

1923
MINING DEPT.
CLEVELAND - ANNUAL

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THE
CLEVELAND - CLIFFS IRON CO.
MINING DEPARTMENT

ANNUAL REPORT OF GENERAL MANAGER
FOR YEAR ENDING
DECEMBER 31ST. 1923

MS 86-100
1994

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January 1, 1924.

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

Dear Sir:-

I beg to submit the following report of the operations of the Mining Department for the year 1923. The inventories, maps, and statements relating to this report have gone forward to you under separate cover. The colored portions of the maps show the work for the year. The report of the different mines of the Company were made by the Superintendents in Charge and the reports of the Mechanical, Engineering, Geological, Safety, and Welfare Departments by the heads of these departments.

There was a shortage of labor during the first half of the year, which was most pronounced at our outside mines, with the exception of the Swim District, where the curtailment at several of the properties resulted in a full complement of men at the operating mines. There is still a shortage in the North Lake and Negaunee District, except the Negaunee Mine.

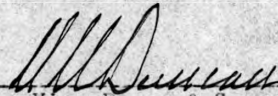
On the first of May there was an advance of ten percent in wages which correspondingly increased costs for the balance of the year. Our present wage scale approaches most nearly that in effect for the months of May, June, and July, 1918. For this reason I have had a comparative statement made for these months in the two years. This shows that while the cost is slightly higher, it is principally due to an increase in taxes, brought about by a smaller output in 1923.

I call your attention, however, to the comparative statement

of the tons per man per day, which shows an increase for 1923, which is very gratifying and which indicates an increased efficiency. This, of course, is due in part to the installation of mechanical equipment, such as loaders and scrapers. We shall continue to follow up this work, as it is the only way to decrease our present costs.

Mr. Jackson, in his reports on the Negaunee, Maas, and Athens Mines, calls attention to the inclined slicing system, which has possibilities, but which up to this time we have not been able to develop to any extent.

The only outstanding lease is to the Empire Iron Company, covering the E $\frac{1}{2}$ of the S $\frac{1}{4}$ and the W $\frac{1}{2}$ of the S $\frac{1}{4}$ of Section 19-47-26.



Vice Pres. & Gen. Mgr.

THE CLEVELAND-CLIFFS IRON COMPANY

MINING DEPARTMENT

ANALYSIS OF COST SHEETS

SUPPLEMENT TO ANNUAL REPORT OF GENERAL

MANAGER FOR YEAR ENDING DECEMBER 31, 1923.

STEPHENSON MINE
ANALYSIS OF COST SHEETS EXPLAINING INCREASE OR DECREASE
IN VARIOUS ACCOUNTS BETWEEN YEARS 1923 AND 1922.

UNDERGROUND COSTS:			
Exploring in Mine,	Year 1923	664.74	Cost per ton .003
	Year 1922	<u>1,011.83</u>	" " " .005
	DECREASE	347.09	DECREASE <u>.002</u>

In 1923, there were two holes drilled in #5 crosscut on the 6th Level on C. & N. W. Ry. Co., Lease, Section 29, to determine the downward extension of the ore body below the 6th Level on both the Stephenson and C. & N. W. Ry. Co. Leases, in order to plan new levels to be opened from auxiliary shaft.

In 1922, six holes were drilled on the 6th Level to determine the downward extension of the North-east ore body at a point near the C. & N. W. Ry. Co. boundary line, so that more accurate estimates could be made of prospective ore below the 6th Level, and also to give information for planning levels to be opened from auxiliary shaft.

There was 188 feet of drilling in 1923, as compared with 427 feet in 1922. The decrease in 1923 was due to less feet drilled.

Sinking in Shaft,	Year 1923	5,819.86	Cost per ton .023
	Year 1922	<u>79.47</u>	" " " .000
	INCREASE	5,740.39	INCREASE <u>.023</u>

There was a small charge to this account in 1922, for timber used in the auxiliary engine house on 6th Level. The 1923 charges cover cost of raising, stripping and timbering auxiliary shaft, 65 feet above the 6th Level and sinking 92 feet below the 6th Level.

Development in Rock,	Year 1923	13,395.92	Cost per ton .054
	Year 1922	<u>16,537.55</u>	" " " .078
	DECREASE	3,141.63	DECREASE <u>.024</u>

The decrease is due to less rock drifting and raising in 1923; there was 1,577 feet in 1923 as compared with 2,488 feet in 1922. The cost per foot was \$8.49 in 1923, as compared with \$6.65 in 1922; the increase in 1923 was due to more motor haulage drifting and less raising, and to increase in wages.

Development in Ore,	Year 1923	1,777.23	Cost per ton .007
	Year 1922	<u>1,607.29</u>	" " " .008
	INCREASE	169.94	DECREASE <u>.001</u>

The increase is due to increase in wages. In 1923, there was 375 feet of raising and drifting in ore, as compared with 398 feet in 1922.

Stoping,	Year 1923	112,339.87	Cost per ton	.454
	Year 1922	<u>80,670.11</u>	" " "	<u>.378</u>
	INCREASE	31,669.76	INCREASE	.076

The increase was due to increase of 16% in output, to increased wages, and to more mining under hanging in new territory where the ore was harder and more expensive to mine. The last two reasons given above account for the increase in the cost per ton.

Timbering,	Year 1923	66,954.40	Cost per ton	.271
	Year 1922	<u>52,383.72</u>	" " "	<u>.246</u>
	INCREASE	14,570.68	INCREASE	.025

Analyzing the above increase shows timber prices increased 15% in 1923, and the total cost for timber increased 17.3%. There was a decrease in the amount of timber used per ton of ore. The cost per ton for timber, lagging, poles and covering boards was 2.6% lower in 1923. The actual expenditure for timber, lagging, poles and covering boards was \$21,898.23 in 1923 as compared with \$17,626.10 in 1922, or an increase of \$4,272.13; the cost per ton was \$.0885 as compared with \$.0909 in 1922. Labor cost for timbering increased \$10,298.50 in 1923, due to increase in wages and to more re-timbering in mine.

Tramming,	Year 1923	33,608.95	Cost per ton	.136
	Year 1922	<u>24,458.34</u>	" " "	<u>.115</u>
	INCREASE	9,150.61	INCREASE	.021

The detail of charges for 1923 and 1922 is as follows:

	<u>1923</u>	<u>1922</u>	<u>INCREASE</u>	<u>DECREASE</u>
Electric Haulage,	23,484.33	16,307.85	7,176.48	
Other Charges,	<u>10,124.62</u>	<u>8,150.49</u>	<u>1,974.13</u>	
	33,608.95	24,458.34	9,150.61	

The increase was due to increase in wages and to larger product.

Pumping,	Year 1923	43,729.64	Cost per ton	.177
	Year 1922	<u>42,510.41</u>	" " "	<u>.199</u>
	INCREASE	1,219.23	DECREASE	.022

The detail of charges for 1923 and 1922 is as follows:

	<u>1923</u>	<u>1922</u>	<u>INCREASE</u>	<u>DECREASE</u>
Labor,	7,193.88	5,657.93	1,535.95	
Electric Power,	35,497.50	35,863.50		366.00
Other Supplies,	<u>1,038.26</u>	<u>988.98</u>	<u>49.28</u>	
	43,729.64	42,510.41	1,219.23	

Gals. Water Pumped, 1,234,675,108 1,258,504,848 23,829,740

There was a slight decrease in the total gallons of water pumped during 1923 as compared with 1922. The increase in expenditures is due to higher labor costs which amounted to \$1,535.95; labor cost increased account higher wages and more time by pumpmen on 6th Level. The cost for electric power decreased \$366.00 and other supplies increased \$49.28.

Compr. & Air Pipes,	Year 1923	22,988.70	Cost per ton	.093
	Year 1922	<u>17,680.72</u>	" " "	<u>.083</u>
	INCREASE	5,307.98	INCREASE	.010

The detail of charges for 1923 and 1922 is as follows:

	<u>1923</u>	<u>1922</u>	<u>INCREASE</u>
Compressors,	19,610.02	15,605.60	4,004.42
Air Pipes,	<u>3,378.68</u>	<u>2,075.12</u>	<u>1,303.56</u>
	22,988.70	17,680.72	5,307.98
Total Cu. Ft. Air,	482,823,405	403,595,010	79,228,395

The increase is due to higher cost for air, on account of more ore mined, sinking auxiliary shaft, operating auxiliary shaft pump and to increase in wages. The expense for air pipes increased on account of increase in wages and extension of air lines in 6th Level crosscuts and on 4th Level. The amount of air used increased 19%.

Undgr. Superintendence,	Year 1923	13,262.68	Cost per ton	.054
	Year 1922	<u>10,354.68</u>	" " "	<u>.049</u>
	INCREASE	2,908.00	INCREASE	.005

The increase of 28% is due to increase in wages, and to employment of Capt. Bath as underground foreman for eight months of the year.

Maintenance Accts.

Hand-Tramming Equipt.	Year 1923	1,494.34	Cost per ton	.006
	Year 1922	<u>1,296.79</u>	" " "	<u>.006</u>
	INCREASE	197.55	----	---

The detail of charges for 1923 and 1922 is as follows:

	<u>1923</u>	<u>1922</u>	<u>INCREASE</u>
Cars,	842.05	710.88	131.17
Tracks,	<u>652.29</u>	<u>585.91</u>	<u>66.38</u>
	1,494.34	1,296.79	197.55

The increase is due to more expense for repair of sub-level cars and tracks, and to new sub-level cars built on account of increase in number of contracts working in the mine.

Elec. Tram. Equipt.	Year 1923	9,746.22	Cost per ton	.039
	Year 1922	<u>6,907.23</u>	" " "	<u>.032</u>
	INCREASE	2,838.99	INCREASE	.007

The detail of charges for 1923 and 1922 is as follows:

	<u>1923</u>	<u>1922</u>	<u>INCREASE</u>	<u>DECREASE</u>
Generator and Motor,	267.33	84.58	182.75	
Locomotives,	1,478.00	1,138.04	339.96	
Wiring,	1,279.56	909.61	369.95	
Main Line Tracks,	2,662.39	1,956.62	705.77	
" " Cars,	4,047.89	2,749.31	1,298.58	
Spotting Engines,	<u>11.05</u>	<u>69.07</u>		58.02
	9,746.22	6,907.23	2,838.99	

Elec. Tram. Equipt. . All accounts, except one, show increases due to more re-
 (continued) pairs in 1923. Wages were higher and more ore was
 handled. More rebuilding of main line cars was necess-
 ary, a blacksmith and helper being employed underground
 at this work practically the entire year.

Pumping Machinery,	Year 1923	8,774.36	Cost per ton	.036
	Year 1922	<u>8,016.73</u>	" " "	<u>.037</u>
	INCREASE	757.63	DECREASE	.001

The detail of charges for 1923 and 1922 is as follows:

	<u>1923</u>	<u>1922</u>	<u>INCREASE</u>	<u>DECREASE</u>
Steam Pumps,	207.97	50.39	157.58	
Electric "	854.90	814.38	40.52	
Dams)	430.73)			
Keystone Drill)	6,591.85)	6,858.09	164.49	
Launders & Ditches,	<u>688.91</u>	<u>293.87</u>	<u>395.04</u>	
	<u>8,774.36</u>	<u>8,016.73</u>	<u>757.63</u>	

All accounts show increases. The account, "Keystone
 Drill", covers expense of work near #66 drill hole in
 connection with effort to get water to enter the mine
 under control. Expense for "Launders" increased on
 account of replacing supports under launder leading from
 shaft to Escanaba River.

TOTAL UNDERGROUND COSTS			
Year 1923	335,672.75	Cost per ton	1.358
Year 1922	<u>263,516.59</u>	" " "	<u>1.236</u>
INCREASE	72,156.16	INCREASE	.122

The increase is due to expense of sinking auxiliary shaft,
 to larger product, to increase in wages, to more re-
 timbering in mine, to employment of underground fore-
 man and to extensive repairs to main line cars.

	SURFACE COSTS		
Hoisting,	Year 1923	13,122.64	Cost per ton .053
	Year 1922	<u>17,808.36</u>	" " " <u>.083</u>
	DECREASE	4,685.72	DECREASE .030

The detail of charges for 1923 and 1922 is as follows:

	<u>1923</u>	<u>1922</u>	<u>INCREASE</u>	<u>DECREASE</u>
Labor,	6,396.42	4,125.39	2,271.03	
Electric Power,	5,002.65	1,809.45	3,193.20	
Heating Expense,	1,449.34	481.26	968.08	
Other Supplies,	274.23	273.28	.95	
Steam Power,		<u>11,118.98</u>		<u>11,118.98</u>
	<u>13,122.64</u>	<u>17,808.36</u>		<u>4,685.72</u>

The decrease is due to hoists being operated by electric
 power in 1923, while in 1922, they were operated by
 steam power for 7-1/2 months and by electric power for
 4-1/2 months. Heating expense increased in 1923, due
 to higher charge from heating plant, after hoists were
 operated by electric power.

Stocking Ore,	Year 1923	12,458.14	Cost per ton	.050
	Year 1922	<u>14,475.00</u>	" " "	<u>.068</u>
	DECREASE	2,016.86	DECREASE	.018

The detail of charges for 1923 and 1922 is as follows:

	<u>1923</u>	<u>1922</u>	<u>INCREASE</u>	<u>DECREASE</u>
Erecting Portable Trestles,	2,012.82	5,921.14		3,908.32
Opt. Tram System,	9,564.01	7,446.22	2,117.79	
Picking and Teaming Rock,	<u>881.31</u>	<u>1,107.64</u>		<u>226.33</u>
	12,458.14	14,475.00		2,016.86

The decrease is due to less expense for erection of stocking trestles. Due to small shipments, comparatively few trestles could be rebuilt. New stocking trestles are charged to another account.

