"

Shipments for 1929 as compared with previous years follows:-

Grade	1929	1928	1927	1926
Holmes Bessemer		19,811	26,173	20,580
Holmes Lump	38,150	18,923	17,580	13,526
Holmes Crushed	57,345	37,437	25,836	49,894
Junction Bessemer	46,020	43,960	47,666	59,562
Junction	211,907	61,156	51,269	216,933
Total	353,422	181,287	168,524	360,495

HOLMES MINE
ANNUAL REPORT
YEAR 1929.

2. PRODUCTION, SHIPMENTS & INVENTORIES: (Continued)

Shipments from Pocket and Stockpile for 1929 follow:

Grade	Pocket Tons	Stockpile Tons	Total Tons	Last Year Total Tons
Holmes Bessemer Crushed				19,811
Holmes Lump	18,407	19,743	38,150	18,923
Holmes Crushed	24,425	32,920	57,345	37,437
Junction Bessemer	25,784	20,236	46,020	43,960
Junction	63,856	148,051	211,907	61,156
Total	132,472	220,950	353,422	181,287
Total Last Year	66,360	114,927	181,287	
Increase in Shipments	66,112	106,023	172,135	

1928 - 1 - 8 Hr. Shift 5 Days per Week Jan. 1st - Dec. 31st.
1929 - 1 - 8 Hr. Shift 5 Days per Week Jan. 1st - April 13th.
1929 - 1 - 8 Hr. Shift 6 Days per Week Apr. 13th - Dec. 31st.

The destination of the ores forwarded in 1929 was as follows:-

L.S. & I. Dock	347,683	Tons
C. & N.W. Dock	1,774	"
L.S. & I. All Rail to Wells Furnace	3,965	"
Total	353,422	"

c. Stockpile Inventories:

Grade	Tons
Holmes Lump	2,507
Holmes Crushed	2,865
Junction Bessemer	5,600
Junction	9,834
Total	20,806

Analysis of Ore in Stock, December 31st, 1929:

Grade	Tons	Iron	Phos.	Sil.	Moist.
Holmes Lump	2,507	62.38	.069	6.60	1.25
Holmes Crushed	2,865	61.47	.071	5.60	4.50
Junction Bessemer	5,600	62.60	.036	4.84	9.00
Junction	9,834	58.74	.086	7.33	9.40
Total	20,806				

The following table gives the balances on hand for previous years:-

Year 1925	304,330	Tons
Year 1926	135,193	"
Year 1927	143,163	"
Year 1928	145,663	"
Year 1929	20,806	"

HOLMES MINE
ANNUAL REPORT
YEAR 1929.

2. PRODUCTION, SHIPMENTS & INVENTORIES: (Continued)

d. Division of Product by Levels:

Third Level	39,252	Tons
Fourth Level	151,125	"
Fifth Level	8,484	"
Total	198,861	"

e. Production by Months:

Month	Days	Holmes Lump Tons	Holmes Crushed Tons	Junction Bessemer Tons	Junction Tons	Total Tons	Rock Tons
Jan.	23	1,772	2,074	4,108	5,912	13,866	1,512
Feb.	20	1,188	1,699	3,004	6,911	12,802	1,120
March	22	914	1,869	3,520	7,294	13,597	1,172
April	25	1,396	2,228	3,569	9,744	16,937	1,392
May	26	2,317	2,692	4,254	9,265	18,528	868
June	24	2,252	2,773	3,666	7,832	16,523	820
July	26	2,166	2,676	4,945	8,939	18,726	316
August	27	2,942	3,173	4,905	8,731	19,751	272
Sept.	24	2,599	3,404	4,519	7,234	17,756	720
Oct.	27	2,794	4,241	2,837	9,016	18,888	788
Nov.	24	2,629	4,031	2,544	7,543	16,747	564
Dec.	24	2,104	2,661	2,192	7,783	14,740	1,124
Total	292	25,073	33,521	44,063	96,204	198,861	10,668
Stockpile Overruns			11,350	2,160	16,194	29,704	
Year	292	25,073	44,871	46,223	112,398	228,565	10,668

f. Ore Statement:

	Holmes Lump Tons	Holmes Crushed Tons	Junction Bessemer Tons	Junction Tons	Total Tons	Total Last Year
On Hand Jan. 1st	15,584	15,339	5,452	109,288	145,663	143,163
Output for Year	25,073	33,521	44,063	96,204	198,861	171,196
Stockpile Overruns		11,350	2,160	16,194	29,704	12,591
Transfers			55	55		
Total	40,657	60,210	51,620	221,741	374,228	326,950
Shipments	38,150	57,345	46,020	211,907	353,422	181,287
Balance on Hand	2,507	2,865	5,600	9,834	20,806	145,663

g. Delays:

Date	Hours	Cause	Tons Lost
May 15th	1½	No current.	150
June 10th	3	No current.	270
Oct. 1st	4	Solomon Ristimaa's funeral.	350
Nov. 13th	1	No current.	100
Year	9½		870

HOLMES MINE
ANNUAL REPORT
YEAR 1929.

3. ANALYSIS:

a. Average Analysis on Output for Year:

Grade	Iron	Phos.	Silica
Holmes Lump	61.40	.066	5.78
Holmes Crushed	61.84	.069	5.78
Junction Bessemer	61.10	.038	5.76
Junction	58.08	.078	7.77

Average Analysis on Ores Shipped in 1929:

Grade	Iron	Phos.	Sil.	Alum.	Mang.	Lime	Mag.	Sul.	Loss	Moist.
Holmes Lump										
Dried	62.60	.059	6.15	2.61	.06	.28	.27	.014	.80	
Natural	61.82	.058	6.07	2.58	.06	.27	.26	.014	.79	1.25
Holmes Crushed										
Dried	61.90	.065	5.90	3.13	.07	.26	.27	.023	1.20	
Natural	59.12	.062	5.64	3.00	.07	.25	.26	.022	1.15	4.50
Junction Bessemer										
Dried	61.95	.033	5.65	2.94	.07	.25	.25	.012	1.45	
Natural	56.38	.030	5.14	2.68	.06	.23	.23	.011	1.32	9.00
Junction										
Dried	58.00	.080	7.75	3.18	.19	.28	.29	.023	4.65	
Natural	52.55	.073	7.02	2.88	.17	.25	.26	.021	4.21	9.40

b. Average Analysis on Straight Cargoes:

Grade	Mine		Lake Erie	
	Iron	Phos.	Iron	Moisture
Holmes Crushed	62.23	.068	62.42	5.11
Junction	57.30	.079	58.07	9.29

4. ESTIMATE OF ORE RESERVES:

Ore in Sight, December 31st, 1929:

Location of Ore	Hard Ore Tons	Soft Ore Tons	Total Tons
Ore Above Third Level	8,208	55,035	63,243
Ore Above Fourth Level	90,737 -	531,320	622,057
Ore Above Fifth Level		179,273	179,273
Total	98,945	765,628	864,573

Ore Reserves by Grades follow:-

	Developed Tons	Prospective Tons	Total Tons
Holmes Bessemer	42,059	8,886	50,945 -
Holmes	40,000	8,000	48,000
Junction Bessemer	80,300	30,000	110,300
Junction	506,055	149,273	655,328
Total	668,414	196,159	864,573

Production 12/31/30 - None
12933
15346
41310
43438

Assumptions:- Hard Ore - 9 cu. ft. per ton.
Soft Ore - 12 cu. ft. per ton.

Deductions:- 10% for loss in mining and 10% for rock.

Holmes Drive

Ore Reserves Dec 31-1929

	Tons	Less Production to May 31/30	Balance Reserves	Class 20%	Total
Holmes Bessemer	50945	—	50945 -	10189 -	61134
Holmes 4 "	48000	28279 -	19721 -	3944 -	23665
Junction Bessemer	110300	11310	98990 -	19798 -	118788
Junction	655328	43438	611890 -	122378 -	734268
	864573	- 83027 -	781546 -	156309 -	937855 ✓

HOLMES MINE
ANNUAL REPORT
YEAR 1929.

4. ESTIMATE OF ORE RESERVES: (Continued)

Analysis of Ore Reserves:

Grade	Iron	Phos.	Sil.	Mang.	Alum.	Lime	Mag.	Sul.	Igni.	Moist.
Holmes Bessemer										
Dried	61.98	.039	6.56	.179	.267	.410	.179	.007	1.09	
Natural	59.50	.037	6.30	.172	.256	.402	.172	.007	1.05	4.00
Holmes										
Dried	59.40	.100	8.13	.110	.244	.300	.220	.021	1.41	
Natural	57.08	.096	7.80	.106	.234	.288	.211	.020	1.35	3.90
Junction Bessemer										
Dried	60.50	.045	7.55	.228	.178	.145	.166	.023	1.52	
Natural	52.94	.039	6.61	.200	.156	.127	.145	.020	1.33	12.50
Junction										
Dried	56.67	.100	8.50	.244	.283	.141	.161	.029	5.09	
Natural	51.00	.090	7.65	.220	.255	.127	.145	.026	4.58	10.00

Table showing ore in sight, production, balance and new ore developed during each year.

	1926	1927	1928	1929
Ore in Sight, Jan. 1st	1,421,000	1,301,000	1,119,000	985,000
Production	172,228	176,494	171,196	198,861
Balance	1,248,772	1,124,506	947,804	786,139
Ore in Sight, Dec. 31st	1,301,000	1,119,000	985,000	864,573
New Ore Developed	52,228	5,506	37,196	78,434

5. LABOR & WAGES:

a. Comments:

(1) Labor:

Labor conditions, as far as supply was concerned, was satisfactory, but the quality of the labor employed at this property is not on a par with the other mines in the Ishpeming and North Lake District. Our efficiency is handicapped by the large number of old and middle aged men employed as miners.

The tons per man and cost per ton for 1929 show a decided improvement over 1928, because of operating full time since April 13th and also because of the unusual amount of dead work done in 1928.

172
176
171
198
717

HOLMES MINE
ANNUAL REPORT
YEAR 1929.

5. LABOR & WAGES: (Continued)

b. Comparative Statement of Wages and Product:

	1929	1928	Increase	Decrease
PRODUCTION	198,861	171,196	27,665	
No. of Shifts and Hours	1-8	1-8		
AVG. NO. OF MEN WORKING:				
Surface	43	46		3
Underground	115	120		5
Total	158	166		8

Year	Surface	Underground	Total
1925	47	108	155
1926	45	106	151
1927	45	112	157
1928	46	120	166
1929	43	115	158

Decrease of 8 men for 1929.

	1929	1928	Increase	Decrease
AVERAGE WAGES PER DAY:				
Surface	4.42	4.40	.02	
Underground	5.26	5.39		.13
Total	5.02	5.10		.08

Year	Surface	Underground	Total
1925	4.43	5.32	5.05
1926	4.41	5.31	5.04
1927	4.37	5.39	5.09
1928	4.40	5.39	5.10
1929	4.42	5.26	5.02

There is an increase in the average daily wage of $ .02 per day for surface labor, while the average underground rate decreased $ .13 per day in 1929 compared with 1928.