Dry House,	Year 1923	7,531.71	Cost per ton	.031
	Year 1922	<u>6,949.17</u>	" " "	<u>.033</u>
	INCREASE	582.54	DECREASE	.002

Heating,	<u>1923</u>	<u>1922</u>	<u>INCREASE</u>
	4,469.52	3,161.20	1,308.32

The increase is due to higher price for coal, and to increase in wages. The cost for operating heating plant was higher after the hoisting plant changed from steam to electric.

Gen'l. Surface Expense,	Year 1923	2,680.91	Cost per ton	.011
	Year 1922	<u>2,366.95</u>	" " "	<u>.011</u>
	INCREASE	313.96	---	

The increase in expenditures is due to higher wages paid in 1923.

Maintenance Accts.

Hoisting Equipment,	Year 1923	9,646.44	Cost per ton	.039
	Year 1922	<u>30,678.46</u>	" " "	<u>.144</u>
	DECREASE	21,032.02	DECREASE	.105

The detail of charges for 1923 and 1922 is as follows:

	<u>1923</u>	<u>1922</u>	<u>INCREASE</u>	<u>DECREASE</u>
Auxiliary Hoist,	5,716.71	657.26	5,059.45	
Steam "		455.59		455.59
Electric "	579.99	27,116.15		26,536.16
Wire Rope,	499.66	119.99	379.67	
Skips, Cages and Skip Roads,	<u>2,850.08</u>	<u>2,329.47</u>	<u>520.61</u>	
	9,646.44	30,678.46		21,032.02

The decrease is due to changing steam hoists to electric, in 1922. Expenditures in 1923 were above normal due to installing electric auxiliary hoist on 6th Level, which includes cost of drifting to engine house, cutting engine house and fire-proofing same, cost of power cable, etc.

Shaft,	Year 1923	401.58	Cost per ton	.002
	Year 1922	<u>614.39</u>	" " "	<u>.003</u>
	DECREASE	202.81	DECREASE	.001

The decrease is due to less repairs to shaft in 1923.

Top Tram Equipment,	Year 1923	3,309.10	Cost per ton	.013
	Year 1922	<u>3,336.66</u>	" " "	<u>.016</u>
	DECREASE	27.56	DECREASE	.003

The detail of charges for 1923 and 1922 is as follows:

	<u>1923</u>	<u>1922</u>	<u>INCREASE</u>	<u>DECREASE</u>
Engines and Motors,	170.88	211.73		40.85
Tracks and Cars,	1,793.64	1,663.24	130.40	
Wire Rope,	662.21	862.96		200.75
Sheaves, Rollers, etc.	<u>682.37</u>	<u>598.73</u>	83.64	
	3,309.10	3,336.66		27.56

Expenses for the two years were practically equal.

Docks, Tres. & Pkts.	Year 1923	3,566.94	Cost per ton	.015
	Year 1922	<u>927.22</u>	" " "	<u>.004</u>
	INCREASE	2,639.72	INCREASE	.011

The detail of charges for the years 1923 and 1922 is as follows:

	<u>1923</u>	<u>1922</u>	<u>INCREASE</u>	<u>DECREASE</u>
Grading and Planking,	53.52	159.75		106.23
Permanent Trestles,	451.29	755.09		303.80
Portable Trestles (Original cost)	3,025.05		3,025.05	
Pockets,	<u>37.08</u>	<u>12.38</u>	24.70	
	3,566.94	927.22	2,639.72	

The increase is due to original cost of erecting portable trestle in order to provide for stocking the ore hoisted during the winter 1923-1924. This new construction was due to small shipments made in 1923.

Mine Buildings,	Year 1923	2,776.24	Cost per ton	.011
	Year 1922	<u>1,226.80</u>	" " "	<u>.005</u>
	INCREASE	1,549.44	INCREASE	.006

The detail of charges for 1923 and 1922 is as follows:

	<u>1923</u>	<u>1922</u>	<u>INCREASE</u>	<u>DECREASE</u>
Office,	330.65	52.78	277.87	
Warehouse,	13.73	245.90		232.17
Stables,	167.56	91.56	76.00	
Shaft House,	100.79	8.52	92.27	
Engine House,	602.22	340.66	261.56	
Boiler House,	54.07	34.54	19.53	
Dry House,	675.96	430.96	245.00	
Coal Dock and Trestle,	59.61	6.29	53.32	
Fire Protection,	615.69	9.39	606.30	
Water Tank,	149.71		149.71	
Oil House,	<u>6.25</u>	<u>6.20</u>	.05	
	2,776.24	1,226.80	1,549.44	

Mine Buildings:
(Continued)

The increase is due to more expenditures on account of repairs to heating system at mine office, to rewiring stables, to concrete floor in engine house, to repairs of roof and piping in dry house, to repairing coal dock trestle, to purchase of 150 feet of fire house and installation of water lines to timber yards for fire protection, and to repairs to water tank.

TOTAL SURFACE COSTS			
Year 1923	55,493.70	Cost per ton	.225
Year 1922	<u>78,383.01</u>	" " "	<u>.367</u>
DECREASE	22,889.31	DECREASE	.142

The large decrease is due to extraordinary expense in 1922, on account of changing steam hoists to electric.

Gen'l. Mine Accts.

Insurance,	Year 1923	206.58	Cost per ton	.001
	Year 1922	<u>234.60</u>	" " "	<u>.001</u>
	DECREASE	28.02	---	

This account shows a decrease of \$28.02 due to less premiums paid in 1923.

Engineering,	Year 1923	3,591.17	Cost per ton	.014
	Year 1922	<u>3,766.08</u>	" " "	<u>.018</u>
	DECREASE	174.91	DECREASE	.004

The decrease is due to less time by engineers on Stephenson mine work.

Analysis,	Year 1923	8,013.32	Cost per ton	.032
	Year 1922	<u>8,074.08</u>	" " "	<u>.038</u>
	DECREASE	60.76	DECREASE	.006

The detail of charges for 1923 and 1922 is as follows:

	<u>1923</u>	<u>1922</u>	<u>INCREASE</u>	<u>DECREASE</u>
Laboratory Costs,	5,864.22	5,791.84	72.38	
Sampling "	<u>2,149.10</u>	<u>2,282.24</u>		<u>133.14</u>
	8,013.32	8,074.08		60.76
Number Determinations,	20,405	21,827		1,422
Rate per Determination,	.2874	.2653	.0221	

The increase in laboratory costs and higher rate per determination for 1923 are due to increased wages. The decrease in sampling costs is due to the decreased shipments in 1923.

Pers. Inj. Expense,	Year 1923	13,699.62	Cost per ton	.055
	Year 1922	<u>8,316.35</u>	" " "	<u>.039</u>
	INCREASE	5,383.27	INCREASE	.016

The increase in this account is due to two fatal accidents during 1923; Rinaldo Betteneschi, Accident Report #626, February 3rd, 1923, and Wm. Ranta, #628, February 12th, 1923. There were no fatal accidents in 1922.

Safety Dept. Exp.	Year 1923	231.31	Cost per ton	.001
	Year 1922	<u>158.57</u>	" " "	<u>.001</u>
	INCREASE	72.74	---	

The detail of charges for 1923 and 1922 is as follows:

	<u>1923</u>	<u>1922</u>	<u>INCREASE</u>	<u>DECREASE</u>
Salaries of Committee,	159.62	130.25	29.37	
Traveling Expenses,	9.90	--	9.90	
First-Aid Supplies,	<u>661.79</u>	<u>28.32</u>	<u>33.47</u>	
	231.31	158.57	72.74	

The increase is due to more expense for first-aid practice and more first-aid supplies used.

Tel. & Saf. Devices,	Year 1923	1,113.88	Cost per ton	.005
	Year 1922	<u>261.90</u>	" " "	<u>.001</u>
	INCREASE	851.98	INCREASE	.004

The detail of charges for 1923 and 1922 is as follows:

	<u>1923</u>	<u>1922</u>	<u>INCREASE</u>	<u>DECREASE</u>
Lighting for Shaft & Levels	432.02	161.31	270.71	
Mine Telephones,	61.02	31.88	29.14	
Safety Gates,	14.04	8.71	5.33	
Sign Boards & Signals,	40.73	60.00		19.27
Fire Protection, U.G.	232.57	--	232.57	
Ishpeming Charge,	<u>333.50</u>		<u>333.50</u>	
	1,113.88	261.90	851.98	

The increase is due to more expense for lighting levels, more repairs to mine telephones, expense for fire truck underground, and charge from Ishpeming office of \$333.50, as the Stephenson Mine proportion of cost of new oxygen helmets.

Local Gen'l. Welfare,	Year 1923	2,085.91	Cost per ton	.008
	Year 1922	<u>2,223.22</u>	" " "	<u>.010</u>
	DECREASE	137.31	DECREASE	.002

The total Local General Welfare for the Gwinn District showed a small increase for 1923, but the proportion charged to Stephenson Mine was 20.4% in 1923 as compared with 23.7%, in 1922, which accounts for the decrease shown above.

Special Expenses,	Year 1923	240.06	Cost per ton	.001
	Year 1922	--	" " "	---

This charge is made direct at the Ishpeming office.

Mine Office,	Year 1923	6,057.08	Cost per ton	.025
	Year 1922	<u>5,012.72</u>	" " "	<u>.024</u>
	INCREASE	1,044.36	INCREASE	.001

The increase above is due to increased salaries and to increases in other accounts as follows:
Office expense \$127.12 Printing & Stationery, \$23.17; Exchange, \$71.50. Traveling decreased \$60.66 and Stable Expense - \$31.16.

District Office,	Year 1923	5,647.12	Cost per ton	.023
	Year 1922	<u>5,983.97</u>	" " "	<u>.028</u>
	DECREASE	336.85	DECREASE	.005

The total Gwinn District office expense increased \$2074.66 but the proportion charged to Stephenson in 1923 was 20.4% and in 1922 - 22.7%, making the decrease of \$336.85 above shown.

<u>TOTAL GENERAL MINE ACCOUNTS</u>				
Year 1923	40,886.05	Cost per ton	.165	
Year 1922	<u>34,031.49</u>	" " "	<u>.160</u>	
INCREASE	6,854.56	INCREASE	..005	

The large increase is due to the two fatal accidents in February, 1923.

<u>COST OF PRODUCTION</u>				
Year 1923	432,052.50	Cost per ton	1.748	
Year 1922	<u>375,931.09</u>	" " "	<u>1.763</u>	
INCREASE	56,121.41	DECREASE	.015	

	<u>1923</u>	<u>1922</u>	<u>INCREASE</u>	<u>DECREASE</u>
Total Underground Costs,	335,672.15	263,516.59	72,156.16	
" Surface "	55,493.70	78,383.01		22,889.31
" General Mine Accts.	<u>40,886.05</u>	<u>34,031.49</u>	6,854.56	
COST OF PRODUCTION	432,052.50	375,931.09		
NET INCREASE - 1923			57,121.41	

The increase is mainly due to increase in wages, to larger product, and to the two fatal accidents in February, 1923.

AUSTIN MINE
ANALYSIS OF COST SHEETS EXPLAINING INCREASE OR DECREASE
IN VARIOUS ACCOUNTS BETWEEN YEARS 1923 AND 1922.

		UNDERGROUND COSTS			
Development in Rock,	Year 1923	10,864.97	Cost per ton	.131	
	Year 1922	<u>3,864.37</u>	" " "	<u>.076</u>	
	INCREASE	7,000.60	INCREASE	.055	

	<u>1923</u>	<u>1922</u>	<u>INCREASE</u>
Number feet,	1,556	1,034	522
Cost per foot,	6.98	3.74	3.24

The increase is due to more rock drifting and raising. The increase in cost per foot was due to higher wages and to more main level haulage drifts in 1923, while most of the rock drifting in 1922 was through caved ground.

Development in Ore,	Year 1923	1,650.39	Cost per ton	.020	
	Year 1922	<u>450.37</u>	" " "	<u>.009</u>	
	INCREASE	1,200.02	INCREASE	.011	

The increase is due to 330 feet of ore drifting and raising in 1923, as compared with 99 feet of ore raising in 1922.

Stoping,	Year 1923	44,730.50	Cost per ton	.539	
	Year 1922	<u>24,120.11</u>	" " "	<u>.474</u>	
	INCREASE	20,610.39	INCREASE	.065	

The increase in expenditures is due to the mine operating 258 days in 1923, as compared with 172 days in 1922. Wages increased approximately 12%, and the product increased 63%.

Timbering,	Year 1923	32,002.03	Cost per ton	.386	
	Year 1922	<u>20,335.02</u>	" " "	<u>.399</u>	
	INCREASE	11,667.01	DECREASE	.013	

The increase in expenditures is due to the mine operating 86 more days in 1923. The cost per ton for timber, lagging, poles and covering boards was \$.1044 in 1923 as compared with \$.0972 in 1922, the increase was due to higher prices paid for timber, etc.

Tramming,	Year 1923	13,385.61	Cost per ton	.161	
	Year 1922	<u>8,561.00</u>	" " "	<u>.168</u>	
	INCREASE	4,824.61	DECREASE	.007	

The increase in expenditures is due to the mine operating 86 more days in 1923, to more trammers employed on account of larger daily product.

Pumping,	Year 1923	2.12	Cost per ton	.000
	Year 1922	<u>91.65</u>	" " "	<u>.002</u>
	DECREASE	89.53	DECREASE	.002

There was practically no expenditures in this account in 1923; the 1922 charges cover cost of pumping out skip pit in No. 1 Shaft until in early winter, when the skip rope was shortened so that the skip only went to the 4th Level pocket. The Austin Mine water flows to the Stephenson Mine through the drift connecting these mines.

Compr. & Air Pipes,	Year 1923	8,266.85	Cost per ton	.100
	Year 1922	<u>5,489.01</u>	" " "	<u>.108</u>
	INCREASE	2,777.84	DECREASE	.008

		<u>1923</u>	<u>1922</u>	<u>INCREASE</u>
Compressors,		6582.11	4775.33	1806.78
Air Pipes,		<u>1684.74</u>	<u>713.68</u>	<u>971.06</u>
		8266.85	5489.01	2777.84

The increased expenditures are due to the mine operating 86 more days in 1923. The expense for air pipes also increased due to change in air lines on account of abandoning No. 1 Shaft.

U.G. Superintendence,	Year 1923	5,817.51	Cost per ton	.070
	Year 1922	<u>3,149.08</u>	" " "	<u>.062</u>
	INCREASE	2,668.43	INCREASE	.008

The increase is due to the mine operating 86 days more in 1923, and to increase in wages.

Maintenance Accts.

Hand-Tram Equipment,	Year 1923	2,385.60	Cost per ton	.029
	Year 1922	<u>1,111.20</u>	" " "	<u>.022</u>
	INCREASE	1,274.40	INCREASE	.007

The detail of charges for 1923 and 1922 is as follows:

		<u>1923</u>	<u>1922</u>	<u>INCREASE</u>
Cars,		981.06	400.02	581.04
Tracks,		<u>1,404.54</u>	<u>711.18</u>	<u>693.36</u>
		2,385.60	1,111.20	1,274.40

The increase is due to the mine operating 86 more days in 1923, to increase in wages, and to installation of permanent haulage tracks in drifts from No. 1 to No. 2 Shafts.

Pumping Machinery,	Year 1923	283.83	Cost per ton	.003
	Year 1922	<u>348.58</u>	" " "	<u>.007</u>
	DECREASE	64.75	DECREASE	.004

The detail of charges for the two years is as follows:

		<u>1923</u>	<u>1922</u>	<u>INCREASE</u>	<u>DECREASE</u>
Steam Pumps,		129.03	104.45	24.58	
Electric Pumps,			5.10		5.10
Launders and Ditches,		<u>154.80</u>	<u>239.03</u>		<u>84.23</u>
		283.83	348.58		64.75

Pumping Machinery
(Continued)

The decrease is due to less expense for drain pipes in shaft and ditches. The charges for pumps in both years cover cost of repairs to pumps used in pumping water from skip pits.

TOTAL UNDERGROUND COSTS			
Year 1923	119,752.19	Cost per ton	1.443
Year 1922	<u>67,528.39</u>	" " "	<u>1.327</u>
INCREASE	52,223.80	INCREASE	.116

The large increase in expenditures is due to the mine operating 86 more days in 1923. It was increased also on account of higher wages, and to some expense on account of transfer of hoisting operations from No. 1 to No. 2 Shaft.

SURFACE COSTS			
Hoisting,	Year 1923	3,409.21	Cost per ton .041
	Year 1922	<u>2,235.18</u>	" " " <u>.044</u>
	INCREASE	1,174.03	DECREASE .003

The increase is due to the mine operating 86 more days in 1923 and to higher wages paid brakeman. The cost per ton decreased on account of larger daily product.

Stocking Ore,	Year 1923	5,909.20	Cost per ton .071
	Year 1922	<u>4,462.08</u>	" " " <u>.088</u>
	INCREASE	1,447.12	DECREASE .017

The detail of charges for 1923 and 1922 is as follows:

	<u>1923</u>	<u>1922</u>	<u>INCREASE</u>
Erecting Portable Trestles,	1565.84	686.11	879.73
Optg. Tram System,	3633.00	3414.29	218.71
Rock Pickers & Teaming Rock,	<u>710.36</u>	<u>361.68</u>	<u>348.68</u>
	5909.20	4462.08	1447.12

The increase is due to more expense for erecting portable trestle, and more expense for rock picking, due, in both cases, to the mine operating 86 more days in 1923. The expense for operating tram system for the two years was nearly equal, due to more ore shipped from pocket in 1923 and less ore stocked.

Dry House,	Year 1923	3,396.03	Cost per ton .041
	Year 1922	<u>1,551.52</u>	" " " <u>.031</u>
	INCREASE	1,844.51	INCREASE .010

The increase is due to the mine operating 86 more days in 1923, to increase in wages and increase in cost of fuel.

Gen'l. Surf. Expense,	Year 1923	2,178.98	Cost per ton .026
	Year 1922	<u>1,393.42</u>	" " " <u>.027</u>
	INCREASE	785.56	DECREASE .001

The increase is due to the mine operating 86 more days in 1923, and to increase in wages.

Maintenance Accts.

Hoisting Equipment,	Year 1923	4,007.73	Cost per ton	.048
	Year 1922	<u>837.99</u>	" " "	<u>.016</u>
	INCREASE	3,169.74	INCREASE	.032

The detail of charges for 1923 and 1922 is as follows:

	<u>1923</u>	<u>1922</u>	<u>INCREASE</u>	<u>DECREASE</u>
Pulley Stands,		171.19		171.19
Auxiliary Hoist,		99.31		99.31
Steam Hoist,	4.30		4.30	
Electric Hoist,	2,323.95	104.07	2,219.88	
Wire Rope,	76.75	61.90	14.85	
Skips, Cages & Skip Roads	<u>1,602.73</u>	<u>401.52</u>	<u>1,201.21</u>	
	4,007.73	837.99	3,169.74	

The large increase is due to installation of rebuilt hoist in No. 2 engine house, fixing new skip for No. 2 Shaft and installing guides and back runners in skip road, No. 2 Shaft. Approximately 75% of the expense in 1923 was due to transfer of hoisting operations from No. 1 to No. 2 Shaft.

Shaft,	Year 1923	279.63	Cost per ton	.003
	Year 1922	<u>95.11</u>	" " "	<u>.002</u>
	INCREASE	184.52	INCREASE	.001

The increase is due to more expense for maintenance of No. 1 Shaft, on account of the mine operating 86 more days in 1923.

Top Tram Equipment,	Year 1923	3,944.98	Cost per ton	.048
	Year 1922	<u>429.79</u>	" " "	<u>.008</u>
	INCREASE	3,515.19	INCREASE	.040

The detail of charges for 1923 and 1922 is as follows:

	<u>1923</u>	<u>1922</u>	<u>INCREASE</u>
Engines and Motors,	1,278.00	78.71	1,199.29
Tracks and Cars,	1,243.52	291.24	952.28
Wire Rope,	802.04	19.16	782.88
Sheaves, Rollers, etc.	<u>621.42</u>	<u>40.68</u>	<u>580.74</u>
	3,944.98	429.79	3,515.19

The large increase is due to tramming ore from No.1 Shaft to No. 2 Shaft loading pocket, to equipping trestle from No. 2 Shaft to No. 2 loading pocket, and also new stocking trestle. It is estimated that 80% of the expenditures in 1923 were due to transfer of hoisting operations from No. 1 to No. 2 Shaft.

Docks, Tres. & Pkts.	Year 1923	7,672.18	Cost per ton	.093
	Year 1922	<u>2,170.00</u>	" " "	<u>.043</u>
	INCREASE	5,502.18	INCREASE	.050

The detail of charges for 1923 and 1922 is as follows:

	<u>1923</u>	<u>1922</u>	<u>INCREASE</u>
Grading and Planking,	1,415.76		1,415.76
Permanent Trestles,	2,919.56	2,129.59	789.97
Portable Trestles, (Orig. cost)	1,606.31		1,606.31
Pockets,	<u>1,730.55</u>	<u>40.41</u>	<u>1,690.14</u>
	7,672.18	2,170.00	5,502.18

Docks, Tres. & Pkts.
(Continued)

The expenditures in both 1923 and 1922 are due to preparations to transfer hoisting operations from No. 1 to No. 2 Shaft. The old stocking grounds had to be abandoned and new grounds prepared, new permanent and stocking trestles erected, as also new railroad loading pocket. These might properly be termed "extraordinary expenses".

Mine Buildings,	Year 1923	2,828.17	Cost per ton	.034
	Year 1922	<u>624.60</u>	" " "	<u>.012</u>
	INCREASE	2,203.57	INCREASE	.022

The detail of charges for 1923 and 1922 is as follows:

	<u>1923</u>	<u>1922</u>	<u>INCREASE</u>	<u>DECREASE</u>
Office,	.71	18.25		17.54
Stables,	11.18		11.18	
Shaft House,	1,277.04	467.44	809.60	
Engine "	1,164.09	37.10	1,126.99	
Boiler "		9.71		9.71
Fire Protection,	<u>375.15</u>	<u>92.10</u>	<u>283.05</u>	
	2,828.17	624.60	2,203.57	

The large expenditures in this account in 1923 are due to abandoning No. 1 Shaft and transferring hoisting operations to No. 2 Shaft. The expense for fire protection increased in 1923, due to installation of sprinklers at the collars of both No. 1 and No. 2 Shafts.

TOTAL SURFACE COSTS			
Year 1923	33,626.11	Cost per ton	.405
Year 1922	<u>13,799.69</u>	" " "	<u>.271</u>
INCREASE	19,826.42	INCREASE	.134

Surface costs increased in 1923 due to the mine operating 86 more days and to extraordinary expenditures on account of abandoning No. 1 Shaft, and stocking grounds with the transfer of operations to No. 2 Shaft. A new railroad loading pocket was built, new permanent and stocking trestles, new stocking grounds, new shaft house, new tram system and new engine house and hoist. It is estimated that the normal surface cost per ton should be about \$.240.

Gen'l. Mine Accts.

Engineering,	Year 1923	2,626.53	Cost per ton	.032
	Year 1922	<u>1,379.43</u>	" " "	<u>.027</u>
	INCREASE	1,247.10	INCREASE	.005

The increase is due to the mine operating 86 more days in 1923, to raise in wages, and to more time required by engineers on account of new construction work in connection with the transfer of hoisting operations from No. 1 to No. 2 Shaft.

Analysis,	Year 1923	4,705.43	Cost per ton	.057
	Year 1922	<u>2,765.18</u>	" " "	<u>.054</u>
	INCREASE	1,940.25	INCREASE	.003

The detail of charges for 1923 and 1922 is as follows:

	<u>1923</u>	<u>1922</u>	<u>INCREASE</u>
Laboratory Costs,	2,835.63	1,566.42	1,269.21
Sampling "	<u>1,869.80</u>	<u>1,198.76</u>	<u>671.04</u>
	4,705.43	2,765.18	1,940.25
Number determinations,	10,097	5,988	4,109
Rate per "	.2807	.2616	.0191

The number of determinations in 1923 increased due to the mine operating 86 more days. More ore was shipped from pocket and stockpile, making the charges for sampling higher and also increasing the number of determinations.

Pers. Injury Expense,	Year 1923	1,842.48	Cost per ton	.022
	Year 1922	<u>425.13</u>	" " "	<u>.008</u>
	INCREASE	1,417.35	INCREASE	.014

The large increase is due to more serious accidents in 1923. One of these accidents, Report No. 67, occurred in February, and compensation is still being paid. There were three other accidents during the year on which ten weeks or more compensation was paid.

Safety Dept. Exp.	Year 1923	63.96	Cost per ton	.001
	Year 1922	<u>13.46</u>	" " "	<u>.000</u>
	INCREASE	50.50	INCREASE	.001

The detail of charges for 1923 and 1922 is as follows:

	<u>1923</u>	<u>1922</u>	<u>INCREASE</u>
Salaries of Committee,	49.66	11.88	37.78
Traveling Expense,	3.30		3.30
First-Aid Supplies,	<u>11.00</u>	<u>1.58</u>	<u>9.42</u>
	63.96	13.46	50.50

The increase is due to more expense on account of first-aid practice and more first-aid supplies used.

Tel. & Safety Devices,	Year 1923	820.35	Cost per ton	.010
	Year 1922	<u>53.85</u>	" " "	<u>.001</u>
	INCREASE	766.50	INCREASE	.009

The detail of charges for 1923 and 1922 is as follows:

	<u>1923</u>	<u>1922</u>	<u>INCREASE</u>
Lighting for shaft and levels,	99.92	18.98	80.94
Mine Telephones,	14.75	11.00	3.75
Safety Gates,	29.95	23.87	6.08
Sign Boards and Signals,	316.94		316.94
Fire Protection Underground,	25.29		25.29
E. & A. #436,	<u>333.50</u>		<u>333.50</u>
	820.35	53.85	766.50

Tel. & Saf. Devices: The increase is due to more expense for lighting shafts and levels, due to installing lights in No. 2 Shaft and on levels at No. 2 Shaft, to new signal system installed in No. 2 Shaft and to charge made direct at Ishpeming office, E. & A. No. 436.

Local Gen'l. Welfare,	Year 1923	993.09	Cost per ton	.012
	Year 1922	<u>539.76</u>	" " "	<u>.011</u>
	INCREASE	453.33	INCREASE	.001

There is a small increase in the total Local General Welfare for the Gwinn District and the Austin proportion, based on pay-rolls, was 10.2% for 1923, compared with 9.3% for 1922, which accounts for the increase shown above.

Special Expenses,	Year 1923	28.80	Cost per ton	.000
	Year 1922	.00	" " "	---

This charge is made at the Ishpeming Office.

Mine Office,	Year 1923	1,478.77	Cost per ton	.018
	Year 1922	<u>868.08</u>	" " "	<u>.017</u>
	INCREASE	610.69	INCREASE	.001

The increase in this account is caused by higher salaries and the mine operating during a longer period in 1923.

District Office,	Year 1923	2,783.84	Cost per ton	.033
	Year 1922	<u>1,518.56</u>	" " "	<u>.026</u>
	INCREASE	1,465.28	INCREASE	.007

There is an increase of \$2,074.60 in the total of Gwinn District office expense for 1923. The Austin proportion for 1923 is 10.2%, compared with 9.3% for 1922, which accounts for the increase shown above.