	1929	1928	Increase	Decrease
WAGES PER MO. OF 25 DAYS:				
Surface	110.50	110.00	.50	
Underground	131.50	134.75		3.25
Total	125.50	127.50		2.00
PRODUCT PER MAN PER DAY:				
Surface	15.00	13.07	1.93	
Underground	5.89	5.36	.53	
Total	4.23	3.80	.43	

Year	Surface	Underground	Total
1927	14.06	5.99	4.20
1928	13.07	5.36	3.80
1929	15.00	5.89	4.23

The year 1929 shows a marked improvement over last year.

HOLMES MINE
ANNUAL REPORT
YEAR 1929.

5. LABOR & WAGES: (Continued)

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

	1929	1928	Increase	Decrease
LABOR COST PER TON:				
Surface	.295	.336		.041
Underground	.892	1.007		.115
Total	1.187	1.343		.156

Year	Surface	Underground	Total
1925	.316	.879	1.195
1926	.300	.851	1.151
1927	.311	.900	1.211
1928	.336	1.007	1.343
1929	.295	.892	1.187

	1929	1928	Increase	Decrease
AVERAGE PRODUCT STOPING & TRAMMING	9.19	9.21		.02
AVERAGE WAGES CONTRACT MINERS	5.55	5.60		.05

TOTAL NUMBER OF DAYS:			
Surface	13,255¾	13,090½	165¼
Underground	33,709¼	31,934	1,775¼
Total	46,965	45,024½	1,940½

Increase in 1929 due to operating full time since April 1929.

AMOUNT FOR LABOR:	1929	1928	Increase	Decrease
Surface	58,643.80	57,593.79	1,050.01	
Underground	177,476.18	172,405.49	5,070.69	
Total	236,119.98	229,999.28	6,120.70	

PROPORTION SURFACE TO UNDERGROUND MEN:

1924 - 1 to 2.23
1925 - 1 to 2.30
1926 - 1 to 2.36
1927 - 1 to 2.49
1928 - 1 to 2.60
1929 - 1 to 2.67

6. SURFACE:

a. Buildings and Repairs:

A fuse-cutting room was built under the main stairway in the dry.

The roofs of all the mine buildings were treated with a coat of tar paint. The woodwork was painted and repaired wherever necessary.

b. Stockpiles:

The 1929 season was remarkable in that nearly all the stockpiles were cleaned up, the balance on hand amounting to but little. All the Junction ore piles were cleaned up, including 2200 tons stocked south of the main road in the swamp. The Junction Bessemer pile was cleaned up in September. The last of the Holmes Crushed ore was loaded out in September. The Holmes Lump pile showed a small shortage.

HOLMES MINE
ANNUAL REPORT
YEAR 1929.

6. SURFACE:
(Continued)

d. Subsidence:

The crack that opened in the fall of 1928 between the C. & N.W. Ry. and D.S.S. & A. Ry. tracks on Section 16 land, south of the boundary, has extended across the ditch that carries the water from the Section 16 Mine, and two more cracks have opened up. The water from this ditch is running into the mine because we had an abnormally large increase in the flow of water in April 1929 on the south boundary, 420 feet west of the southeast corner post.

It would seem imperative to have the railway tracks moved in 1930.

7. UNDERGROUND:

b. Development:

Diamond Drilling:

Several underground holes were drilled from the fourth level in an effort to either prove or disprove the existence of ore below the fifth level.

Hole No. 30 was started vertically on June 14th and finished on August 10th. The hole went through 319 feet of hanging material, then cut hard ore formation; 5 feet of 57% hard ore; 32 feet of hard ore jasper; 26 feet of soft ore jasper and then entered the foot.

Hole No. 31 drilled N. 45° E. with a 60 degree dip found 206 feet of hanging; 44 feet of hard ore jasper; 4 feet of soft ore jasper and then encountered foot-wall material.

Hole No. 32, drilling S. 40° 50° W. with a dip of 81 degrees, went through hanging quartzite and slate for 420 feet; then cut 10 feet of high grade hard ore followed by hard ore jasper, where the hole was bottomed at the end of the year.

Development by Drifting and Raising:

220 Foot Sub-Level:

The hard ore deposit was proven to extend below the 240 foot sub, heretofore considered the bottom, by the exploratory sub driven northwest from #415 Raise on the 220 foot sub-level.

Fourth Level:

The west cross-cut on the fourth level was driven 180 feet southwest and a diamond-drill station cut, from which drill-holes were put down to explore along the hanging contact below the fifth level elevation.

125 Foot Sub-Level:

This sub, located halfway between the fourth and fifth levels, was driven to determine the width and extent of the ore area. The exploratory work proves up two narrow lenses. The western end of the sub lies in the main footwall deposit, which comes down from the fourth level and bottoms on the fifth. The eastern end of the sub lies near the bottom of the main soft ore area.

HOLMES MINE
ANNUAL REPORT
YEAR 1929.

7. UNDERGROUND:
(Continued)

b. Development: (Continued)

Development by Drifting and Raising:

Fifth Level:

The fifth level was largely developed in the year 1928, but both the east and west drifts were extended approximately 175 feet. There was very little ore shown up in the main level drifts, and apparently the main soft ore deposit on the east end pinches out halfway between the fourth and fifth levels, while the deposit on the west side of the mine practically cuts out entirely at the fifth level elevation.

c. Stoping:

320 Foot Sub-Level:

The topmost sub mined was the 320 foot sub, where a small soft ore area was mined along the main foot just east of the main north-south third level tramming drift.

310 Foot Sub-Level:

At this elevation four pillars were taken out. Along the hanging the hard ore was mined between the first and second cross-cuts west of the center of the ore area. The soft ore tributary to the footwall raises between the 22500 west and 22700 west coordinate lines was taken out.

300 Foot Sub-Level:

Mining was confined to the area between the 22400 and the 23000 west coordinate lines. All of the ore that remains at this elevation has now been mined, except a triangular shaped pillar on the northwest side, which is being left in place to support the main lines of the D.S.S. & A. and the C. & N.W. Rys. The hard ore mined at this elevation lay along the hanging between the 22600 and the 23000 west coordinate lines.

Third Level:

The soft ore deposit in the southeast corner of the mine was mined in previous years. During 1929 a portion of the soft ore footwall deposit centered about 400 feet west of the east boundary was mined. South of the large dike that separates the footwall and the middle deposit, several drifts were driven between the old cross-cuts. The hard ore was mined in the northwest corner of the level and also a few pillars were taken between the 22600 and the 23000 west coordinate lines.

280 Foot Sub-Level:

Mining was confined to the extreme west end and the south central portion of the ore area. Hard ore was taken along the hanging for 175 feet in the crotch between the foot and hanging, and a pillar of soft ore approximately 300 feet east and west and 150 feet north and south, 200 feet north of the south boundary, was mined in 1929.

HOLMES MINE
ANNUAL REPORT
YEAR 1929.

7. UNDERGROUND:
(Continued)

c. Stoping: (Continued)

270 Foot Sub-Level:

Practically the same areas mentioned under the 280 foot sub-level caption were mined out on the 270 foot sub.

260 Foot Sub-Level:

A shrinkage stope about 200 feet long was opened up in the hard ore section in the west end of the deposit. This stope took out all the hard ore between the third level and the 240 foot sub.

The soft ore mined during 1929 on the 260 foot sub-level extended from the south boundary on the 22500 west coordinate to a point on the foot, 250 feet north of the south boundary line. The pillar running northeast and southwest was approximately 250 feet long and 175 feet wide.

250 Foot Sub-Level:

Mining at this elevation was confined to the soft ore area between the south boundary and the 10000 south coordinate line. Along the boundary the ore is gone from the foot to the hanging.

240 Foot Sub-Level:

On the 240 foot sub the ore tributary to raises numbered 454, 455, 462, 463 and 464 was mined. Drifting was also done along the hanging on both sides of Raise No. 469. In the northwest corner or hard ore section of the sub, a dozen or more small raises were put up to the bottom of the shrinkage stope.

230 Foot Sub-Level:

Mining in 1929 was confined to taking a small pillar of soft ore between the south boundary and the footwall in the southeast corner of the mine.

220 Foot Sub-Level:

Two contracts at the close of the year started drifting from Raises #461 and #462, close to the south boundary.

Tons per man per day stoping for the past few years is as follows:-

1929	-	10.30
1928	-	10.31
1927	-	9.95
1926	-	11.45
1925	-	10.43

HOLMES MINE
ANNUAL REPORT
YEAR 1929.

7. UNDERGROUND:
(Continued)

d. Timbering:

Following is a timber statement for the year ending December 31st, 1929.

Kind	Lineal Feet	Average Price	Amount 1929	Amount 1928
6" to 8" Timber	56,371	.0509	2,870.08	1,827.92
8" to 10" Timber	72,132	.0691	4,985.41	3,072.94
10" to 12" Timber	39,620	.0952	3,771.40	2,914.51
12" to 14" Timber	12,201	.1176	1,434.63	1,826.72
10" Treated Timber	2,558	.2534	648.13	302.14
12" Treated Timber	4,296	.2313	993.66	157.64
Total Timber 1929	187,178	.0786	14,703.31	
Total Timber 1928	144,043	.0706		10,101.87
		Per 100'		
5 Ft. Lagging - 922 Cords	783,700	.759	5,950.73	5,084.70
1 Inch Covering Boards	39,710	2.103	834.89	832.01
Total Lagging, Etc.	823,410	.824	6,785.62	5,916.71
Tamarack Poles	231,536	1.449	3,355.56	3,994.66
Total Lagging, Poles, Etc. 1929	1,054,946	.961	10,141.18	
Total Lagging, Poles, Etc. 1928	940,575	1.062		9,911.37
Total All Timber 1929 and 1928			24,844.49	20,013.24

PRODUCT	198,861	171,196
Ft. of Timber per Ton of Ore	.941	.841
Ft. of Lagging per Ton of Ore	3.941	3.897
Ft. of Lagging per Ft. of Timber	4.187	4.663
Cost per Ton for Timber	.0739	.0590
Cost per Ton for Lagging	.0299	.0297
Cost per Ton for Poles	.0169	.0233
Cost per Ton for All Timber	.1207	.1120
Ft. Board Measure	338,459	
Ft. Board Measure per Ton of Ore	1.702	1.674

e. Drifting and Raising:

The following table shows the amount of rock and ore drifting and raising done the past five years:-

Year	Rock Drifting Feet	Rock Raising Feet	Ore Drifting Feet	Ore Raising Feet	Total Feet
1929	1250	275	622	839	2986
1928	2816	37	324	468	3645
1927	585	137	175	731	1628
1926	1330	254	314	457	2355
1925	1460	128	288	533	2409

HOLMES MINE
ANNUAL REPORT
YEAR 1929.

7. UNDERGROUND:
(Continued)

e. Drifting and Raising: (Continued)

In 1929 the fifth level cross-cuts were extended and some rock drifting done on the fourth level in order to get a drift out in the hanging to provide a diamond-drill station, from which holes were drilled down to explore along the hanging contact at depth.

f. Explosives, Drilling and Blasting:

Statement of Explosives Used During the Year 1929:

Developing Ore & Stoping: Kind	Quantity	Average Price	Amount 1929	Amount 1928
50% Powder L.F. Standard	25,450	12.71	3,235.53	3,036.75
60% Powder L.F. Standard	69,550	13.77	9,580.67	8,648.50
60% Powder Amm. Gelatin	8,050	14.26	1,148.07	654.50
Total Powder	103,050	13.54	13,964.27	12,339.75
Eagle Brand Fuse Per C.	367,500	.583	2,142.37	1,475.24
No. 6 Blasting Caps " M.	77,420	11.59	898.18	743.33
Tamping Bags " M.	10,000	2.05	20.50	21.00
Cap Crimpers	8	.73	5.85	8.85
Prop. Cost Calif. Crimper			17.00	
Powder Bags	35	1.32	46.25	
Fuse & Cap Containers	38	1.40	53.20	
Total Fuse, Caps, Etc.			3,183.35	2,248.42
TOTAL ALL EXPLOSIVES			17,147.62	14,588.17
PRODUCT			198,861	171,196
Pounds Powder per Ton of Ore			.518	.500
Cost per Ton for Powder			.070	.072
Cost per Ton for Fuse, Caps, Etc.			.016	.013
Cost per Ton for All Explosives			.086	.085
Development in Rock:				
50% Powder L.F. Standard				82.00
60% Powder L.F. Standard	4,150	13.72	570.63	740.25
60% Powder Amm. Gelatin	7,350	14.17	1,041.85	1,812.00
80% Powder Amm. Gelatin				2,355.50
Total Powder	11,500	14.02	1,612.48	4,989.75
Eagle Brand Fuse Per C.	24,300	.583	141.58	295.74
No. 6 Blasting Caps " M.	7,200	11.59	83.42	129.64
Cap Crimpers	3	.75	2.25	.75
Prop. Cost Calif. Crimper			5.00	
Fuse & Cap Containers	3	1.72	5.16	
Total Fuse, Caps, Etc.			237.41	426.13
TOTAL ALL EXPLOSIVES			1,849.89	5,415.88

HOLMES MINE
ANNUAL REPORT
YEAR 1929.

7. UNDERGROUND:
(Continued)

f. Explosives, Drilling and Blasting: (Continued)

Statement of Explosives Used During the Year 1929: (Continued)

Loading by Steam-Shovel: (Blasting Stockpiles)

Kind	Quantity	Average Price	Amount 1929	Amount 1928
50% Powder L.F. Standard	250	12.75	31.87	32.75
Eagle Brand Fuse Per C.	400	.583	2.32	1.76
No. 6 Blasting Caps " M.	300	11.53	3.46	1.06
Crimpers	1		.75	.50
TOTAL ALL EXPLOSIVES			38.40	36.07
TOTAL EXPLOSIVES AS PER COST SHEET			19,035.91	22,391.35

8. COST OF OPERATING:

a. Comparative Mining Costs:

	1929	1928	Increase	Decrease
PRODUCT	198,861	171,196	27,665	
Underground Costs	1.471	1.737		.266
Surface Costs	.226	.293		.067
General Mine Accounts	.105	.139		.034
Cost of Production	1.802	2.169		.367
Movable Equipment	.002	.002		
Plant and Equipment	.121	.120	.001	
Development	.079	.079		
Taxes	.189	.263		.074
Central Office	.110	.148		.038
Welfare, Hospital, Etc.	.049	.054		.005
Cost on Stockpile	2.352	2.835		.483
Loading and Shipping	.086	.067	.019	
Cost on Cars	2.438	2.902		.464
No. of Days Operating	292	262	30	
No. of Shifts and Hours	1-8	1-8		
Average Daily Product	682	653	29	
COST OF PRODUCTION:				
Labor	1.162	1.336		.174
Supplies	.640	.833		.193
Total	1.802	2.169		.367

b. Detailed Cost Comparison:

ACCOUNT
EXPLORING IN MINE:

	Amount	Per Ton
Year 1929	$ 2,787.42	$ .014
Year 1928	884.18	.005
Increase	$ 1,903.24	$ .009

In 1928 424 feet of diamond-drill holes were drilled at a cost of $ 2.085 per foot. In 1929 1190 feet were drilled at a cost of $ 2.3421 per foot.

8. COST OF OPERATING: (Continued)

ACCOUNT
DEVELOPMENT IN ROCK:

	Amount	Per Ton
Year 1929	$ 12,387.29	$ .062
Year 1928	22,230.75	.130
Decrease	$ 9,843.46	$ .068

In 1928, 2394 feet of rock drifting was done at a cost of $ 9.28 per foot. In 1929 the total footage driven was 1525, costing $ 8.12 per foot.

ACCOUNT
DEVELOPMENT IN ORE:

	Amount	Per Ton
Year 1929	$ 12,127.36	$ .062
Year 1928	5,931.31	.035
Increase	$ 6,196.05	$ .027

Increase due to larger footage driven in ore in 1929. In 1928 a total of 743 feet of ore drifts and raises were driven compared with 1461 feet in 1929. The 1929 total consists of 622 feet of ore drifting at $ 8.12 per unit and 839 feet of ore raises at $ 6.89 per unit.

ACCOUNT
STOPING:

	Amount	Per Ton
Year 1929	$ 129,339.62	$ .650
Year 1928	112,056.93	.655
Increase	$ 17,282.69	
Decrease		$ .005

Cost for 1929 increased, but tonnage mined increased also because of 30 more shifts worked in 1929. Unit cost for 1929 shows a small decrease.

ACCOUNT
TIMBERING:

	Amount	Per Ton
Year 1929	$ 58,334.15	$ .293
Year 1928	51,753.49	.303
Increase	$ 6,580.66	
Decrease		$ .010

Cost increased because of additional shifts operated in 1929. Number of shifts worked increased 11½% and total cost for timbering increased 12%. It will be noted that unit cost actually shows a small decrease. Labor for timbering increased from $ 27,685.73 to $ 29,788.35, partially due to more shifts worked in 1929 and also because of main level repair gangs employed on the third level. On the foot side near the main crosscut from the shaft, because of the sub-levels close to the back of the level, extra labor had to be employed in order to keep the main haulage-way open. The cost of the timber

8. COST OF OPERATING: (Continued)

ACCOUNT
TIMBERING: (Continued)

used in the past year increased from $ 20,013.24 in 1928 to $ 24,844.49 in 1929. This is due to purchasing $ 1641.79 worth of treated timber and approximately $ 1000 more for cribbing timber, besides the increased consumption of stull timber. There were two gangs employed most of the year replacing sets on the third and fourth main levels.

ACCOUNT
TRAMMING:

	Amount	Per Ton
Year 1929	$ 19,975.04	$ .100
Year 1928	14,824.79	.086
Increase	$ 5,150.25	$ .014

Increased labor cost due to transferring ore on the 240 foot sub. More labor also employed cleaning tracks.

ACCOUNT
VENTILATION:

	Amount	Per Ton
Year 1929	$ 399.44	$ .002
Year 1928	421.26	.002
Decrease	$ 21.82	$ .000

Cost for both years just about the same.

ACCOUNT
PUMPING:

	Amount	Per Ton
Year 1929	$ 11,818.11	$ .059
Year 1928	8,571.20	.051
Increase	$ 3,246.91	$ .008

Water pumped in 1929 - 108,313,916 Gallons
Water pumped in 1928 - 82,552,319 Gallons
Water pumped in 1927 - 82,829,187 Gallons
Water pumped in 1926 - 83,223,451 Gallons
Water pumped in 1925 - 56,915,287 Gallons

It will be noted that the amount of water pumped increased from a normal of about 83,000,000 gallons to 108,313,916 gallons, because of the opening of additional cracks on surface due to subsidence. Also more water is being pumped from the new fifth level, as the workings between the fourth and fifth level are being opened up.

8. COST OF OPERATING: (Continued)

ACCOUNT
COMPRESSORS & AIR PIPES:

	Amount	Per Ton
Year 1929	$ 15,696.93	$ .079
Year 1928	20,562.52	.120
Decrease	$ 4,865.59	$ .041

Costs in detail were as follows:-

	YEAR 1929		
	Labor	Supplies	Total
Compressors	$ 675.43	$ 12,174.58	$ 12,850.01
Air Pipes	1,835.99	1,010.93	2,846.92
Total	$ 2,511.42	$ 13,185.51	$ 15,696.93

	YEAR 1928		
Compressors	$ 874.85	$ 16,885.72	$ 17,760.57
Air Pipes	1,575.89	1,226.06	2,801.95
Total	$ 2,450.74	$ 18,111.78	$ 20,562.52

In 1928 electric power cost for compressing air was $ 16,278.02, while in 1929 this dropped to $ 11,626.50. In 1928 cu. ft. of air used amounted to 484,785,000, while in 1929 the total was 348,795,000 cu. ft. In 1928 the compressor was run two shifts while the shaft was being sunk. In 1929 the compressor plant ran day shift only.

ACCOUNT
BACK FILLING:

	Amount	Per Ton
Year 1929	$ 418.60	$ .002
Year 1928	184.00	.001
Increase	$ 234.60	$ .001

Increased because of breaking matting over hard ore stope mined by #25.

ACCOUNT
UNDERGROUND SUPERINTENDENCE:

	Amount	Per Ton
Year 1929	$ 9,210.91	$ .046
Year 1928	9,393.23	.055
Decrease	$ 182.32	$ .009

There were four shift-bosses employed part of the year 1928 while the fifth level plat and pump-house were being cut. In 1929 the men were being supervised by three shift-bosses.

8. COST OF OPERATING: (Continued)

ACCOUNT
COMPRESSORS & POWER DRILLS:

		Amount	Per Ton
Year 1929	$	3,016.61	$ .016
Year 1928		2,256.42	.013
Increase	$	760.19	$ .003

The cost in detail was as follows:-

	Labor	YEAR 1928 Supplies	Total
Compressors	$ 160.85	$ 181.69	$ 342.54
Power Drills		1,913.88	1,913.88
Total	$ 160.85	$ 2,095.57	$ 2,256.42

	Labor	YEAR 1929 Supplies	Total
Compressors	$ 241.84	$ 50.52	$ 292.36
Power Drills		2,724.25	2,724.25
Total	$ 241.84	$ 2,774.77	$ 3,016.61

In 1929 eleven new drilling machines were purchased consisting of four S3 Stopers; five RB12 Jackhammers; one D8 Drifter and one A1 Jackhammer. In 1928 eight machines were charged out, four of them drifters and four Jackhammers.