TOTAL GENERAL MINE ACCOUNTS

Year 1923	15,562.00	Cost per ton	.188
Year 1922	<u>7,657.04</u>	" " "	<u>.150</u>
INCREASE	7,904.96	INCREASE	.038

The large increase is due to the mine operating 86 more days in 1923, to increase in wages, to more ore shipped, to more compensation payments for personal injuries and to expense connected with transfer of operations from No. 1 to No. 2 Shaft.

COST OF PRODUCTION

Year 1923	168,940.30	Cost per ton	2.036
Year 1922	<u>88,985.12</u>	" " "	<u>1.748</u>
INCREASE	79,955.18	INCREASE	.288

	<u>1923</u>	<u>1922</u>	<u>INCREASE</u>
Total Underground Costs,	119,752.19	67,528.39	52,223.80
" Surface "	33,626.11	13,799.69	19,826.42
" General Mine Accounts,	<u>15,562.00</u>	<u>7,657.04</u>	<u>7,904.96</u>
	168,940.30	88,985.12	79,955.18

The main reasons for large increase in 1923 are as follows:
 1. Mine operated 86 more days in 1923.
 2. Wage increase.
 3. Extraordinary expense on account of transfer of operations from No. 1 to No. 2 Shaft.

FRANCIS MINE
ANALYSIS OF COST SHEETS EXPLAINING INCREASE OR DECREASE IN
VARIOUS ACCOUNTS BETWEEN THE YEARS 1923 AND 1922.

UNDERGROUND COSTS:			
Development in Rock,	Year 1923	7,039.38	Cost per ton .064
	Year 1922	<u>7,657.15</u>	" " " <u>.078</u>
	DECREASE	617.75	DECREASE <u>.014</u>

The decrease was due to less rock drifting and raising in 1923. In 1923, there was 1101½ feet, as compared with 1168½ feet in 1922. The cost per foot in 1923 was \$6.39, in 1922, \$6.55, the reduction in 1923 amounting to 16¢ per foot. Underground wages increased about 12% in 1923, the decrease in cost per foot, in spite of the advance in wages, was due to less extension of main haulage drifts and more raising in 1923.

Development in Ore,	Year 1923	704.94	Cost per ton .006
	Year 1922	<u>2,515.48</u>	" " " <u>.026</u>
	DECREASE	1,810.54	DECREASE <u>.020</u>

The decrease was due to less development in ore. In 1923, there was 137 feet of raising and main level drifting in ore as compared with 721½ feet in 1922.

Stopping,	Year 1923	62,921.67	Cost per ton .569
	Year 1922	<u>48,068.28</u>	" " " <u>.490</u>
	INCREASE	14,853.39	INCREASE <u>.079</u>

The increased expenditure was due to an increase of 12,501 tons in the product in 1923, to increase of approximately 12% in wages paid miners, and to extraordinary expense in November and December on account of sudden increase in the mine water and crushing of timber on the South side of the mine. The mine operated on single shift eleven months of the year, going on double shift in December. The cost per ton increases on double shift due to lowered efficiency on night shift work. The narrow ore bodies in the Francis Mine increase the amount of drifting and decrease the amount of slicing, as compared with the mines with larger ore bodies, making the cost per ton for stopping higher.

Timbering,	Year 1923	35,232.76	Cost per ton .319
	Year 1922	<u>25,702.40</u>	" " " <u>.262</u>
	INCREASE	9,530.36	INCREASE <u>.057</u>

The increased expenditures in 1923, are due to an increase of 22% in the amount of timber used and 15% in the cost per foot, as compared with 1922. The total cost for timber, lagging, poles and covering boards in 1923 was 35% greater than in 1922 and the cost per ton was 18% higher.

Timbering, (cont'd)

The labor cost for timbering in 1923 was 37% greater than in 1922, due to increase in wages of approximately 12% and to the extraordinary expense for timbering on the South side of the mine in November and December, due to crushing.

Tramming,

Year 1923	17,117.80	Cost per ton	.155
Year 1922	<u>11,534.05</u>	" " "	<u>.118</u>
INCREASE	5,583.75	INCREASE	.037

The increase in expenditures and cost per ton in 1923, is due to increase of approximately 12% in wages and more hand tramming. The ore mined on the 3rd Level in 1923 was hand-trammed to the shaft on 4th Level, and a large percentage of the product from the "New Find" on the South footwall was transferred by hand-tramming from the sub-level to raises from 5th Level. In December, the entire product from the "New Find" and South footwall above the 5th Level was transferred by hand-tramming on 5th Level to raises from the 6th Level, due to crushing of 5th Level motor haulage drift.

Ventilation,

Year 1923	753.95	Cost per ton	.007
Year 1922	<u>968.80</u>	" " "	<u>.010</u>
DECREASE	214.85	DECREASE	.003

The decrease in expenditures and in cost per ton in 1923 is due to expense incurred in January, 1922, for moving ventilating fan from collar of Gwinn Mine shaft to the 5th Level, Francis Mine, and installing it. All expenses for operation of ventilating fan are divided equally between the two mines. The fan was operated more hours in 1923, the charge for current to the Francis Mine being \$460.68, as compared with \$355.74 in 1922. The balance of charges cover cost of operating fan, oil and grease, and ventilating doors installed in the mine.

Pumping,

Year 1923	4,534.20	Cost per ton	.041
Year 1922	<u>3,163.61</u>	" " "	<u>.032</u>
INCREASE	1,370.59	INCREASE	.009

The increase was due to operating auxiliary pumping plant on the 6th Level the latter half of the year, and to increase in mine water in last two months of the year. Over one-half of the incoming mine water is now being pumped by auxiliary pump on the 6th Level, up to the main pumping plant on the 5th Level. This is due to mining operations being under-way between the 6th and 5th Levels, with crushing of the 5th Level drifts, so that water now goes to the 6th Level.

Compr. & Air Pipes,

Year 1923	12,003.87	Cost per ton	.109
Year 1922	<u>11,927.38</u>	" " "	<u>.122</u>
INCREASE	76.49	DECREASE	.013

The detail of charges for the two years is as follows:-

	<u>1923</u>	<u>1922</u>	<u>INCREASE</u>	<u>DECREASE</u>
Compressors,	9,716.07	10,187.69		471.62
Air Piping,	<u>2,287.80</u>	<u>1,739.51</u>	548.29	
	12,003.87	11,927.38	76.49	

The cost for air was lower in 1923, due to the Francis Mine compressor being idle the greater part of the year, air being supplied by the Central Power Plant compressor. In 1923, there was less work on night shift, due to "New Find" on South footwall being developed on double shift in 1922. The Francis compressor is run to supply air on night shift. The increase in cost for air piping in 1923, was due to opening the 6th Level and installing permanent air lines.

Undgr. Superintendence,	Year 1923,	6,275.00	Cost per ton	.057
	Year 1922	<u>5,224.59</u>	" " "	<u>.053</u>
	INCREASE	1,051.01	INCREASE	.004

The increase is due to increase in wages and to extra shift boss on night shift the last week of November and in December, on account of crushing ground, and increase in mine water on the South side of the mine.

Maintenance Accts.

Compr. & Pwr. Drills,	Year 1923	595.24	Cost per ton	.005
	Year 1922	<u>257.42</u>	" " "	<u>.003</u>
	INCREASE	337.82	INCREASE	.002

The charges for 1923, cover cost of one new auger drill, \$155.00, repairs to main bearing on compressor, \$158.00 and expense for repairs to air line from Central Power Plant compressor to Francis Mine. This latter item includes cost of alcohol used in this air line to prevent freezing. There were no drills bought in 1922, and no large repair charge for compressor. The main charges in 1922 were for repairs to surface air line from Central Power Plant compressor to Francis Mine and for alcohol used to prevent freezing.

Hand-Tram. Equipment,	Year 1923	823.38	Cost per ton	.007
	Year 1922	<u>1,199.65</u>	" " "	<u>.012</u>
	DECREASE	376.27	DECREASE	.005

The detail of charges for 1923 and 1922 is as follows:--

	<u>1923</u>	<u>1922</u>	<u>DECREASE</u>
Cars,	368.80	491.69	122.89
Tracks,	<u>454.58</u>	<u>707.96</u>	<u>253.38</u>
	823.38	1,199.65	376.27

The decrease in 1923 is due to less expense for extension and repairs to sub-level and other hand-tram tracks. The expense for repairs of hand-tram cars was also less in 1923.

Elec. Tram Equipment,	Year 1923	2,724.95	Cost per ton	.025
	Year 1922	<u>2,338.83</u>	" " "	<u>.024</u>
	INCREASE	386.12	INCREASE	.001

The detail of charges for the two years is as follows:-

	<u>1923</u>	<u>1922</u>	<u>INCREASE</u>	<u>DECREASE</u>
Generator and Motor,	133.81		133.81	
Mine Locomotives,	560.93	550.50	10.43	
Wiring,	517.19	526.69		9.50
Main Line Tracks,	629.64	698.50		68.86
" " Cars,	<u>883.38</u>	<u>563.14</u>	<u>320.24</u>	
	2724.95	2338.83	386.12	

Three sub-divisions of this account show increases in 1923, while two show decreases. The expenditure in account "Generator and Motor" was due to burning out of several coils on the convertor. The only other increase of any importance in 1923, was in "Main Line Cars" and was due to more expense for repairing cars.

Pumping Machinery,	Year 1923	1,919.77	Cost per ton	.017
	Year 1922	<u>3,051.82</u>	" " "	<u>.031</u>
	DECREASE	1,312.05	DECREASE	.014

The detail of charges for 1923 and 1922 is as follows:

	<u>1923</u>	<u>1922</u>	<u>INCREASE</u>	<u>DECREASE</u>
Electric Pumps,	1,036.88	501.99	534.89	
Water Lines,	158.60	32.88	125.72	
Pump House and Sump,	193.53	2,483.73		2,290.20
Launders, Ditches, Dams, etc.	<u>530.76</u>	<u>33.22</u>	<u>497.54</u>	
	1,919.77	3,051.82		1,132.05

All sub-accounts except "Pump House and Sump" show increases in 1923. "Electric Pumps" show an increase due to installing a 400-gal. electric pump (borrowed from the Gwinn Mine) on the 6th Level as an auxiliary to pump water from the 6th Level to main pumping plant on 5th Level. The expense for water lines increased for the same reason. "Launders, Ditches, Dams, etc." increased in 1923 due to installing power device for closing and opening the doors on the cast iron cylinders in safety dam between the Gwinn and Francis Mines; also on account of installing launders for carrying water in raises from 6th to 5th Levels, after the increase in the mine water in November.

TOTAL UNDERGROUND COSTS

Year 1923	152,765.17	Cost per ton	1.382.
Year 1922	<u>124,109.80</u>	" " "	<u>1.266</u>
INCREASE	28,655.37	INCREASE	.116

There was an increase of 23% in expenditures in 1923, the product increased 12%, and wages about 12%. The mine operated on single shift for 11 months and double shift for one month. The increase in cost per ton is due to increase in wages; to increase in timbering cost, account of crushing ground and higher price paid for timber, in tramming cost, account of more hand-tramming, in pumping cost, account of increase in mine water and operating auxiliary pumping plant last half of year.

SURFACE COSTS			
Hoisting,	Year 1923	8,168.22	Cost per ton .074
	Year 1922	<u>7,090.92</u>	" " " .073
	INCREASE	1,077.30	INCREASE .001

The increase is due to more time by engineer on night shift charged to hoisting, on account of the Francis compressor not operating, hence no division of his time, to higher wages and to more current used, on account of larger product and an increase in the depth of hoist, due to all ore coming from the 6th Level the latter part of the year.

Stocking Ore,	Year 1923	5,973.81	Cost per ton .054
	Year 1922	<u>4,627.17</u>	" " " .047
	INCREASE	1,346.64	INCREASE .007

The detail of charges for 1923 and 1922 is as follows:-

	<u>1923</u>	<u>1922</u>	<u>INCREASE</u>	<u>DECREASE</u>
Erecting Portable Trestles,	204.60	133.06	71.54	
Operating Tram System,	<u>4,956.19</u>	3,959.86	996.32	
Rock pickers, etc.,	<u>813.02</u>	<u>534.25</u>	287.77	
	5,973.81	4,627.17	1,346.64	

The cost for operating tram system increased 25% in 1923, although wages increased only about 12%. The balance of increase is due to more expense for operating on account of side-dumping on stockpiles to get maximum stocking capacity of trestles. The cost for rock picking increased in 1923, due to picking rock from old stockpiles, as well as new ones.

Dry House,	Year 1923	3,713.50	Cost per ton .0034
	Year 1922	<u>2,929.60</u>	" " " .030
	INCREASE	783.90	INCREASE .004

The increase is due to more expense for operating heating plant, due to increase of \$2.00 per ton in cost of coal, and more coal used, and to increase in wages of fireman and dry man. One-half of the dryman's time is charged to heating plant and one-half to dry house, as one man does the work at dry house and heating plant.

Gen'l. Surf. Expense,	Year 1923	1,647.72	Cost per ton .015
	Year 1922	<u>1,399.80</u>	" " " .014
	INCREASE	247.92	INCREASE .001

The increase is due almost entirely to increase of approximately 15% in surface wages. There was a small increase in expense for hauling cinders on mine roads.

Maintenance Accts.

Hoisting Equipment,	Year 1923	3,177.97	Cost per ton .029
	Year 1922	<u>1,281.73</u>	" " " .013
	INCREASE	1,896.24	INCREASE .016

The detail of charges for the years 1923 and 1922 is as follows:

Hoisting Equipment, (cont'd.) Detail

	<u>1922</u>	<u>1923</u>	<u>INCREASE</u>	<u>DECREASE</u>
Electric Hoists,	2,116.60	286.40	1,830.20	
Wire Rope,	615.77	620.66		4.89
Skips, Cages & Skip Roads,	<u>445.60</u>	<u>374.67</u>	70.93	
	3,177.97	1,281.73	1,896.24	

The large increase is due to expense of installing "Lilly Overwinding Safety Device" on both skip and cage hoists. There was a small increase in expense for repairs of skips, cages and skip roads.