ACCOUNT
HAND TRAMMING EQUIPMENT:

		Amount	Per Ton
Year 1929	$	9,381.68	$ .047
Year 1928		10,873.11	.063
Decrease	$	1,491.43	$ .016

The detailed cost follows:-

	Labor	YEAR 1928 Supplies	Total
Cars	$ 207.81	$ 324.84	$ 532.65
Scrapers	1,356.82	8,802.38	10,159.20
Tracks		181.26	181.26
Total	$ 1,564.63	$ 9,308.48	$ 10,873.11

In use in 1928.

Scrapers	13
Timber Hoists	17
Cars	20

	Labor	YEAR 1929 Supplies	Total
Cars	$ 746.85	$ 515.90	$ 1,262.75
Scrapers	2,394.31	4,944.59	7,338.90
Tracks	675.89	104.14	780.03
Total	$ 3,817.05	$ 5,564.63	$ 9,381.68

6. COST OF OPERATING: (Continued)

ACCOUNT
HAND TRAMMING EQUIPMENT: (Continued)

In use in 1929.

Scrapers	16
Timber Hoists	17
Cars	20

A little more money was spent for underground tracks and cars in 1929 and four new scrapers purchased. In 1928 six new units were put into service.

ACCOUNT
ELECTRIC TRAM EQUIPMENT:

	Amount	Per Ton
Year 1929	$ 5,560.81	$ .029
Year 1928	10,289.84	.060
Decrease	$ 4,729.03	$ .031

Detail cost of electric haulage equipment:-

	Labor	Supplies	Total
YEAR 1928			
Generators & Motors	$ 19.50	$ 16.49	$ 35.99
Locomotives	759.10	569.90	1,329.00
Wiring	526.32	440.59	966.91
Main Line Tracks	3,247.12	690.60	3,937.72
Main Line Cars	1,355.03	2,665.19	4,020.22
Total	$ 5,907.07	$ 4,382.77	$ 10,289.84
YEAR 1929			
Locomotives	$ 829.54	$ 754.29	$ 1,583.83
Wiring	765.23	254.78	1,020.01
Main Line Tracks	1,531.22	266.30	1,797.52
Main Line Cars	758.86	400.59	1,159.45
Total	$ 3,884.85	$ 1,675.96	$ 5,560.81

It will be noted from the above statements that the decreased cost for 1929 is almost entirely under the headings of "Main Line Tracks and Cars." In 1928 the fifth level plat and main line from the shaft to the footwall cross-cuts were equipped with tracks and cars.

ACCOUNT
PUMPING MACHINERY:

	Amount	Per Ton
Year 1929	$ 2,026.40	$ .010
Year 1928	8,973.95	.052
Decrease	$ 6,947.55	$ .042

Cost for 1928 was unusually high because of cutting new pump-house and sump on the fifth level and installing a new Dean pump and a second-hand Aldrich pump. There was also an expenditure of nearly $ 800 for new launder. The 1929 cost includes a new belt, costing $ 840.42, for the Aldrich pump, and 70 feet new 8" discharge pipe.

8. COST OF OPERATING: (Continued)

ACCOUNT
HOISTING:

		Amount		Per Ton
Year 1929	$	13,864.80	$	.070
Year 1928		14,543.71		.085
Decrease	$	678.91	$	.015

In 1928 rock from shaft-sinking and fifth level plat was hoisted night shift. In 1929 the engine-house crew worked day shift only.

ACCOUNT
STOCKING ORE:

		Amount		Per Ton
Year 1929	$	8,265.55	$	.042
Year 1928		13,339.29		.079
Decrease	$	5,073.74	$	.037

The cost of operating the top-tram system in 1928 was $ 7597.49 compared with $ 4203.20 in 1929. In the former year a night shift crew was employed night shift handling rock from the shaft-sinking, fifth level plat and rock drift. Also in 1928 rock pickers were employed nearly the entire year because some ore was stocked most of the summer. In 1929 all the ore hoisted was shipped and the rock pickers charged to Loading and Shipping.

ACCOUNT
SCREENING-CRUSHING AT MINE:

		Amount		Per Ton
Year 1929	$	3,312.14	$	.017
Year 1928		3,436.01		.020
Decrease	$	123.87	$	.003

The maintenance expense was less for 1929.

ACCOUNT
DRY HOUSE:

		Amount		Per Ton
Year 1929	$	5,622.95	$	.028
Year 1928		5,531.69		.032
Increase	$	91.26		
Decrease			$	.004

ACCOUNT
GENERAL SURFACE EXPENSE:

		Amount		Per Ton
Year 1929	$	6,270.32	$	.032
Year 1928		6,374.54		.037
Decrease	$	104.22	$	.005

Less labor employed keeping premises clean.

HOLMES MINE
ANNUAL REPORT
YEAR 1929.

8. COST OF OPERATING: (Continued)

ACCOUNT
HOISTING EQUIPMENT:

		Amount	Per Ton
Year 1929	$	3,777.03	$ .019
Year 1928		3,334.52	.019
Increase	$	442.51	$ .000

A new skip was built in 1929 and two new 8 ft. steel-lined sheaves purchased. Part of this cost was offset by wire-rope purchases in 1928.

ACCOUNT
SHAFT:

		Amount	Per Ton
Year 1929	$	846.44	$ .004
Year 1928		703.66	.004
Increase	$	142.78	$ .000

ACCOUNT
TOP TRAM EQUIPMENT:

		Amount	Per Ton
Year 1929	$	1,136.87	$ .006
Year 1928		1,392.84	.008
Decrease	$	255.97	$ .002

ACCOUNT
DOCKS, TRESTLES & POCKETS:

		Amount	Per Ton
Year 1929	$	468.59	$ .002
Year 1928		644.24	.004
Decrease	$	175.65	$ .002

Less money spent on shaft-house pockets in 1929.

ACCOUNT
MINE BUILDINGS:

		Amount	Per Ton
Year 1929	$	1,289.37	$ .006
Year 1928		777.91	.005
Increase	$	511.46	$ .001

The detailed cost was as follows:-

	Year 1928	Year 1929
Office	$ 65.22	$ 36.72
Warehouse	48.18	27.31
Shops	3.55	59.75
Shaft-House	24.07	177.36
Engine-House	223.76	164.72
Boiler-House		1.14
Dry-House	368.53	516.97
Coal Dock	1.18	15.92
Miscellaneous	23.46	240.65
Fire Protection	19.96	48.83
Total	$ 777.91	$ 1289.37

8. COST OF OPERATING: (Continued)

ACCOUNT
MINE BUILDINGS: (Continued)

In the shaft-house all the steps were repaired and a building built to house the top-tram equipment. The dry-house was repaired, painted and the roof treated with tar paint. The storage-sheds and scrap platform were also repaired.

ACCOUNT
INSURANCE:

		Amount	Per Ton
Year 1929	$	90.67	$ .000
Year 1928		87.30	.001
Increase	$	3.37	
Decrease			$ .001

Nominal difference for the two years.

ACCOUNT
ENGINEERING:

		Amount	Per Ton
Year 1929	$	1,458.70	$ .007
Year 1928		1,698.74	.010
Decrease	$	240.04	$ .003

Less engineering supervision in 1929 accounts for the decrease.

ACCOUNT
ANALYSIS:

		Amount	Per Ton
Year 1929	$	6,662.17	$ .034
Year 1928		6,979.65	.041
Decrease	$	317.48	$ .007

A smaller proportion of the district laboratory expense was charged to the Holmes Mine in the year 1929.

ACCOUNT
PERSONAL INJURY EXPENSE:

		Amount	Per Ton
Year 1929	$	4,973.38	$ .025
Year 1928		4,800.63	.028
Increase	$	172.75	
Decrease			$ .003

Increased because of larger pay-roll footings in 1929. 2% of pay-roll is charged to this account each month.

8. COST OF OPERATING: (Continued)

ACCOUNT
SAFETY DEPARTMENT EXPENSE:

		Amount	Per Ton
Year 1929	$	258.46	$ .001
Year 1928		291.74	.002
Decrease	$	33.28	$ .001

Small decrease.

ACCOUNT
TELEPHONES & SAFETY DEVICES:

		Amount	Per Ton
Year 1929	$	920.65	$ .005
Year 1928		607.00	.003
Increase	$	313.65	$ .002

Increased because of charging off gloves, goggles and deficit on hard hats. Also installed lamps and extension cords in some of the underground working places.

ACCOUNT
LOCAL GENERAL WELFARE:

		Amount	Per Ton
Year 1929	$	415.95	$ .002
Year 1928		631.28	.003
Decrease	$	215.33	$ .001

This is a Central Office charge.

ACCOUNT
MINE OFFICE:

		Amount	Per Ton
Year 1929	$	8,762.83	$ .045
Year 1928		8,736.30	.051
Increase	$	26.53	
Decrease			$ .006

Small change in mine office expense.

ACCOUNT
SAFETY EXPENSE:

		Amount	Per Ton
Year 1929	$	1,270.05	$ .006
Year 1928			
Increase	$	1,270.05	$ .006

The cost for 1929 covers a proportion of the Labor Day Mining Department Safety Picnic.

HOLMES MINE
ANNUAL REPORT
YEAR 1929.

9. EXPLORATIONS:

The limits of the ore areas in the mine above the fifth level have been very definitely established, but there is a possibility of finding ore 400 or 500 feet below the fifth level. There is evidence of faulting in the fourth level cross-cut that runs out into the hanging, and the drill-holes put down during 1929 prove that there is a mineralized formation below the fifth level. Additional drilling will be done in 1930 to explore along the hanging-wall at depth.

10. TAXES:

The taxes assessed to the Holmes Mine property for the past two years follow:-

	1929		1928	
	Valuation	Taxes	Valuation	Taxes
Realty	$ 566,000	$ 21,471.33	$ 854,000	$ 28,513.85
Personal	434,000	16,463.89	496,000	16,560.74
Total	$ 1,000,000	$ 37,935.22	$ 1,350,000	$ 45,074.59
Taxes per Ton Shipped		$ .1072		$ .2678
Taxes per Ton Produced		.1909		.2637

11. ACCIDENTS & PERSONAL INJURY:

The accident record for the year was marred by one fatality. Solomon Ristimaa, miner, was instantly killed by a fall of ground on Saturday, September 28th, at 11:00 A.M. in contract #27, a shrinkage stope below the west end of the third level. The working place had been inspected that morning by Captain Tamblin and Shift-Bosses Denny and Harper and found in safe condition. Ristimaa was killed by a wedge-shaped piece of ore weighing about two tons, which had dropped out from between the hanging side of No. 401 Raise and the foot of the stope.

The number and severity of the accidents occurring in 1928 and 1929 were as follows:-

	1929	1928
No Lost Time Accidents	26	22
Compensable Accidents	7	5
Accidents of more than one day duration, but on which no compensation was paid.	1	2
Total	34	29

The severity rate for accidents for the past three years was as follows:-

1929	-	22.6
1928	-	3.1
1927	-	9.3

The severity rate for 1929 was high because of the nature of the compensable accidents, which kept the injured men away from work for long periods.

HOLMES MINE
ANNUAL REPORT
YEAR 1929.

18. NATIONALITY OF EMPLOYEES:

English	69
Finnish	40
Swedish	26
Italian	1
German	1
French	20
Irish	3
Norwegian	5
Austrian	1
Total	166

CHARLES J. STAKEL, SUPERINTENDENT.

MORRIS LLOYD MINE

ANNUAL REPORT

YEAR 1929

1. GENERAL

The Morris-Lloyd Mine continued to show marked improvement in every direction. 1929 was the banner year for production and shipments.

We had the best tons per man and lowest costs. Our ore reserves were added to, the increase in new ore developed being very large.

The five day a week schedule which had been followed for a number of years was changed in April to six days a week.

The mine is completely mechanized, all the ore being handled by scrapers or loaders. The capacity of the scraping units has increased so much, that we are able to successfully operate 48" hoe type scrapers.

The new 8th level in the Morris shaft was opened up and equipment ordered for the new proposed 6th level from the Morris shaft to the Section 6 territory.

2. PRODUCTION, SHIPMENTS & STOCKPILE BALANCES

a. Production by Grades

The following table shows the ore produced in 1929 sub divided into grades:-

Grade	Tons
Morris	196,072
Morris Manganese	11,310
Morrisville	34,633
Lloyd	59,560
Lloyddale	113,213
Lloyd Silica	20,642
Total	435,430

Production by grades for previous years viz:-

Year	Morris	Manganese	Silica	Lloyd	Lloyddale	Total
1925	100,568		59,945	105,316		265,829
1926	110,863	3,436	53,088	49,678	73,097	290,162
1927	173,118	1,357	33,871	58,251	60,217	326,814
1928	134,455	33,347	49,745	32,161	106,447	356,164
1929	196,072	11,310	55,275	59,560	113,213	435,430

b. Shipments:

The tonnage shipped shows a large increase for 1929 as shown by the following table:-

Grades	1925	1926	1927	1928	1929
Morris	122,435	86,413	148,118	193,093	242,740
Morris Manganese		3,259	86	22,849	21,966
Morrisville	28,673	12,372	15,790	2,391	72,236
Lloyd	67,953	33,948	58,615	66,440	179,191
Lloyddale		67,119	53,641	83,736	101,459
Lloyd Silica	21,084	21,664	21,038	24,675	20,642
Total	240,145	224,775	297,288	393,184	638,234

MORRIS LLOYD MINE

ANNUAL REPORT

YEAR 1929

2. PRODUCTION, SHIPMENTS & STOCKPILE BALANCES (Continued)

b. Shipments: Continued-

Shipments as forwarded from pockets and stockpiles follow;-

Grade	Pocket	Stockpile	Total	Total Last Year
Morris	135,795	106,945	242,740	193,093
Morris Mangamese	10,622	11,344	21,966	22,849
Morrisville	15,741	56,495	72,236	2,391
Lloyd	55,256	123,935	179,191	66,440
Lloyddale	42,875	58,584	101,459	83,736
Lloyd Silica	20,642		20,642	24,675
Total	290,931	357,303	638,234	393,184

1928 1-8hr. shift 5 days per week. Jan. 1 to Dec. 31.
1929 1-8hr. shift 5 days per week. Jan. 1 to April 11.
1929 1-8hr. shift 6 days per week. April 11 to Dec. 31.

The ores shipped in 1929 were consigned to the docks and charcoal furnaces as shown:-

Destimation	Total Tons
L. S. & I. Dock	483,198
C. & N. W. Dock	57,641
Pioneer No. 2 Furnace	38,326
Wells Furnace	21,004
Newberry Furnace	17,919
Antrim Iron Co.	20,055
Lump	91
Total	638,234

c. Stockpile Balances:

The following are various grades stocked at mine as of Dec. 31 each year:-

Year	Morris	Mang.	Morrisville	Lloyd	Lloyddale	Lloyd Silica	Total
1925	164,842		15,579	154,733		14,538	349,872
1926	194,820		34,783	164,763	6,354	14,538	415,259
1927	219,820	1,271	31,786	164,399	12,930	14,579	444,785
1928	167,324	10,656	53,282	124,844	35,939	15,680	407,765
1929	120,656		15,679	5,253	47,693	15,680	204,961

MORRIS LLOYD MINE

ANNUAL REPORT

YEAR 1929

2. PRODUCTION, SHIPMENTS & STOCKPILE BALANCES (Continued)

e. Production by Months:-

Month	Days	Morris	Mang.	M. Ville	Lloyd	Lloyddale	Lloyd Silica	Total	Rock
January	23	15,730		2,153	4,237	3,524	1,910	27,554	3,117
February	20	13,969	1,584	1,669	5,164	6,183	418	28,987	2,688
March	21	16,648	1,447	1,656	3,753	9,498	554	33,556	3,321
April	25	19,173	56	3,649	4,377	9,667	1,080	38,002	1,107
May	26	18,120	1,168	4,561	4,598	10,333	860	39,640	246
June	24	17,694	1,187	3,482	3,806	9,440	1,602	37,211	531
July	26	16,468	1,151	3,550	2,938	10,096	1,988	36,191	1185
August	27	16,629	1,027	4,375	11,346	8,415	718	42,510	2,247
Sept.	24	18,011	576	3,995	7,088	8,828	1,447	39,945	1,716
Oct.	27	14,555	1,694	5,036	13,556	4,641	820	40,102	2,070
Nov.	24	14,651	860	4,521	6,248	10,932	700	37,912	1,728
Dec.	23	16,167		3,971	3,674	9,506	502	33,820	603
Total	290	197,615	10,750	42,618	70,785	101,063	12,599	435,430	19,374

f. Production from Chase Leases by Months:-

Leases	No. 9	No. 24	No. 25	No. 26	No. 27 & 28	Total
Minimum Yearly Tonnages Required	10,000	15,000	15,000	15,000	22,500	77,500
January	12,916	1,068				
February	13,178	2,018				
March	15,502	1,678				
April	18,746	1,461				
May	18,638	2,140				
June	19,044	422				
July	15,260					
August	18,159					
September	17,682					
October	16,410					
November	16,619					
December	15,130					
Totals	197,284	8,787				206,071

Production from Leases by Years:-

The following table shows production from each lease.

Lease No.	9	24	25	26	27	28	Totals
Minimums	10,000	15,000	15,000	15,000	15,000	7,500	77,500
Year							
1925	77,244	29,526	10,367	2,425	0	0	119,562
1926	53,102	47,876	14,604	303	0	0	115,885
1927	88,956	48,931	10,040	952	0	0	148,879
1928	119,115	20,090	0	0	0	0	148,205
1929	197,284	8,787	0	0	0	0	206,071

MORRIS LLOYD MINE

ANNUAL REPORT

YEAR 1929

2. PRODUCTION, SHIPMENTS & STOCKPILE BALANCES (Continued)

Total Royalties accrued and Production from Leases:

No. of Lease	Accrued To Dec. 31, 1929	Mined To Dec. 31, 1929	Balance
9	212,283	1,204,666	992,383
24	301,088	231,935	69,153
25	301,088	51,246	249,842
26	291,713	9,043	282,670
27	269,213	178	269,035
28	134,607	0	134,607
Totals	1,509,992	1,497,068	12,924

Table showing balance due on accrued royalties for leases Nos. 9 to 28 Inclusive, for past five years.

Year	Tons Accrued	Tons Mined	Balance
1925	1,199,992	878,028	321,964
1926	1,277,492	993,913	283,579
1927	1,354,992	1,142,792	212,200
1928	1,432,492	1,290,997	141,495
1929	1,509,992	1,497,068	12,924

g. Ore Statement:

	Morris	Morris Mang.	Morris ville	Lloyd	dale	Silica	Total
On Hand Jan.1,1929	167,324	10,656	53,282	124,884	35,939	15,680	407,765
Production in 1929	197,615	10,750	42,618	70,785	101,063	12,599	435,430
Transferred	1,543	560	7,985	11,225	12,150	8,043	
Total	363,396	21,966	87,915	184,444	149,152	36,322	843,195
Shipments	242,740	21,966	72,236	179,191	101,459	20,642	638,234
Balance in Stock	120,656	0	15,679	5,253	49,693	15,680	204,961
Increase in Output							79,274
Dec. in Ore on Hand							202,804

h. Delays:

Date	Hours Delayed	Cause	Tons Lost
March 7	8	Severe Storm	1000
Oct. 23	8	Severe Storm	1000
Dec. 14	8	Funeral	1100
		Total	3100

MORRIS LLOYD MINE

ANNUAL REPORT

YEAR 1929

3. ANALYSIS

Average Mine Analysis on Output For Year 1929

Grade	Iron	Phos.	Silica
Lloyd Mine			
Lloyd	59.58	.117	6.41
Lloyddale	58.59	.162	6.80
Lloyd Silica	52.11	.072	17.53
Morris Mine			
Morris	59.45	.065	7.90
Morris Manganese	60.35	.052	6.60
Morrisville	51.65	.066	18.98

Average Analysis on straight Cargoes for Year 1929

Grade- All Ore Mixed.

Average Mine Analysis for Year 1929
Ores Stocked:

Grade		Iron	Phos.	Silica	Moisture
Morris	Dried	59.70	.090	7.53	
	Natural	53.28	.080	6.72	10.75
Morrisville	Dried	52.20	.061	18.60	
	Natural	46.74	.055	16.60	10.50
Lloyd	Dried	58.85	.122	6.86	
	Natural	52.23	.108	6.09	11.25
Lloyddale	Dried	58.75	.170	7.10	
	Natural	52.15	.151	6.30	11.25

Ores Shipped:

Grade		Iron	Phos.	Silica	Moisture
Morris	Dried	59.45	.076	8.04	
	Natural	53.05	.068	7.18	10.75
Morris Manganese	Dried	60.40	.061	6.90	
	Natural	54.05	.055	6.20	10.50
Morrisville	Dried	51.35	.068	19.04	
	Natural	45.96	.061	17.04	10.50
Lloyd	Dried	59.25	.138	6.21	
	Natural	52.58	.122	5.51	11.25
Lloyddale	Dried	58.25	.173	7.06	
	Natural	51.70	.154	6.27	11.25
Lloyd Silica	Dried	51.90	.105	16.40	
	Natural	46.19	.093	14.60	11.00

4. ESTIMATE OF ORE RESERVES

Assumption:-

12 Cu. ft. equals one ton
10% deduction for rock
10% " " loss in mining.

MORRIS LLOYD MINE

ANNUAL REPORT

YEAR 1929

4. ESTIMATE OF ORE RESERVES
(Continued)

Ore in Sight as of December 31st. 1929.