Shaft,	Year 1923	2,234.09	Cost per ton	.020
	Year 1922	<u>276.07</u>	" " "	<u>.003</u>
	INCREASE	1,958.02	INCREASE	.017

The large increase is due to extraordinary expense in the latter part of year account of repairs to shaft. The runners in skip and cage compartments were loose due to wearing of bolts holding the plates to which the runners are bolted. These plates are fastened to the steel sets and if loose, make the runners loose. In addition to this work, plank was put in between the steel sets near the 3rd Level, where the skip only had a clearance of 1-1/4 inches, to prevent it catching under the steel end pieces.

Top Tram Equipment,	Year 1923	1,742.96	Cost per ton	.015
	Year 1922	<u>2,165.12</u>	" " "	<u>.022</u>
	DECREASE	422.16	DECREASE	.007

The detail of charges for the years 1923 and 1922 is as follows:

	<u>1923</u>	<u>1922</u>	<u>INCREASE</u>	<u>DECREASE</u>
Engine and Motors,	21.01	350.73		329.72
Tracks and Cars,	661.49	480.40	181.09	
Wire Rope,	542.76	781.45		238.69
Sheaves and Rollers,	<u>517.70</u>	<u>552.51</u>		<u>34.81</u>
	1,742.96	2,165.12		422.16

The decrease in "Engine and Motors" is due to expense of rewinding top tram motor and for new set of stator coils in 1922, while in 1923 the expense is small and covers minor repairs. The expense for "Tracks and Cars" increased in 1923 due to building more new trestles on account of no ore shipped. The expense for "Wire Rope" decreased due to less new rope charged out. The old ropes were used as long as possible, the poor parts being cut out and pieces spliced in, also larger diameter spools were used, with less wear on ropes.

Docks, Tres. & Pockets,	Year 1923	6,227.23	Cost per ton	.056
	Year 1922	<u>3,836.43</u>	" " "	<u>.039</u>
	INCREASE	2,390.80	INCREASE	.017

The detail of charges for the years 1923 and 1922 is as follows:

Docks, Tres. & Pockets (Cont'd.)

	<u>Detail</u>			
	<u>1923</u>	<u>1922</u>	<u>INCREASE</u>	<u>DECREASE</u>
Grading and Planking,	2,104.30	558.66	1,545.64	
Permanent Trestles,	22.87	695.62		672.75
Portable "	4,011.58	2,483.78	1,527.80	
Pockets, Chutes, etc.,	88.48	98.37		9.89
	<u>6,227.23</u>	<u>3,836.43</u>	<u>2,390.80</u>	

The increase is due to more expense in 1923, for making additional stockpile grounds and erecting new stocking trestles, due to there having been only a few thousand tons of ore shipped in 1922, and no shipments in 1923.

Mine Buildings,	Year 1923	306.92	Cost per ton	.003
	Year 1922	<u>315.58</u>	" " "	<u>.003</u>
	DECREASE	8.66	-----	

The detail of charges for 1923 and 1922 is as follows:

	<u>1923</u>	<u>1922</u>	<u>INCREASE</u>	<u>DECREASE</u>
Office,	1.51	5.06	3.55	
Warehouse,		.36		.36
Shops,	1.20	4.68		3.48
Stables,	17.41	25.30		7.89
Shaft House,	11.01	8.46	2.55	
Engine "	69.26	64.40	4.86	
Boiler "		2.08		2.08
Dry "	120.85	177.40		56.55
Coal Dock & Trestle,	5.55	8.94		3.39
Miscellaneous,	<u>80.13</u>	<u>18.90</u>	61.23	
	<u>306.92</u>	<u>315.58</u>		8.66

The costs for both 1923 and 1922 covered only the usual necessary repairs.

TOTAL SURFACE COSTS			
Year 1923	33,192.42	Cost per ton	.300
Year 1922	<u>23,922.42</u>	" " "	<u>.244</u>
INCREASE	9,270.00	INCREASE	.056

The main items entering into increase are as follows:

1. Increased wages paid in 1923.
2. Installation of "Lilly Overwinding Safety Device on cage and skip hoists.
3. More expense for repair of shaft.
4. More expense for preparation of stocking grounds and erection of new trestles.

Gen'l. Mine Accts.

Engineering,	Year 1923	3,726.79	Cost per ton	.034
	Year 1922	<u>3,689.63</u>	" " "	<u>.038</u>
	INCREASE	37.16	DECREASE	.004

The increase is due to higher salary paid engineer; the cost per ton decreased account of larger product.

Analysis,	Year 1923	3,606.55	Cost per ton	.033
	Year 1922	<u>3,760.93</u>	" " "	<u>.038</u>
	DECREASE	154.38	DECREASE	.005

The detail of charges for 1923 and 1922 is as follows:

	<u>1923</u>	<u>1922</u>	<u>INCREASE</u>	<u>DECREASE</u>
Laboratory costs,	3,110.99	3,071.95	39.04	
Sampling, etc.,	<u>495.56</u>	<u>688.98</u>		<u>193.42</u>
	3,606.55	3,760.93		154.38
Number determinations,	10,865	11,470		605
Laboratory Cost per Determination,	.2863	.2678	.0185	

During 1922, an underground sampler was employed for about five months, and during 1923 for only one and one-half months. The laboratory costs for 1923 were higher on account of increased wages.

Pers. Injury Expense,	Year 1923	6,093.99	Cost per ton	.055
	Year 1922	<u>1,247.07</u>	" " "	<u>.013</u>
	INCREASE	4,846.92	INCREASE	.042

The increase is due to fatal accident to John Koski, Accident Report No. 149, April 10th, 1923; also serious accident to Eli Brazeau, Report No. 143, January 18th, 1923.

Safety Dept. Expense,	Year 1923	157.44	Cost per ton	.001
	Year 1922	<u>232.88</u>	" " "	<u>.002</u>
	DECREASE	75.44	DECREASE	.001

The detail of charges for 1923 and 1922 is as follows:

	<u>1923</u>	<u>1922</u>	<u>INCREASE</u>	<u>DECREASE</u>
Salaries of Committee,	108.85	143.06		34.21
Traveling Expense,	3.30		3.30	
First-Aid Supplies,	<u>45.29</u>	<u>89.82</u>		<u>44.53</u>
	157.44	232.88		75.44

The decrease is due to less expense for first-aid practice and less supplies used.

Tel. & Safety Devices,	Year 1923	1,198.08	Cost per ton	.011
	Year 1922	<u>405.18</u>	" " "	<u>.004</u>
	INCREASE	792.90	INCREASE	.007

The detail of charges for 1923 and 1922 is as follows:

	<u>1923</u>	<u>1922</u>	<u>INCREASE</u>	<u>DECREASE</u>
Lighting Shaft and Levels,	362.35	183.01	179.34	
Mine telephones,	25.97	45.46		19.49
Safety Gates and Underground Improvements,	119.12	28.30	90.82	
Apparatus for care of injured person,	18.82		18.82	
Miscellaneous,	<u>671.82</u>	<u>148.41</u>	<u>523.41</u>	
	1,198.08	405.18	792.90	

The increase is due to higher cost for lighting shaft and levels; also for safety gates and underground improvement. In 1923, there was an expenditure of \$587.41 for underground fire equipment.

Local Gen'l. Welfare,	Year 1923	1,104.03	Cost per ton	.010
	Year 1922	<u>1,157.25</u>	" " "	<u>.012</u>
	DECREASE	53.22	DECREASE	.002

There was an increase in the total expense for "Local General Welfare" for the Gwinn District of approximately 5%, but the Francis proportion, based on payrolls, decreased from 12.2% in 1922 to 10.9% in 1923, making a decrease of \$53.22, as shown above.

Mine Office,	Year 1923	3,766.41	Cost per ton	.034
	Year 1922	<u>3,520.92</u>	" " "	<u>.036</u>
	INCREASE	245.49	DECREASE	.002

The increase in this account is due to larger salaries during 1923, also \$29.50 increase in exchange, due to larger pay-rolls; \$74.40 office expense account of higher cost for heat, etc., and \$38.74 in Mechanical Engineering, due to more traveling expenses.

District Office,	Year 1923	3,009.10	Cost per ton	.027
	Year 1922	<u>3,094.69</u>	" " "	<u>.032</u>
	DECREASE	85.59	DECREASE	.005

There was an increase in 1923 in the total expense for District Office of approximately 8%, due to increase in salaries. The Francis proportion, based on pay-rolls, decreased from 12.2% in 1922 to 10.9% in 1923, making a decrease of \$85.59, as shown above.

TOTAL GENERAL MINE ACCOUNTS.

Year 1923	23,152.22	Cost per ton	.209
Year 1922	<u>17,550.20</u>	" " "	<u>.179</u>
INCREASE	5,602.02	INCREASE	.030

The increase above shown is due to the large increase in "Personal Injury Expense", "Telephones and Safety Devices" and "Mine Office". All other accounts show only minor variations.

COST OF PRODUCTION

Year 1923	209,109.81	Cost per ton	1.891
Year 1922	<u>165,582.42</u>	" " "	<u>1.689</u>
INCREASE	43,527.39	INCREASE	.202

	<u>1923</u>	<u>1922</u>	<u>INCREASE</u>	<u>PERCENT INCREASE</u>
Total Underground Costs,	152,765.17	124,109.80	28,655.37	23%
" Surface "	33,192.42	23,922.42	9,270.00	38%
" General Mine Accounts,	<u>23,152.22</u>	<u>17,550.20</u>	<u>5,602.02</u>	<u>32%</u>
COST OF PRODUCTION,	209,109.81	165,582.42	43,527.39	26%
Product,	110,550	98,049	12,501	

The 1923 product increased 12%, and wages 12%. Other causes for increased expenditures were crushing of South side of mine in November, and increase in mine water, operation of auxiliary pumping plant, ore hoisted from greater depth, installation of "Lilly Overwinding Safety Device" on cage and skip hoists, more repairs to shaft, making new stocking grounds, and fatal accident.

PRODUCTION.

Month	Athens	Rock
January	25,248	
February	23,608	
March	24,268	
April	20,017	68
May	18,215	496
June	16,829	268
July	17,558	232
August	19,707	
September	19,482	
October	19,567	
November	20,190	
December	20,856	91
TOTAL -	245,545	1,155

ANALYSIS OF PRODUCTION AND COSTS.

Production of 1922 193,259 tons,
 " 1923 245,545 "
 Increase 1923 52,286 tons.

Cost of production 1922 \$270,752.85 - Cost per ton \$1.401
 " " " 1923 407,613.22 1.660
 Increase 1923 \$136,860.37 Increase \$.259

DETAIL OF COST OF PRODUCTION.

	TOTAL COST				COST PER TON		
	LABOR	%	SUPPLIES	%	LABOR	SUPPLIES	TOTAL
1922 -	\$165,491.34	61.2	\$105,261.51	38.8	\$.856	\$.545	\$1.401
1923 -	<u>253,329.93</u>	62.11	<u>154,283.29</u>	37.9	<u>1.032</u>	<u>.628</u>	<u>1.660</u>
	\$ 87,838.59		\$ 49,021.78		\$.176	\$.083	\$.259
	Incr.		Incr.		Incr.	Incr.	Incr.

From January 1st to April 29th the mine worked two eight-hour shifts. On April 29th the night shift was taken off.

The average number of men employed during the year was 182, for a total of 54,112 days or 297 days per man as compared with 1922 of 152 men employed for a total of 38,868 days or 208 days per man, an increase in 1923 of 30 men and an increase of 15,244 days.

The average tons per man underground in 1923 was 5.82 or a decrease of .56 tons per man per day as compared with 1922 when the average tons per man was 6.38. The total tons per man per day in 1923 was 4.54, while in 1922 the total tons per man was 4.97; and decrease of .43 tons per man per day.

There was an increase of 10% in wages effective May 1st.

UNDERGROUND COSTS:

Development in Rock,

1923 Amount \$1,057.13 - Cost per ton \$.004
 1922 134.24 .001
 Increase \$ 922.89 \$.003

	Drifting	Sub Division		Per.Ft.
		Per Ft.	Raising	
1923	81'	6.80	40'	4.90
1922	35'	3.25	none	none
Increase	46'	3.55	40'	4.90

Development in Ore,

1923 Amount	\$5,765.61	- Cost per ton	\$.024
1922	5,242.88		.027
Increase	\$ 522.73	Decrease	\$.003

In 1923, 6,002 tons of ore were mined in development work at an average of 6.39 tons per man per day, while in 1922, 7,600 tons were mined at an average of 8.62 tons per man per day, or a decrease in 1923 of 1,598 tons, and 2.23 tons per man per day.

Stoping,

1923 Amount	\$124,172.69	- Cost per ton	\$.506
1922	85,640.10		.443
Increase	\$ 38,532.59		.063

Detail.

	Labor		Supplies	
1923	\$103,170.93	83.1%	\$21,001.76	16.9%
1922	70,281.06	82.1%	15,359.04	17.9%
Increase	\$ 32,889.87		\$ 5,642.72	

	Cost per ton		
	Labor	Supplies	Total
1923	\$.420	\$.086	\$.506
1922	.364	.079	.443
Increase	\$.056	\$.007	\$.063

Due to increase in wages and less tons per man per day.

	Explosives	
	1923	1922
Total lbs. Powder	82,600	66,450
Avg. price per lb.	.1469	.1461
Total Amount	12,137.51	9,708.86
Fuse, Caps, etc.	2,775.93	2,328.28
Grand Total,	14,913.44	12,037.14
Lbs. Powder per ton of ore	.3364	.3438

Cost per ton for powder	.0494	.0502
Cost per ton for all explosives	.0607	.0622
Decrease 1923	\$.0015 per ton.	