MORRIS MINE

Location of Ore	Morris Bessemer	Morris	Total Tons
Above 6th level-C.C.I.Co.lands,		3,375	3,375
" " " -Chase Lease No. 9,		557	557
" 7th " -C.C.I.Co. lands,	33,185	200,031	233,216
" " " -Chase Lease No. 9,	27,209	250,603	277,812
" " " - " " No. 24,		18,011	18,011
" " " - " " No. 25,		22,937	22,937
" " " - " " No. 26,		9,687	9,687
Below " " -C.C.I.Co. lands,	120,240	360,718	480,958
" " " -Chase Lease No. 9,	184,882	579,961	764,843
" " " - " " No. 24,		18,394	18,394
" " " - " " No. 25,		10,336	10,336
" " " - " " No. 26,		16,453	16,453
Total	365,516	1,491,063	1,856,579

LLOYD MINE

Location of Ore	Lloyd	Lloyddale	Total Tons
Above 3rd level,	29,211		29,211
Below " "	9,353		9,353
Total	38,564		38,564

LLOYD MINE EAST

Location of Ore	Lloyd	Lloyddale	Total Tons
Above 3rd Main Sub	8,333	50,302	58,635
" 4th " "	14,281	97,833	112,114
Between 3rd level and 4th main sub.		96,270	96,270
Above and below 4th level,	236,943	664,712	901,655
Total	259,557	909,117	1,168,674

SUMMARY OF TOTAL ORE

Mine	Bessemer	Morris	Lloyd	Lloyddale	Total Tons
Morris	365,516	1,491,063			1,856,579
Lloyd			38,564		38,564
East Lloyd			259,557	909,117	1,168,674
Total	365,516	1,491,063	298,121	909,117	3,063,817

Total ore in Chase Lease No. 9, - -	1,043,212
" " " " " No. 24,	36,405
" " " " " No. 25,	33,273
" " " " " No. 26,	26,140
Total Ore in all Leases,	1,139,030
Total ore in all C.C.I.Co. lands,	1,924,787
Total ore in Morris-Lloyd Mine,	3,063,817

MORRIS LLOYD MINE

ANNUAL REPORT

YEAR 1929

4. ESTIMATE OF ORE RESERVES

Analysis of Ore Reserves

Grades	Iron	Phos.	Sil.	Mang.	Alum.	Lime.	Mag.	Sul.	Ign.	Moist.
Morris Bessemer										
Dried	58.96	.048	6.14	1.14	2.86	0.86	0.29	.014	3.43	
Natural	51.59	.042	5.37	1.00	2.50	0.75	0.25	.012	3.00	12.50
Morris										
Dried	58.70	.103	7.15	.39	2.34	0.90	0.45	.012	4.03	
Natural	52.40	.090	6.38	.35	2.09	0.80	0.40	.011	3.60	10.75
Lloyd, Dried	59.12	1.22	6.06	.27	2.55	1.063	0.31	.011	4.80	
Natural	51.72	.107	5.30	.24	2.23	.093	0.27	.010	4.20	12.50
Lloyddale										
Dried	58.90	.139	5.71	.27	2.62	1.055	0.34	.013	5.59	
Natural	51.55	.121	5.31	.24	2.30	0.92	0.30	.012	4.90	12.30

Estimated tonnage of ore underground as reported to the State Tax Commission. All tonnages reported this year as developed ores.

Bessemer Grade	Morris Shaft	Lloyd and Lloyd East	Total
Morris Bessemer	365,516		365,516
Non-Bessemer Grades			
Morris	1,491,063		1,491,063
Lloyd		298,121	298,121
Lloyddale		909,117	909,117
Total	1,856,579	1,207,238	3,063,817

The following table shows the ore in sight Jan. 1st; product for the year; ore in sight Dec. 31 and the new ore developed during the year.

	1925	1926	1927	1928	1929
Ore in Mine Jan.1.	3,309,075	3,325,341	2,891,893	2,612,722	2,335,103
Production	265,829	290,162	326,814	356,164	435,430
Balance	3,043,246	3,035,179	2,565,079	2,256,558	1,899,673
Ore in Mine Dec.31.	3,325,341	2,891,893	2,612,722	2,335,103	3,063,817
New Ore Developed.	282,095	148,286	47,643	78,545	1,164,144

5. LABOR AND WAGES

a. General

Labor conditions were most satisfactory during the year with the exception of the first two weeks in November when a great many men went deer hunting.

b. COMPARATIVE STATEMENTS OF WAGES AND PRODUCT:

	1929	1928	Inc.	Dec.
Production	435,430	356,164	79,266	
No. of Shifts& Hours	1-8hr.	1-8hr.		

MORRIS LLOYD MINE

ANNUAL REPORT

YEAR 1929

5. **LABOR AND WAGES**
(Continued)

AVERAGE NUMBER OF MEN WORKING

	1929	1928	Inc.	Dec.
Surface	55	52	3	
Underground	176	173	3	
Total	231	225	6	

Year	Surface	Underground	Total
1921	46	203	249
1922	48	162	210
1923	44	156	200
1924	44	144	188
1925	45	145	190
1926	45	149	194
1927	50	178	228
1928	52	173	225
1929	55	176	231

AVERAGE WAGES PER DAY

	1929	1928	Inc.	Dec.
Surface	4.35	4.34	.01	
Underground	5.08	5.09	.	.01
Total	4.90	4.90		

Year	Surface	Underground	Total
1922	3.72	4.19	4.08
1923	4.12	4.65	4.53
1924	4.29	4.94	4.78
1925	4.34	5.02	4.86
1926	4.32	5.02	4.85
1927	4.33	5.14	4.94
1928	4.34	5.09	4.90
1929	4.35	5.08	4.90

WAGES PER MONTH OF 25 DAYS

	1929	1928	Inc.	Dec.
Surface	108.75	108.50	.25	
Underground	127.00	127.25		.25
Total		122.50		

PRODUCT PER MAN PER DAY

	1929	1928	Inc.	Dec.
Surface	25.53	23.09		
Underground	8.22	7.59		
Total	6.22	5.71		

MORRIS LLOYD MINE

ANNUAL REPORT

YEAR 1929

5. LABOR AND WAGES
(Continued)

PRODUCT PER MAN PER DAY

Year	Surface	Underground	Total
1920	17.67	4.33	3.48
1921	18.78	4.22	3.44
1922	17.40	5.33	4.08
1923	18.47	5.58	4.28
1924	19.08	6.42	4.80
1925	20.45	6.85	5.13
1926	21.42	6.97	5.26
1927	20.93	6.61	5.02
1928	23.09	7.59	5.71
1929	25.53	8.22	6.22

The year 1929 shows a large increase in the tons per man per day, the total increasing .51 tons per man per day.

LABOR COST PER TON

	1929	1928	Inc.	Dec.
Surface	.171	.188		.017
Underground	.618	.671		.053
Total	.789	.859		.070

Year	Surface	Underground	Total
1920	.307	1.482	1.791
1921	.242	1.248	1.490
1922	.214	.786	1.000
1923	.223	.834	1.057
1924	.225	.770	.995
1925	.212	.733	.945
1926	.201	.721	.922
1927	.207	.777	.984
1928	.188	.671	.859
1929	.171	.618	.789

	1929	1928	Inc.	Dec.
Average Product Stoping & Tramming	15.20	13.64	1.56	
Average Wages Contract Miners	5.67	5.69		.02

TOTAL NUMBER OF DAYS

	1929	1928	Inc.	Dec.
Surface	17,054¾	15,425	1,629¾	
Underground	52,977¼	46,948½	6,028¾	
Total	70,032	62,373½	7,658½	

AMOUNT FOR LABOR	1929	1928	Inc.	Dec
Surface	74,228.13	66,965.09	7,263.04	
Underground	269,122.98	238,962.49	30,160.49	
Total	343,351.11	305,927.58	37,423.53	

PROPORTION SURFACE TO UNDERGROUND MEN:

1924	1 to 3.27
1925	1 to 3.22
1926	1 to 3.31
1927	1 to 3.56
1928	1 to 3.33
1929	1 to 3.20

MORRIS LLOYD MINE

ANNUAL REPORT

YEAR 1929

6. SURFACE

a. Buildings

In The mine location all the houses were repaired and painted. New roofs were put on the porches and the siding replaced wherever necessary.

At the mine the old clothes racks were taken out of both dry houses and chains and hooks installed so that the underground clothes could be pulled up clear of the floor. The roofs of these buildings were treated with a coat of tar paint and the interiors painted. The drys were also cleaned by the Vermin Extermination Process.

The compressor room in the Morris Engine house was partioned off from the main engine room in order to keep the oily atmosphere away from the underground haulage sets which have burned out three times due to formation of an oil film on the rotor.

In order to enlarge the room, where the surface men eat lunch and dry their clothing, so as to be able to accommodate the shop employees, the electricians store room was moved. As the carpenter shop also was crowded because a great deal of space was taken up by the electricians repair room, another building was constructed large enough for both a work room and a store room for the mine electricians.

A new saw, intended primarily for sawing ties, was set up in the carpenter shop. The motor for driving both the planer, saw and boring machine was set up in the attic and counter shafting installed for all the machines in the carpenter shop.

b. Stockpiles

More ore was loaded out from the stockpiles than ever before. The Lloyd and Lloyddale piles were nearly cleaned out. The Morris and Morrisville balances were reduced materially and all the Morris Manganese forwarded to the docks.

d. Miscellaneous

New 4" iron pipe was laid in the water line from the Lloyd shaft to the concrete storage tank, so that by the end of the year the entire line was rebuilt and no further trouble from leaks can occur.

UNDERGROUND

b. Development

Section 6 Mine

No. 3 contract drove a sub level drift on the 1060 ft. sub connecting No. 10 and No. 12 raises to facilitate the handling of timber used to repair these long raises. This drift cut a seam of ore about 15 feet wide which was followed to the west but pinched out at a distance of 65 feet from the North South drift.

On the 900 foot sub a main East-West drift was driven 325 feet parallel to the foot from the old sub level workings close to the 3200 coordinate line east to the crotch between the foot and hanging. Later developments proved that the East breast of this drift had not reached the end of the ore because the 870 foot sub exploring drift extended 50 feet still farther East.

On the 840 foot sub two East-West drifts were driven from the old workings near the 3200 East coordinate line to the East limits of the ore. These two drifts are in the Centres of ore lenses separated by a horse of jasper. From these drifts small raises were put up about 20 feet apart and two sub level stopes started mining from both East and West ends towards the pillar left in place.

MORRIS LLOYD MINE

ANNUAL REPORT

YEAR 1929

UNDERGROUND

b. Development

Section 6 Mine

(Continued)

The only other development work done in the East end of the mine consisted of a new raise put up from the 4th level cross-cut to enable us to mine the ore lens shown on the 850 foot sub level map between the 2800 and 3000 East coordinate lines.

MORRIS MINE

The most important development campaign carried on in 1929 was the driving of the main level drifts on the 8th level and the raises and exploring subs between the 7th and 8th levels.

The main 8th level drift was driven South from the shaft for 300 feet and then turned about 45 degrees South-West, going through slate and iron formation for about 900 feet, entering the ore on the 3400 East-West Coordinate line. The cross-cut was then extended another 600 feet most of which was in high grade Bessemer ore, although we did cut several dikes and lean ore areas.

Three raises numbered No. 1, 4 and 6 were started in the ore and No. 6 was up halfway to the 7th level by the end of the year. From No. 1 and No. 4 exploring cross-cuts were driven on the -90 foot sub level. From these it would appear that there is a lean jasper zone in the main ore body similar to the horse of rock between No. 71 and No. 32 on the subs above the 7th level.

The main foot wall rock drift was driven West across Chase lease No. 9 to the 3000 West coordinate line. This drift started in slate, than cut iron formation, then a dike and, finally, cut through some high grade ore near the 1800 North South coordinate line.

The development work done on the 8th level added a large tonnage to our ore reserves.

Material was ordered and plans perfected for driving the main 6th level East under the Section 6 territory early in 1930

c. Stoping

In 1929 we again show an increase in the tons per man secured from stoping operations. The unit cost was cut from .417 to .392 per ton.

Stoping Tons Per Man:

Year	Tons Per Man Stoping
1920	9.27
1921	10.20
1922	13.82
1923	15.54
1924	15.67
1925	17.10
1926	17.33
1927	17.46
1928	20.26
1929	23.29

MORRIS LLOYD MINE

ANNUAL REPORT

YEAR 1929

UNDERGROUND

c. Stoping
(Continued)
The Averages by Months for the Year 1929 follows:

Month	Tons Per Man
Jan.	21.24
Feb.	24.81
March	26.72
April	24.36
May	22.80
June	23.27
July	22.93
August	23.78
Sept.	23.17
October	23.41
Nov.	22.64
Dec.	22.32

The increase in efficiency is due partially to the use of large scrapers and scraping units and also because we are sub level stoping all the narrow ore lens that have good hanging and foot walls. We have also incertain areas adopted the transfer sub level system, wherby the slices are driven at right angles to a drift connecting a series of small raises put up from the transfer drift. The following table shows the increasing number of scraping units in service at the end of each year.

	1927	1928	1929
Lake Shore Hoist			1
Sullivan Air Hoists	11	12	12
" Electric Hoists	8	14	18
Ingersoll-Rand Air Hoists	5	5	5
Waugh Electric Hoists	7	7	7
Total	31	38	43

Section 6 Mine
Main Deposit

The extreme East end of the main deposit was sliced out from the 1280 foot sub to the 1250 foot elevation. The three top subs were radially sliced into No. 51 and 52 and 61 raises, but the last sub was sliced into small dog raises put up from the 1210 foot sub transfer drift. During the latter part of the year we worked two, three men contracts in this territory aiming at four cuts per shift.

Below the 3rd main sub in the North West end of the main deposit, No. 20 after sub stoping the ore out above the main sub, dropped down to the 1100 foot elevation and stoped all the ore from the 3rd main sub down between the 3600 and 3800 coordinate lines, leaving a pillar just large enough to protect No. 50 raise.

In the main deposit below the main third level, the foot wall lens was stoped from the 900 foot sub up to the hanging 300 feet South East of Section 6 shaft. South West of the shaft, two sub stopes separated by a horse of jasper were mined from the 900 foot sub down to the 840 foot elevation for a distance of 45 feet back from the old workings.

MORRIS LLOYD MINE

ANNUAL REPORT

YEAR 1929

UNDERGROUND

c. Stoping
(Continued)

No. 8 Deposit

Near the close of the year contract No. 40 resumed mining this deposit on the third main sub. This ore was radially sliced into No. 10 raise. The 1150 foot sub was just started at the end of the year.

No. 10 Deposit

One more sub called the 1180 foot sub was mined out above the third main sub. Below this elevation for quite a distance the ore chimney is too small to mine. In the lower part of No. 10 deposit near the third level, the 980 and the 970 foot subs were sliced. At the third level elevation the ore area again becomes small, opening up again on the 890 foot sub. At the latter elevation NO. 46, drove a transfer drift West for 120 feet, put up four small raises and sub stoped the ore between the third level and the 890 foot sub back to the main raise.

No. 12 Deposit

This deposit was worked out by the sub level slicing system from the 1250 foot sub to the 1230 foot sub, slicing into main No. 12 raise and also the transfer raise put up from the end of the 1200 foot sub level drift.

Lloyd Mine

There was but little ore left in the Lloyd Mine deposit at the end of the year, as the five gangs employed here had finished the 975 and the 965 foot subs and were rapidly mining out the 955 and 945 foot sub levels.

Morris Mine

6th Level, Chase Lease No. 9

Most of the ore trammed on the 6th level came from No. 61 deposit, No. 33 sub stope located 1250 foot South West of the Morris Shaft. The main level drift was driven 200 feet due West and eight raises put up connected by small sub level drifts. The stope was started from the East end where the ore was 125 feet high tapering down to a 50 foot height at the West end. This stope was completely mined out during the year.

7th Level

Excelsior Iron Companys Lands:

In No. 21 deposit driftswere driven both East and West from No. 64 raise located 75 feet East of the East line of Chase Lease No. 9. Contract No. 64 traced the deposit North East for 150 feet while No. 36 drove both North West and South West finding two separate stringers separated by jasper. No. 64 also raised just East of the 1200 coordinate line and holed on the 6th level under the old subs mined by No. 35. The ore near this transfer raise was mined from the old subs down to the 320 foot elevation.

West of No. 64 raise contract No. 36 sub stoped the narrow lens South West of their raise, the stope crossing the line over into Chase Lease No. 9. The North West limb was being prepared for stoping in the latter part of 1929.

MORRIS LLOYD MINE

ANNUAL REPORT

YEAR 1929

UNDERGROUND

c. Stoping
(Continued)
7th Level
Excelsior Iron Co.'s Lands:

In the main deposit No. 63 working out the top radially sliced, the 280, 270, 260 and 250 foot sub levels into their raise. We found it necessary to go through so much dike that we decided to put in a transfer drift at a lower elevation and get some new raises up in the ore North of the dike. A new drift was driven North West from No. 63 raise on the 210 foot sub level and raises put up to the top of the ore, between the foot wall and the dikes, the 240 foot sub being mined into these dog raises.

Chase Lease No. 9.

There were a large number of contracts employed between the 6th and 7th levels on Chase Lease No. 9.

In the main deposit No. 39 radially sliced the 180 foot sub into their raise and just started the 170 foot sub before the year ended. This contract works close to the East line of the lease occasionally going over the boundary into the Excelsior Iron Co.'s lands.

On the West side of No. 39, No. 32 worked out the territory in the main deposit from the 180 foot sub down to the 130 foot elevation.

In the South side of the main deposit No. 71, 75, 90, and 92 have mined the ore down to within two subs of the sill floor of the 7th level.

In No. 61 deposit the sub level stope above the 250 foot sub was finished. Below this elevation it was decided to sub level slice the ore and with that end in view, the 160 foot sub level transfer drift was driven 150 feet West of the main raise and 65 feet in the opposite direction. Six raises spaced 22 feet apart were put up to the 230 foot elevation, and the latter sub sliced out two slices to a raise. Slicing also was started on the 220 foot sub before the year ended.

In order to be able to mine out the pillar under the 6th level floor under No. 33 sub stope, the 230 foot transfer drift was driven a little over 200 feet East of the main raise. From the end of the drift an inclined raise was put up on the foot and branch raises connected with it, making it possible to stope the East end of No. 61 deposit from the 6th level down to the 230 foot sub level.

Chase Lease No. 24

The West deposit was mined out by No. 75 from the 150 foot sub down to the bottom a short distance above the 7th level.

The trench stope deposit was finished, the last sub being only a short distance above the main level.

C. C. I. Co.'s Lands

South of Chase Lease No. 9 contract No. 91 worked out what little ore was left between the 120 and the 100 foot sub between the main dike and the dike running parallel to the lease line.

No. 21 Deposit, Chase Lease No. 9

Contract No. 34 mined out three subs above the 180 foot elevation, North of the dike between the East line of the lease and their raise.

MORRIS LLOYD MINE

ANNUAL REPORT

YEAR 1929

UNDERGROUND

d. Timbering

The total cost for timbering in 1929 was $88,467.62, compared with $79,651.94 in 1928. The unit costs for the two years was .224 and .203 respectively, the reduction in the cost per ton being due to a larger proportion of ore mined by the sub level stoping method.

Timber Statement:

The following statement shows the various quantities of timber used during 1929.

	Lineal Feet	Avg. Price Per Foot	Amount 1929	Amount 1928
6" to 8" Timber	72,116	.043	3,080.06	3,682,43
8" to 10" "	86,770	.060	5,242.24	3,923.49
10" to 12" "	35,196	.090	3,164.06	3,071.29
12" to 14" "	8,404	.106	887.51	1,555.21
Treated Timber	4,185	.369	1,545.41	346.40
Total Timber 1929	206,671	.067	13,922.28	
Total Timber 1928	195,800	.064		12,578.82
		Per 100'		
5' Lagging	568,650	.752	4,274.89	4,042.14
8' "	644,744	.787	5,077.98	4,509.84
Total Lagging	1,213,394	.771	9,352.87	8,551.98
3" Poles	464,479	1.42	6,609.88	6,560.14
Total Lagging & Poles 1929	1,677,873	.952	15,962,75	
" " " 1928	1,581,365	.956		15,112.12

	Amount 1929	Amount 1928
Product	435,430	356,164
Feet of Timber Per Ton of Ore	.474	.550
" " Lagging " " " "	2.79	3.18
" " " " Foot " Timber	5.86	5.78
Cost Per Ton for Timber	.0320	.0353
" " " " Lagging	.0215	.0240
" " " " Poles	.0152	.0184
" " " " All Timber	.0687	.0777
Equivalent of Stull Timber to Board Measure	341,196	333,836
Foot of Board Measure Per Ton of Ore	.783	.937

Cost of Timber, Lagging, Poles Etc. - 1929	29,885.03
" " " " " " - 1928	27,690.94
" " " " " " - 1927	27,993.33
" " " " " " - 1926	21,787.65
" " " " " " - 1925	17,701.50
" " " " " " - 1924	16,664.69
" " " " " " - 1923	15,207.16
" " " " " " - 1922	11,735.86

MORRIS LLOYD MINE

ANNUAL REPORT

YEAR 1929

UNDERGROUND

e. Drifting and Raising:

It will be noted from the figures that follow that in 1929 we carried on the most extensive development campaign in recent years. The total footage was more than twice as much as last year.