Timbering,

1923 Amount	\$82,082.87	- Cost per ton	\$.334
1922	48,465.83		.251
Increase	\$33,617.04		\$.083

Detail cost of timber.

	<u>1923</u>	<u>1922</u>
Cost of stull timber	13,573.53	9,480.23
Cost of Lagging & Poles	9,782.62	6,578.29
Total Cost	23,356.15	16,058.52
Ft. timber per ton of ore	.815	.885
Cost per ton for timber, lagging & poles,	.0951	.0857

During the year three new Ingersoll Rand tigger hoists were purchased and a new Ford motor was put in timber tunnel motor to replace the one received with the Milwaukee locomotive.

All timber used on main levels to replace broken sets was peeled and nearly all of it was treated with chloride of zinc.

Tramming,

1923 Amount	\$33,218.30	- Cost per ton	\$.135
1922	20,833.46		.108
Increase	\$12,384.84		\$.027

Sub Division.

	<u>1922</u>	<u>1921</u>
Tramming	27,005.93	16,914.04
Skip Tenders & Bellmen	3,860.71	2,549.14
Cleaning skip pit	2,351.66	1,370.28

Increase due principally to increase in wages.

Ventilation,

1923 Amount	\$12,765.69	- Cost per ton	\$.052
1922	1,512.99		.008
Increase	\$11,252.70		\$.044

During the year a number of improvements were made to the ventilating system. Two #35 style "C" exhaust fans with motors were purchased from the Mesaba-Cliffs Iron Co. at a cost of \$715.20. One #2 $\frac{1}{2}$ Anaconda Type Sirocco Fan and 5 H.P. motor with starter was purchased from Morgan Gerrish Co. costing \$392.00. One #250 Type S.P. Coppus air driven Vano Blower complete was purchased from Coppus Engineering Corporation at a cost of \$250.00.

Considerable ventube was purchased from E. I. Dupont DeNemours Co. for the purpose of conveying air from ventilating fans and up raises to the sub levels. For the purpose of improving ventilation expanded metal lath was nailed on partition between skip and cage roads and then gunited.

Pumping,

1923 Amount	\$18,509.86	- Cost per ton	\$.075
1922	15,489.02		.080
Increase	\$ 3,020.84	Decrease	\$.005

1923 - Gals. of water pumped 103,329,158; gallons per minute 197.

1922 - Gals. of water pumped 86,235,707; gallons per minute 164.

Increase 1923 of 17,093,451 gallons and 33 gallons per minute.

Compressors & Air Pipes,

1923 Amount	\$30,917.41	- Cost per ton	\$.126
1922	22,371.96		.116
Increase	\$ 8,545.45		\$.010

	Sub Division.	
	<u>1923</u>	<u>1922</u>
Compressor	27,108.88	20,083.94
Air Pipes	3,808.53	2,288.02

Cu. ft. air compressed in 1923 was 635,535,000 @ .0426 per M cu. ft.

Cu. ft. air compressed in 1922 was 456,615,000 @ .0439 per M cu. ft.; an increase of 178,920,000 cu. ft. and \$.0013 per M cu. ft.

Underground Superintendence,

1923 Amount	\$8,546.35	- Cost per ton	\$.035
1922	5,737.19		.030
Increase	\$2,809.16		\$.005

In 1923 four shift bosses were employed to April 29th when the night shift crew was discontinued. From then on only three shift bosses were employed.

Compressors & Power Drills,

1923 Amount	\$1,939.05	- Cost per ton	\$.008
1922	298.16		.001
Increase	\$1,640.89		\$.007

	Sub Division.	
	<u>Repairs to compressor</u>	<u>Power Drills</u>
1923	919.05	1,020.00
1922	298.16	none
Increase	620.89	1,020.00

Increase 1923 repairs to compressor due to building spray pond and repairs to compressor.

In 1923 six Cleveland Auger drills were purchased from the Cleveland Rock Drill Co., while in 1922 no power drills were purchased.

Hand Trammig Equipment,

1923 Amount	\$1,912.55	- Cost per ton	\$.008
1922	955.91		.005
Increase	\$ 956.64		\$.003

	Sub Division.	
	Cars	Tracks
1923	1,729.32	183.23
1922	717.14	238.77
Incr.	1,012.18	Decr 55.54

Increase in 1923 to sub level cars due to making 10 new cars and equipping them with new roller bearing trucks.

Decrease in sub level tracks due to less rail for tracks.

Electric Tram Equipment,

1923 Amount	\$7,184.19	- Cost per ton	\$.029
1922	4,457.67		.023
Increase	\$2,726.52		\$.006

	Sub Division.		
	Gen. & Dyn.	Locomotives	Wiring
1923	98.40	2,444.44	699.51
1922	50.12	842.37	586.43
Incr.	48.28	1,602.07	113.08

	M. L. Tracks	M. L. Cars
1923	719.82	3,222.02
1922	598.25	2,380.50
Incr.	121.57	841.52

Increase in Generator & Dynamo due to repairs to Generator.

Increase in Locomotives due to general overhauling of two locomotives.

Increase in Wiring due to repairs to trolley lines.

Increase in Main Line Tracks due to repairs to tracks.

Increase in Main Line Cars due to repairs to cars and new car wheels pressed on axles.

Pumping Machinery,

1923 Amount	\$1,152.18	- Cost per ton	\$.005
1922	1,329.27		.007
Decrease	\$ 177.09		\$.002

Decrease due to less repairs to pumps.

SURFACE COSTS:

Hoisting,

1923 Amount	\$25,324.70	- Cost per ton	\$.103
1922	18,746.45		.097
Increase	\$ 6,578.25		\$.006

In 1923 the tons of ore and rock hoisted were 245,636 tons at an average depth of 2186 ft. In 1922, 193,711 tons at an average depth of 2230 feet, or an increase in 1923 of 51,925 tons and a decrease in the depth hoisted of 44 feet.

Increase in cost per ton due increase in wages.

Stacking Ore,

1923 Amount	\$4,122.83	- Cost per ton	\$.017
1922	3,489.09		.018
Increase	\$ 633.74	Decrease	\$.001

Increase in Amount for 1923 due to increase in product.

Dry House,

1923 Amount	\$7,129.19	- Cost per ton	\$.029
1922	4,275.85		.022
Increase	\$2,853.34		\$.007

The heating charge to Dry House in 1923 was \$5,229.02; in 1922 \$3,400.68; increase in 1923 \$1,828.34. The increase in heating plant charge due to charging out coal shortage and putting firemen on ten hour shifts instead of twelve hour shifts since last half of July.

General Surface Expense,

1923 Amount	\$6,412.81	- Cost per ton	\$.026
1922	4,612.04		.024
Increase	\$1,800.77		\$.002

In 1923 the charges to improvement and care of grounds were \$1,053.67, while in 1922 only \$525.28; increase in 1923 \$528.39. Balance of increase due to increase in wages and general surface work.

Hoisting Equipment,

1923 Amount	\$7,296.44	- Cost per ton	\$.030
1922	4,778.67		.025
Increase	\$2,517.77		\$.005

Sub Division

	Machinery Parts
1923	\$1,778.60
1922	<u>2,450.90</u>
Decrease	\$ 672.30
	Wire Rope
1923	\$3,296.98
1922	<u>1,489.72</u>
Increase	\$1,807.26

In 1923 two 1 3/8" hoisting ropes at a cost of \$2,358.70 and one 1 1/2" hoisting rope at a cost of \$993.88 were used while in 1922 only two 1 3/8" ropes at a cost of \$1,489.72. The cost of the 1922 ropes were reduced by a credit on old ropes sold to other mines.

	Skips & Skip Roads
1923	\$2,220.86
1922	<u>838.05</u>
Increase	\$1,382.81

Increase in 1923 due to overhauling both cages and repairs to skip roads.

Shaft,

1923 Amount	\$860.45	- Cost per ton	\$.004
1922	490.65		.002
Increase	\$369.80		\$.002

Increase due to repairs to underground pockets.

Top Tram Equipment,

1923 Amount	\$1,053.12	- Cost per ton	\$.004
1922	455.00		.002
Increase	\$ 598.13		\$.002

In November 1923 a new tram plant for rock tram was authorized and \$448.16 was spent on this plant. During the year three sets of tram car wheels were sent to the general shop for repairs which cost \$127.83.

Docks, Trestles & Pockets,

1923 Amount	\$226.86	- Cost per ton	\$.001
1922	1,359.57		.007
Decrease	\$1,132.71		.006

The charges for 1923 were for new plates in shaft house pockets and repairs to chutes in shaft house.

Mine Buildings,

1923 Amount	\$1,817.51	- Cost per ton	\$.007
1922	332.27		.002
Increase	\$1,485.24		\$.005

Detail of Mine Buildings.

	<u>1923</u>	<u>1922</u>
Mine Office	15.68	5.85
Shops	2.48	2.11
Shaft House	804.78	
Engine House	57.88	141.31
Boiler House	3.80	

Dry House,	79.61	183.00
Timber Tunnel,	61.56	
New Rock Tram Building,	553.58	
Crusher House,	238.14	

Charges to shaft house and crusher house were for guniting them as a fire prevention. The charges to engine house were for painting floors and repairs to windows. Charges to Dry House were for repairs to electric wiring. Charges to Timber Tunnel, painting. The new Rock Tram Building was made necessary when the new steel trestles were erected.

GENERAL MINE ACCOUNTS:

Insurance,

1923 Amount	\$17.28	- Cost per ton	\$.000
1922	16.85		.000
Increase	\$.43		

Engineering,

1923 Amount	\$3,715.44	- Cost per ton	\$.015
1922	3,064.80		.016
Increase	\$ 650.64	Decrease	\$.001

Analysis,

1923 Amount	\$3,551.29	- Cost per ton	\$.014
1922	3,230.75		.017
Increase	\$ 320.54	Decrease	\$.003

The Athens samples are worked at the Negaunee Mine laboratory.

1923 - 15,290 determination	@	\$.15485	per determ.
1922 - 16,134	"	.13574	" "
Decr. 844	"	Incr. \$.01911	per determ.

Cost per determination higher due to increase in wages.

Personal Injury Expense,

1923 Amount	\$8,692.82	- Cost per ton	\$.035
1922	6,233.83		.032
Increase	\$2,458.99		\$.003

During 1923 there was one fatal accident that of Algot Carlson, accident report #182, October 29th.

Safety Department Expense,

1923 Amount	\$154.07	- Cost per ton	\$.001
1922	221.26		.001
Decrease	\$ 67.19		

Telephones & Safety Devices,

1923 Amount	\$1,450.61	- Cost per ton	\$.006
1922	922.70		.005
Increase	\$ 527.91		\$.001

Sub Division.

Lighting for shaft & levels:	1923	\$667.49
	1922	761.75
	Decr.	\$ 94.26

Mine Telephones:	1923	\$139.29
	1922	143.77
	Decr.	\$ 4.48

Safety Gates & U. G. Impr.:	1923	\$247.54
	1922	none

The charges to this account in 1923 includes the cost of two water tanks for fire protection underground.

Sign Boards, Signals, etc.:	1923	\$56.91
	1922	none

Fire Protection,

Fire Protection:	1923	\$333.50
1923 Amount	1922	none

Increase due to Central Office charge, account of changing fire helmets to Paul helmets.

Miscellaneous:	1923	\$ 5.88
	1922	17.18
	Decr.	\$11.30

The charges to this account in 1923 was for safety devices on shaft house. In 1922 the charges were for machine shop lathe and water gauge in heating plant.

Special Expense,

1923 Amount none - Cost per ton \$.000
 1922 \$68.98 .000

Mine Office,

1923 Amount \$6,563.91 - Cost per ton \$.027
 1922 5,985.41 .031
 Increase \$ 578.50 Decrease \$.004

Sub Division.

	<u>Direct Charges</u>	<u>Central Office</u>
1923	1,058.45	5,505.46
1922	976.25	5,009.16
Increase	82.20	Incr. 496.30

PRODUCTION.

Month	Bessemer	Maas	Total	Rock
January	4,948	17,252	22,200	84
February	3,068	17,704	20,772	80
March	4,276	17,600	21,876	56
April	2,392	16,408	18,800	24
May	4,615	14,549	19,164	104
June	5,483	11,983	17,466	20
July	4,903	12,715	17,618	
August	4,857	13,821	18,678	4
September	3,224	14,135	17,359	120
October	775	16,088	16,863	228
November		18,596	18,596	32
December	1,052	17,348	18,400	12
Total -	39,593	188,199	227,792	764
Transferred from	8,643 to	8,643		
Total -	30,950	196,842	227,792	764

	<u>1923</u>	<u>1922</u>
Bessemer Ore Shipped	42,545 tons,	2,020 tons,
Maas " "	144,779 "	16,837 "
Total ore shipped -	187,324 tons.	18,857 tons.
Bessemer Ore on Hand Dec. 31st,	100,934 tons,	112,529 tons,
Maas " " " "	389,741 "	337,678 "
Total ore on hand,	490,675 tons.	450,207 tons.

ANALYSIS OF PRODUCTION AND COSTS.

Production of 1923	227,792 tons,
" 1922	216,600 "
Increase 1923	11,192 tons.
Cost of production 1923	\$399,895.25 - Cost per ton \$1.756
" " " 1922	347,935.70 1.606
Increase	\$ 51,959.55 Increase \$.15

DETAIL OF COST OF PRODUCTION.

	TOTAL COST				COST PER TON		
	LABOR	%	SUPPLIES	%	LABOR	SUPPLIES	TOTAL
1923 -	\$250,450.23	62.6	\$149,445.02	37.4	\$1.10	\$.656	\$1.756
1922 -	<u>208,322.34</u>	59.9	<u>139,613.36</u>	40.1	<u>.962</u>	<u>.644</u>	<u>1.606</u>
Incr.	\$ 42,127.89		\$ 9,831.66		\$.138	\$.012	\$.15

The mine worked on one eight-hour per day basis throughout the year. In 1922, from January 1st to June 5th, the mine worked on a six four-hour shift per week schedule.

The average number of men employed during the year was 180 for a total of 53,805 days. In 1922 an average of 207 men were employed for a total of 49,295 days; a decrease of 27 men and an increase of 4,510 days.

The average tons per man per day underground in 1923 was 5.40, a decrease of .08 tons per man per day compared with 1922, when the average tons per man was 5.48.

There was one adjustment in wages during 1923; a 10% increase effective May 1st, which made an increase of \$.49 per day against the 1922 labor costs or 12%.

The actual increase in wages during the year amounts to \$26,364.45, which based on the production mined equals \$.116 per ton.

In 1923 the total supply cost was \$149,445.02 or 37.4% of the cost of production, which is 2.7% less than the supplies in 1922, when the supply cost was \$139,613.36 or 40.1% of the cost of production.

The increase of \$.150 per ton in the cost of production in 1923 is largely due to the increase in wages, which based on the production mined amounted to \$.116 per ton.

UNDERGROUND COSTS:

Development in Rock,

1923 Amount	\$622.54--	Cost per ton	\$.003
1922	1,596.08		.007
Decrease	\$973.54		\$.004

There was 141 feet of rock work in 1923 at \$4.41 per ft.; and 318 feet in 1922 at \$5.02 per ft.; a decrease of 177 feet.

Development in Ore,

1923 Amount	\$1,720.38	Cost per ton	\$.007
1922	2,232.21		.010
Decrease	\$ 511.83		\$.003

There was 208 feet of ore development in 1923 against 472 feet in 1922, a decrease of 264 feet.

Stoping,

1923 Amount	\$130,382.30	Cost per ton	\$.572
1922	107,162.89		.495
Increase	\$ 23,219.41		\$.077

Detail.

	<u>Labor</u>		<u>Supplies</u>	
1923	\$107,918.19	82.8%	\$22,464.11	17.2%
1922	88,289.46	82.4%	18,873.43	17.6%
Incr.	\$ 19,628.73		\$ 3,590.68	

	<u>Cost per ton</u>		
	<u>Labor</u>	<u>Supplies</u>	<u>Total</u>
1923	\$.474	\$.098	\$.572
1922	.407	.088	.495
Incr.	\$.067	\$.010	\$.077

This increase in cost per ton for labor is due to increase in wages.

Increase in supply charge due to three Mayne Loaders charged to stoping in 1923 at a cost of \$1650.00.

	Explosives.	
	<u>1923</u>	<u>1922</u>
Total lbs. of Powder	81,700	80,975
Average price per lb.	.1625	.1577
Total Amount	13,279.59	12,772.87
Fuse, Caps, etc.	2,311.31	2,381.39
Grand Total -	15,590.90	15,154.26
Lbs. Powder per ton of ore	.3587	.3738
Cost per ton for powder	.0583	.059
" " " All Explosives.	.0683	.07

Timbering,

1923 Amount	\$69,446.18	- Cost per ton	\$.305
1922	57,308.21		.265
Increase	\$12,137.97		\$.040

	<u>1923</u>	<u>1922</u>
Timber Cost,	9,562.21	7,891.34
Lagging, Poles, etc.,	8,588.43	7,386.25
Total,	18,150.64	15,277.59
Ft. timber per ton of ore	.5755	.7284
Cost per ton, all timber	.0796	.0705
Avg. price per ft. all tbr.	.0729	.05

There was more large timber and less small timber used in 1923.

The average price per foot for timber increased 46% as compared with the 1922 price. The 1922 price was small due to inventory adjustment of 1921.

The feet of timber per ton of ore was 21% less than in 1922.

Tramming,

1923 Amount \$27,484.16 - Cost per ton \$.121
1922 20,432.24 .094
Increase \$ 7,051.92 \$.027

This increase is due to a larger amount of ore handled on the transfer sub.

Ventilation,

1923 Amount \$670.08 - Cost per ton \$.003
1922 no charge

A ventilating plant was installed on the transfer sub level in 1923.

Pumping,

1923 Amount \$40,130.94 - Cost per ton \$.176
1922 38,798.72 .179
Increase \$ 1,332.22 Decrease \$.003

Gallons of water pumped 1923 - 509,330,141

" " " " 1922 - 516,431,099

Gallons of water pumped per minute 1923 - 966

" " " " " " 1922 - 985

Decrease, 19

Compressors & Air Pipes,

1923 Amount \$20,651.21 - Cost per ton \$.091
1922 19,365.57 .090
Increase \$ 1,285.64 \$.001

Cu. ft. of air made by Maas compressors,
1923 - 482,220,000 cu.ft.
1922 - 458,010,000 "
Incr. 24,210,000 cu.ft.

Back Filling,

1923 Amount \$128.40 - Cost per ton \$.001
1922 no charge
Increase \$128.40 \$.001

Underground Superintendence,

1923 Amount	\$11,652.33	- Cost per ton	\$.051
1922	9,402.18		.044
Increase	\$ 2,250.15		\$.007

Increase due to increase in wages.

MAINTENANCE ACCOUNTS:

Compressors & Power Drills,

1923 Amount	\$539.06	- Cost per ton	\$.002
1922	506.00		.002
Increase	\$ 33.06		\$.000

The charge in both years was for general repairs to two Ingersoll Rand compressors.

Hand Tramming Equipment,

1923 Amount	\$1,560.83	- Cost per ton	\$.007
1922	1,746.69		.008
Decrease	\$ 185.86		\$.001

The 1922 charge included the cost of one Ingersoll Rand Double Drum Slusher at \$645.50.

Electric Tram Equipment,

1923 Amount	\$11,847.60	- Cost per ton	\$.052
1922	8,720.08		.040
Increase	\$ 3,127.52		\$.012

	Eng. & Dyn.	Sub Division. Locomotives	Wiring
1923	208.96	2,862.22	1,049.00
1922	179.88	1,740.08	918.59
Incr.	29.08	1,122.14	130.41

	M. L. Tracks	M. L. Cars
1923	2,213.61	5,513.81
1922	2,489.17	3,392.36
Decr.	275.56	Incr. 2,121.45

Increase in Locomotives due to general repairs on locomotives including four sets wheels \$420.00, 1 new controller \$154.38 and 8 journal boxes 151.33.

Decrease in M. L. Tracks due to less labor maintaining main level tracks.

Increase in Wiring due to more labor on trolley lines.

Increase in M. L. Cars due to general upkeep of main level cars.

Pumping Machinery,

1923 Amount	\$4,325.59	- Cost per ton	\$.019
1922	8,009.41		.037
Decrease	\$3,683.82		\$.018

The 1922 charge was high due to making an addition to the third level pump station and transferring the Aldrich pump from the second to the third level.

Total Underground Costs,

1923 Amount	\$321,161.60	- Cost per ton	\$1.410
1922	275,280.28		1.271
Increase	\$ 45,881.32		\$.139

SURFACE COSTS:

Hoisting,

1923 Amount	\$14,195.91	- Cost per ton	\$.062
1922	12,665.83		.059
Increase	\$ 1,530.08		\$.003

Increase due to increase in wages.

Stocking Ore,

1923 Amount	\$11,834.88	- Cost per ton	\$.052
1922	8,927.98		.041
Increase	\$ 2,906.90		\$.011

In the fall of 1923 a new two track trestle was erected for 36 bents to take care of the Maas grade of ore.

The 1922 cost was high due to the small amount of ore shipped that season and it was necessary to stock the product during the entire year.

Dry House,

1923 Amount \$8,335.31 - Cost per ton \$.037
 1922 6,804.24 .032
 Increase \$1,531.07 \$.005

The 1922 cost was high due to connecting the dry sewer with the city main; 1700' of sewer pipe was necessary to make this connection.

General Surface Expense,

1923 Amount \$4,698.33 - Cost per ton \$.021
 1922 4,176.00 .019
 Increase \$ 522.33 \$.002

Increase due to increase in wages.

MAINTENANCE ACCOUNTS:

Hoisting Equipment,

1923 Amount \$4,301.30 - Cost per ton \$.019
 1922 4,029.06 .019
 Increase \$ 272.24 \$.000

Sub Division.

	1923	1922	
Electric Hoists,	823.88	1309.12	485.24 Decr.
Wire Rope	1435.14	919.81	515.33 Incr.
Skips, Cages and Roads	2042.28	1800.13	242.15 Incr.

Shaft,

1923 Amount \$119.68 - Cost per ton \$.000
 1922 72.86 .000
 Increase \$ 46.82

The charge in both years is for repairs made to loading pockets.

Top Tram Equipment,

1923 Amount \$1,794.95 - Cost per ton \$.008
 1922 1,792.60 .008
 Increase \$ 2.35 \$.000

Sub Division.

	1923	1922
Engine and Motors		114.84
Tracks and cars,	1,310.91	985.22
Wire Rope	401.93	479.08
Sheaves, rollers, etc.	82.11	213.46

Docks, Trestles & Pockets,

1923 Amount	\$404.88	- Cost per ton	\$.002
1922	823.50		.004
Decrease	\$418.62		\$.002

1922 Cost was high due to repairing shaft house pockets.

Mine Buildings,

1923 Amount	\$3,034.40	- Cost per ton	\$.013
1922	273.74		.001
Increase	\$2,760.66		\$.012

Increase due to repairing carpenter shop wing of shop building which was destroyed by fire December 29, 1922; new Brooks Brand roof put on the entire shop building at this time.

Total Surface Costs,

1923 Amount	\$48,719.64	- Cost per ton	\$.214
1922	39,565.81		.183
Increase	\$ 9,153.83		\$.031

GENERAL MINE ACCOUNTS:

Insurance,

1923 Amount	\$249.15	- Cost per ton	\$.001
1922	245.15		.001
Increase	\$ 4.00		\$.000

Engineering,

1923 Amount	\$2,674.79	- Cost per ton	\$.012
1922	2,819.62		.013
Decrease	\$ 144.83		\$.001

Analysis,

1923 Amount	\$9,308.13	- Cost per ton	\$.041
1922	8,238.20		.038
Increase	\$1,069.93		\$.003

This account includes the operating laboratory charge.

	<u>No. of Dets.</u>	<u>Cost per Det.</u>	<u>Total</u>
1923	36,366	\$.15381	\$5,593.51
1922	39,424	.13770	5,428.79
Decr.	3,058	Incr. \$.01611	Incr. \$ 164.72

Personal Injury Expense,

1923 Amount	\$ 6,354.73	- Cost per ton	\$.028
1922	10,835.23		.050
Decrease	\$ 4,480.50		\$.022

The 1922 charge included the amount due account of fatal accident to Alfred Franzen which occurred Sept. 8, 1921. 1922 also included settlement in the case of John Russo, who was carried since December 1920; and weekly payments to John Heiskonen, arm injury December 1920.

The 1923 charge included weekly payments to John Heiskonen arm injury, who is still receiving compensation.

Also a settlement amounting to \$504.00 account of accident to Dom. Francisco; and partial payment to Herman Grandlund for injury July 1st, 1920 amounting to \$2556.32.

Safety Department Expense,

1923 Amount	\$ 99.55	- Cost per ton	\$.000
1922	114.50		.000
Decrease	\$ 14.95		

Telephones & Safety Devices,

1923 Amount	\$698.83	- Cost per ton	\$.003
1922	298.67		.001
Increase	\$400.16		\$.002

Increase due to fire fighting apparatus charged in October 1923, \$300.00.

Local General Welfare,

1923 Amount	\$1,338.44	- Cost per ton	\$.006
1922	1,547.59		.007
Decrease	\$ 209.15		\$.001

Special Expense,

1923 Amount	no charge		
1922	\$138.59	- Cost per ton	\$.001

Mine Office,

1923 Amount	\$9,290.39	- Cost per ton	\$.041
1922	8,852.06		.041
Increase	\$ 438.33		\$.000

Total General Expense,

1923 Amount	\$30,014.01	- Cost per ton	\$.132
1922	33,089.61		.152
Decrease	\$ 3,075.60		\$.020

PRODUCTION.

Month	Bessemer	Negaunee	Total	Rock
January	5,036	29,226	34,262	36
February	4,504	23,032	27,536	220
March	6,728	27,601	34,329	28
April	2,580	26,704	29,284	
May	3,919	29,228	33,147	56
June	3,517	29,812	33,329	272
July	3,376	28,472	31,848	240
August	3,316	29,992	33,308	780
September	2,795	27,284	30,079	800
October	4,525	28,252	32,777	124
November	3,278	28,762	32,040	116
December	2,984	26,195	29,179	96
Total	46,558	334,560	381,118	2,768
Bess. Stockpile overrun	797		797	
	47,355	334,560	381,915	
Transferred from	5,468	to 5,468		
Total	41,887	340,028	381,915	2,768

ANALYSIS OF PRODUCTION AND COSTS.

Production of 1922 299,051 tons,
 " 1923 381,915 "
 Increase 1923 82,864 tons.

Cost of production 1923 \$530,942.54 - Cost per ton \$1.39
 " " " 1922 401,872.86 1.343
 Increase \$129,069.68 Increase \$.047

DETAIL OF COST OF PRODUCTION.

	TOTAL COST				COST PER TON		
	LABOR	%	SUPPLIES	%	LABOR	SUPPLIES	TOTAL
1923 -	\$333,988.69	62.9	\$196,953.85	37.1	\$.874	\$.516	\$1.39
1922 -	242,778.49	60.4	159,094.37	39.6	.811	.532	1.343
	\$ 1,210.20		\$ 37,859.48		\$.063	\$.016	\$.047
	Incr.		Incr.		Incr.	Decr.	Incr.