Year	Total Footage	Ore Drifting	Ore Raising	Rock Drifting	Rock Raising
1929	13,836 Ft.	7,096 Ft.	4,463 Ft.	2,242 Ft.	35 Ft.
1928	6,296 Ft.	3,211 Ft.	2,778 Ft.	237 Ft.	70 Ft.
1927	4,845 Ft.	2,210 Ft.	2,232 Ft.	9 Ft.	394 Ft.
1926	5,350 Ft.	2,249 Ft.	1,703 Ft.	868 Ft.	530 Ft.
1925	4,896 Ft.	2,794 Ft.	1,288 Ft.	390 Ft.	424 Ft.
1924	3,107 Ft.	1.945 Ft.	803 Ft.		359 Ft.

f. Statement of Explosives Used:

Breaking Ore and Rock Development

Kind	Quantity	Average Price	Amount 1929	Amount 1928
60% Powder	196,481	14.25	27,991.18	25,518.75
Total Powder	196,481	14.25	27,991.18	25,518.75
Fuse	527,457	6.50	3,430.72	3,412.89
Blasting Caps	112,526	11.64	1,309.25	1,078.72
Tamping Bags	40,000	20.43	81.75	101.50
Hand Crimpers	7	35	2.41	5.75
Cap Seal Compound	2	60	1.20	2.30
Bench Crimpers				66.00
Total Fuse, Caps, Etc.			4,825.33	4,667.16
Total Explosives			32,816.51	30,185.91
Product			435,430	356,164
Pounds Powder Per Ton Of Ore			.451	.473
Cost Per Ton For Powder			.064	.0716
" " " " Fuse, Caps, Etc.			.011	.0131
" " " " All Explosives			.075	.0847

Rock Developing

60% Powder	38,600	14.25	5,500.52	1,955.66
Total Powder	38,600	14.25	5,500.52	1,955.66
Fuse	73,143	6.26	458.20	127.92
Blasting Caps	11,949	11.57	138.10	48.01
Crimpers				.89
Elec. Delay Fuses & Caps				94.18
Connecting Wire	2	.69	1.38	9.28
Sealing Compound	6	.67	4.04	.25
Total			601.72	2236.19
Grand Total Explosives used in Mine			33,418.23	32,422.10
Average Price Per Lb. for Powder			.1425	.1513

MORRIS LLOYD MINE

ANNUAL REPORT

YEAR 1929

UNDERGROUND

f. Explosives
(Continued)

We have again decreased the amount and cost per ton for powder as shown by the following summary, viz:-

	Pounds Powder Per ton of Ore	Cost Per Ton For Explosives.
Year 1927	.500	.0890
Year 1928	.473	.0847
Year 1929	.451	.0750

8. COST OF OPERATING

a. Cost of production for pastten years follows:-

Year	Production	Daily Product	Cost of Production Labor	Supplies	Total
1920	261,772	873	1.751	.734	2.485
1921	209,034	723	1.482	.870	2.352
1922	221,979	737	1.019	.649	1.718
1923	260,335	882	1.083	.682	1.765
1924	246,356	940	1.026	.658	1.684
1925	265,829	1,022	.978	.595	1.573
1926	290,162	1,120	.949	.531	1.480
1927	326,814	1,224	1.018	.624	1.642
1928	356,164	1,362	.877	.589	1.466
1929	435,430	1,501	.776	.554	1.360

The Cost of production for 1929 is the lowest in the history of the property.

Comparative Mining Costs:	1929	1928	Inc.	Dec.
Product	435,430	356,164	79,266	
Underground Costs	1.095	1.154		.059
Surface Costs	.158	.181		.023
General Mine Accounts	.110	.131		.021
Cost of Production	1.363	1.466		.103
Depreciation	.219	.234		.015
Taxes	.135	.153		.018
Central Office	.075	.096		.021
Welfare, Safety, Hospital,Etc.	.033	.036		.003
Cost Adjustment	.001			
Cost on Stockpile	1.826	1.985		.159
Loading and Shipping	.055	.044	.011	
Total Cost On Cars	1.881	2.029		.148
Royalty	.110	.104	.006	
Rail Freight	.640	.640		
Lake Freight	.760	.760		
Cargo, Insurance & Analysis	.010	.010		
Shrinkage	.026	.028		.002
Total Cost Lower Lake Ports	3.427	3.571		.144
No. of Days Operated	290	261 1/8	28 1/8	
No. of Shifts & Hours	1-8	1-8		
Average Daily Product	1501	1362	139	
Cost of Production				
Labor	.809	.881		.072
Supplies	.554	.585		.031
Total	1.363	1.466		.103

MORRIS LLOYD MINE

ANNUAL REPORT

YEAR 1929

8. COST OF OPERATING

c. Detailed Cost Comparison:

Sinking in Shaft

	Amount	Per Ton.
Year 1929	0.00	0.00
" 1928	20,258.35	.057
Decrease	20,258.35	.057

The sinking of the Morris shaft from the 8th level to the bottom of the skip pit was done in 1928. The cost shown for 1928 also includes the cost of cutting the plat; concreting the storage pocket and plat; driving tail drift on 8th level and cutting out clean out drift for shaft pockets and sump under pump-house.

Development in Rock

Year 1929	23,652.62	.054
" 1928	3,932.65	.011
Increase	19,719.97	.043

In 1929 we drove a total footage in rock of 2029 feet at a cost of $11.66 per foot. In 1928 there was only 307 feet of rock drifting done at $12.81 per foot. Most of the rock work was done on the 8th level Morris Mine.

Development in Ore

Year 1929	27,277.19	.063
" 1928	21,275.65	.060
Increase	6,001.54	.003

Tons broken by ore development in 1929 totaled 36,259 compared with 28,398 in 1928.

Stoping

Year 1929	170,890.57	.392
" 1928	148,458.24	.417
Increase	22,432.33	
Decrease		.025

Although the total amount increased largely because of the additional working days operated in 1929, the unit cost shows a decrease of 2½ cents per ton. We broke a larger proportion of the ore mined in Sub level stopes in 1929.

MORRIS LLOYD MINE

ANNUAL REPORT

YEAR 1929

8. COST OF OPERATING

c. Detailed Cost Comparison:

Timbering

	Amount	Per Ton
Year 1929	88,467.62	.203
" 1928	79,651.94	.224
Increase	8,815.68	
Decrease		.021

The total amount expended for timbering increased in 1929 because of more days worked, but the unit cost shows a decrease because a larger proportion of the ore was mined by the sub level stoping method. The stoping method requires very little timber.

Tramming

	Amount	Per Ton
Year 1929	56,358.76	.127
" 1928	53,447.36	.150
Increase	2,911.40	
Decrease		.023

The total cost shows an increase because of more working days in 1929 but the unit cost shows a decrease because of larger daily tonnage handled by motor crews, chutemen, dumpers and skip tenders.

Ventilation

	Amount	Per Ton
Year 1929	45.73	
" 1928	170.94	
Decrease	125.21	

The extra cost charged to this account is very little because instead of using electric fans for ventilating the new 8th level drifts and raises we used the spray system for absorbing powder gas.

Pumping

	Amount	Per Ton
Year 1929	16,632.69	.038
" 1928	14,967.28	.042
Increase	1,665.41	
Decrease		.004

Increase is due to pumping water from the new 8th level. Although the 8th level partially drained the 7th level still more water was pumped in 1929 than for some years past as is shown from the figures that follow:

Year 1929	236,012,174	Gallons
" 1928	227,752,993	"
" 1927	223,631,596	"
" 1926	205,247,760	"

The Electric power used for pumping for past four years is as follows:

Electric Power for	1929 -	$10,596.75
" "	1928 -	9,618.18
" "	1927 -	11,194.17
" "	1926 -	9,793.29

MORRIS LLOYD MINE

ANNUAL REPORT

YEAR 1929

8. COST OF OPERATING

c. Detailed Cost Comparison

Compressors and Air Pipes:

	Amount	Per Ton.
Year 1929	43,378.12	.100
" 1928	30,702.65	.086
Increase	12,675.47	.014

Air Compressed in 1929 totaled 947,560,000 Cu. Ft.
Air Compressed in 1928 totaled 693,296,200 Cu. Ft.

Increased consumption and cost, because of operating 29 more days in 1929 and also because of the 8th level development work. The labor cost was almost identical for the two years, the increase being in the supply account. Electric power increased from $23,198.79 to $32,172.09. Cooling water for compressors cost $1,691.41 in 1929 compared with $322.76 in 1928, this increase being due to new pipes installed.

Underground Superintendence:

Year 1929	15,064.05	.035
" 1928	13,839.50	.039
Increase	1,224.55	
Decrease		.004

Increased because 290 days were worked in 1929 compared with 261½ in 1928, but the unit cost decreased because the daily average hoist was increased 139 tons per day.

Compressors and Power Drills:

Year 1929	3,113.67	.007
" 1928	1,385.73	.004
Increased	1,727.94	.003

In 1928 six second hand BBR 230 Jack Hammers were purchased from the Stephenson Mine. Also two new N-75 Drifters and one RB 12 Jack Hammer. In 1929, nine new RB 12 Jack Hammers and one N-75 drifter were charged out. A new piston and other repair parts cost $773.44 were purchased for the Ingersoll Rand Compressor.

Electric Tram Equipment:

Year 1929	17,667.61	.041
" 1928	19,089.73	.054
Decreased	1,422.12	.013

The maintenance cost for the Electric Haulage system for the past two years in detail was as follows:

	Year 1929	Year 1928
Generator	553.86	205.03
Locomotives	2,995.67	5,428.36
Wiring	1,762.91	2,422.78
Main Line Tracks	6,628.96	3,662.70
Main Line Cars	5,726.21	7,370.86
Total	17,667.61	19,089.73

8. COST OF OPERATING

c. Detailed Cost Comparison

Electric Tram Equipment
(Continued)

The detail shows less money spent repairing mine locomotives and cars but an increase in the cost for Tracks. The new 8th level was opened up in 1929 and in the previous year we overhauled all the motor armatures and kept the blacksmith shop crew busy repairing both the two ton Rocker cars and the four ton Saddle Back cars.

Pumping Machinery

	Amount	Per Ton
Year 1929	14,286.81	.033
" 1928	3,682.01	.010
Increase	10,604.80	.023

The large expenditure for 1929 was due to cutting new pump house and sump on the 8th level Morris shaft and equipping the new pump house with two second hand Triplex pumps one from the Salisbury Mine and one from the Spies Mine.

Hoisting

Year 1929	25,901.19	.060
" 1928	21,949.23	.062
Increase	3,951.96	
Decrease		.002

Total cost increased because of the additional ore and rock hoisted in both the Morris and Lloyd shafts came from greater depth. This additional cost was offset by the greater daily product handled by the brakesmen and as a result the unit cost shows a decrease.

Stocking Ore

Year 1929	10,290.31	.024
" 1928	9,800.45	.028
Increase	1,489.86	
Decrease		.004

In 1928 the cost of stocking ore was below normal, that is below the cost for 1925, 1926 and 1927. In those years extensive repairs were made on the permanent trestles and new stringers and legs purchased for the portable trestles. The unit cost for 1929 shows a small decrease because of the increase in daily tonnage in 1929.

There is no doubt that permanent steel stocking trestles should be erected at both the lloyd and Morris shafts as soon as enough ore has been cleaned up to make room for construction work. New stocking areas could be provided North East of the Morris Shaft, but the cost of grading these grounds would be heavy.