The increase in production was due to the mine operating full time in 1923, compared with the 1922 schedule of half time from January 1st to June 5th and full time from June 5th for the balance of year.

The increased cost per ton for labor was due to a 10% increase in wages effective May 1st, 1923.

There was a decrease of \$.016 in the cost of supplies.

In April began sinking #3 shaft preparatory to opening new level. Sunk 113 feet from 12th level, when work was stopped on October 6th due to shortage of water for electric power. Total cost \$13,716.28.

Began in October to gunitite the shaft house building. This work was stopped the latter part of November due to weather conditions. Cost of part completed \$698.04.

During November and December a new Surface Dry was built, the cost to January 1st being \$1,012.05.

In October started grading for an addition to the East trestle. Grading and eight bents completed in December at a cost of \$1,876.56.

During the year 1923 the mine worked one eight-hour shift for 297 days. The average number of men employed during the year was 228 for a total of 69,949 days. In 1922 an average of 232 men were employed for a total of 57,005 days. A decrease in 1923 of 4 men and an increase of 12,944 days.

The average tons per man underground in 1923 was 6.76, an increase of .89 tons per man over 1922 which was 5.87. The total tons per man per day in 1923 was 5.46, an increase of .21 tons per man over 1922, which was 5.25.

UNDERGROUND COSTS:

Sinking Shaft,

1923 Amount	\$13,716.28	- Cost per ton	\$.036
1922		no charge.	

Began sinking a new lift in #3 shaft and completed 113 ft. when work was stopped October 6th due to a shortage of water for electric power.

Development in Rock,

1923 Amount	\$2,339.23	- Cost per ton	\$.006
1922	1,174.46		.004
Increase	\$1,164.77		\$.002

		<u>Drftg.</u>	<u>Raising</u>
No. feet of rock work 1923,	527'	333'	194'
" " " " " 1922,	412'	290'	132'
Increase -	115'	43'	62'

The increased cost per ton is due mostly to an increase in the rate to miners in 1923 over 1922 of 14.3%.

Development in Ore,

1923 Amount	\$4,130.27	- Cost per ton	\$.011
1922	1,880.85		.006
Increase	\$2,249.42		\$.005

		<u>Drftg.</u>	<u>Raising</u>
No. feet Ore Dev. in 1923,	979'	196'	783'
" " " " " 1922,	851'	239'	612'
Increase -	128'		171'
Decrease -		43'	

Increase cost per ton due to 14.3% increase to miners in 1923 over 1922. During 1923 a number of vertical raises were put up for the incline system of mining.

Stoping,

1923 Amount	\$192,304.85	- Cost per ton	\$.504
1922	141,968.32		.475
Increase	\$ 50,336.53		\$.029

Detail.

	<u>Labor</u>		<u>Supplies</u>	
1923	\$155,237.77	80.9%	\$37,067.08	19.1%
1922	113,899.44	80.2%	28,068.32	19.8%

	<u>Cost per ton</u>		
	<u>Labor</u>	<u>Supplies</u>	<u>Total</u>
1923	\$.408	\$.096	\$.504
1922	.381	.094	.475
Incr.	\$.027	\$.002	\$.029

Increase due to increase in wages.

Explosives.

	<u>1923</u>	<u>1922</u>
Total lbs. Powder	163,350	123,150
Average price per pound	.1590	.1641
Total Amount	25,977.29	20,204.53
Fuse, Caps, etc.	3,697.85	3,061.62
Grand Total	29,675.14	23,266.15
Lbs. powder per ton of ore	.4277	.4118
Cost per ton for powder,	.0680	.0676
" " " all explosives	.0777	.0778

Timbering,

1923 Amount	\$102,469.09	- Cost per ton	\$.268
1922	76,291.72		.255
Increase	\$ 26,177.37		\$.013

	<u>1923</u>	<u>1922</u>
Timber Cost,	18,691.69	13,136.41
Lagg. Poles & Cover Bds.	13,815.72	11,629.75
Total,	32,507.41	24,766.16

Ft. of Tbr. per ton of ore	.7045	.5459
Ft. of Lagg. "	2.6762	2.7524
Cost per ft. for timber,	.0695	.0800
Cost per ton for Timber	.0489	.0439
" Lagging,	.0205	.0217
" Poles,	.012	.0105
" Cover Boards,	.0037	.0066
" Tbr., Lagging, poles & Cover Bds.,	.0851	.08282

The increase in cost per ton in 1923 is due to more feet of timber per ton of ore.

Tramming,

1923 Amount	\$29,055.45	- Cost per ton	\$.076
1922	20,620.57		.069
Increase	\$ 8,434.88		\$.007

Increased cost per ton is due to 10% increase in wages on May 1st.

Ventilation,

1923 Amount	\$ 6.37	- Cost per ton	\$.000
1922	19.84		.000

Little or no ventilation repairs.

Pumping,

1923 Amount	\$36,680.70	- Cost per ton	\$.096
1922	37,505.57		.148
Decrease	\$ 824.87		\$.052

Total Gals. water pumped	488,963,860	<u>1923</u>	495,781,440	<u>1922</u>
Gals. pumped per minute	932		945	

A decrease of 6,817,580 gallons of water pumped and 12 gallons per minute.

Decrease cost per ton due to mine operating five months at half time in 1922 and all of 1923 at full time. Pumping being an active account

during the half-time period of 1922.

Compressor & Air Pipes,

1923 Amount	\$25,684.21	- Cost per ton	\$.067
1922	19,451.58		.065
Increase	\$ 6,232.63		\$.002

	<u>Compressor</u>	<u>Air Pipes</u>
1923	\$21,290.63	\$4,393.58
1922	16,125.19	3,326.39
Incr.	\$ 5,165.44	\$1,067.19

Total Cu.Ft. air used	1923	-	655,695,000
Do.	1922	-	414,810,000
Increase -			240,885,000

Increase to this account due to 10% increase in wages and mine operating full time in 1923 as compared with part half-time in 1922.

Back Filling,

1923 Amount	\$3,333.93	- Cost per ton	\$.009
1922	2,575.05		.009
Increase	\$ 758.88		\$.000

More filling.

Underground Superintendence,

1923 Amount	\$13,209.55	- Cost per ton	\$.035
1922	10,316.21		.035
Increase	\$ 2,893.34		\$.000

The 10% increase in wages in 1923 did not increase the cost per ton because in 1922, during the half-time period, there were more bosses in proportion to the tonnage produced.

MAINTENANCE ACCOUNTS:

Cave-In,

1923 Amount	\$178.80	- Cost per ton	\$.000
1922	40.98		.000
Increase	\$137.82		

More repairs to fences around caves.

Compressor & Power Drills,

1923 Amount	\$344.24	- Cost per ton	\$.001
1922	122.04		.001
Increase	\$222.20		\$.000

No power drills purchased. Increase due to more repairs to compressors.

Hand Trimming Equipment,

1923 Amount	\$3,506.42	- Cost per ton	\$.009
1922	2,790.06		.009
Increase	\$ 716.36		\$.000

More repairs and more new buggies built.

Electric Tram Equipment,

1923 Amount	\$10,468.47	- Cost per ton	\$.027
1922	9,976.68		.033
Increase	\$ 491.79	Decrease	\$.006

	Eng. & Motor	Locomotives	Wiring
1923	210.89	2,409.75	1,230.41
1922	67.96	2,840.07	1,267.35
Incr.	142.93	Decr. 430.32	Decr. 36.94

	M. L. Tracks	M. L. Cars
1923	3,281.07	3,336.35
1922	2,407.24	3,394.06
Incr.	873.83	Decr. 57.71

Engine & Motor: Increase due to more repairs.

Locomotives: Decrease due to less repairs to locomotives.

Wiring: Decrease due to less wiring.

M. L. Tracks: Increase due to 10% increase in wages, also more repairs and more rail used.

M. L. Cars: Less repairs to motor cars.

Pumping Machinery,

1923 Amount	\$2,169.33	- Cost per ton	\$.006
1922	2,505.64		.008
Decrease	\$ 336.31		\$.002

Decrease cost per ton due to less repairs in proportion to tonnage.

Total Underground Cost,

1923 Amount	\$439,597.19	- Cost per ton	\$1.151
1922	327,239.97		1.094
Increase	\$112,357.22		\$.057

SURFACE COSTS:

Hoisting,

1923 Amount	\$22,060.63	- Cost per ton	\$.058
1922	16,943.37		.057
Increase	\$ 5,017.26		\$.001

Electric Power 1923,	\$15,616.50
" " 1922,	12,018.00

Increase of 10% in wages, May 1st, 1923, makes cost per ton in 1923 greater.

Stocking Ore,

1923 Amount	\$5,334.07	- Cost per ton	\$.014
1922	2,929.01		.010
Increase	\$2,405.01		\$.004

Increase due to building eight bents on to the East trestle.

Dry House,

1923 Amount	\$9,668.42	- Cost per ton	\$.025
1922	7,418.22		.025
Increase	\$2,250.20		\$.000

Coal to Boiler House -	<u>Tons</u>	<u>Cost</u>
1923	998	9,155.35
1922	1075	7,665.44

Although 77 tons less coal was used in 1923, the cost for coal was \$1500.00 greater than in 1922. During 1923 one of the old boilers was removed and replaced by a boiler from the Imperial Mine.

General Surface Expense,

1923 Amount	\$5,295.15	- Cost per ton	\$.014
1922	4,239.56		.014
Increase	\$1,055.59		\$.000

Increase due to mine working full time in 1923, making more general surface work necessary.

MAINTENANCE ACCOUNTS:

Hoisting Equipment,

1923 Amount	\$7,922.77	- Cost per ton	\$.021
1922	9,724.91		.032
Decrease	\$1,802.14		\$.011

	Sub Division.		
	Wire Rope	Machinery Parts	Skips & Skip Roads
1923	1,492.30	4,050.32	2,380.15
1922	15.16	7,938.78	1,770.97
Incr.	1,477.14	Decr. 3,888.46	Incr. 609.18

Increase in Wire Rope due to no ropes put on in 1922. In 1923 three new ropes; on March 18th one for South skip; on April 29th one for North skip; on August 10th a new cage rope.

Decrease in Machinery Parts. This sub-division high both years. In 1922, 3/4th of E.&A.426, new armature, was charged \$6,345.00.

In 1923 there was an increased cost due to charging third and final payment on E.&A.426 new armature. Also rewinding coils on generator set, due to coils burning out and extending skip hoist drum.

Increase in Skip & Skip Roads due to more repairs to skip and skip roads.

Shaft,

1923 Amount	\$1,239.41	- Cost per ton	\$.003
1922	913.35		.003
Increase	\$ 326.06		\$.000

More shaft repairs in 1923.

Top Tram Equipment,

1923 Amount	\$1,706.85	- Cost per ton	\$.005
1922	1,841.72		.006
Decrease	\$ 134.87		\$.001

	Sub Division.	
	General Repairs	Wire Rope
1923	1,173.01	533.84
1922	1,437.56	404.16
Decr.	264.55	Incr. 129.68

Decrease cost per ton due to completing replacement of top tram ties in 1922. This account high in 1923 also due to more repairs to engine and motor and sheaves and rollers replaced.

Increase in Wire Rope due to 4700 feet of 5/8" wire rope on North side in 1922 and 5800 feet on South side in 1923. The South side rope covers rock trestle also.

Docks, Trestles & Pockets,

1923 Amount	\$1,286.87	- Cost per ton	\$.003
1922	452.37		.001
Increase	\$ 834.50		\$.002

Increase cost per ton due to grading for new Bessemer stocking trestle, extending rock trestle, and some trestle painting.

Mine Buildings,

1923 Amount	\$2,401.22	- Cost per ton	\$.006
1922	1,123.61		.004
Increase	\$1,277.61		\$.002

Increase cost per ton due to completing new roof on office building, guniting in headframe and erecting new surface dry house.

Total Surface Costs,

1923 Amount	\$56,915.39	- Cost per ton	\$.149
1922	45,586.12		.152
Increase	\$11,329.27	Decrease	\$.003

GENERAL MINE ACCOUNTS:

Insurance,

1923 Amount	\$180.48	- Cost per ton	\$.000
1922	180.41		.001
Increase	\$.08	Decrease	\$.001

Engineering,

1923 Amount	\$2,947.76	- Cost per ton	\$.008
1922	2,489.56		.008
Increase	\$ 458.20		\$.000

Analysis,

1923 Amount	\$12,272.04	- Cost per ton	\$.032
1922	9,726.36		.032
Increase	\$ 2,545.68		\$.000

This includes proportion of district laboratory and sampling. The total cost for the laboratory was \$16,373.50 and the total determinations 106,150.

In 1922 the cost was \$14,622.49 and the total determinations were 106,756. An increase in cost of \$1,751.01 and a decrease of 596 determinations.

Cost per determination 1923,	\$.154234
" " " 1922	.136971
Increase -	\$.017263

Increase per determination due mostly to 10% increase in wages May 1st, 1923.

Personal Injury Expense,

1923 Amount	\$4,139.80	- Cost per ton	\$.011
1922	3,953.80		.013
Increase	\$ 186.00	Decrease	\$.002

Decrease cost per ton 1923 due to less injury expense. No fatal accidents in 1923 or 1922.

Safety Department Expense,

1923 Amount	\$145.63	- Cost per ton	\$.000
1922	160.83		.001
Decrease	\$ 15.20		\$.001

Less expense.

Telephone & Safety Devices,

1923 Amount	\$1,964.70	- Cost per ton	\$.005
1922	801.62		.003
Increase	\$1,163.08		\$.002

Increase cost per ton due mostly to E.&A. #445, fire equipment for underground, such as water tanks and trucks for same being charged to this account.

Local General Welfare,

1923 Amount	\$1,755.56	- Cost per ton	\$.005
1922	1,920.05		.006
Decrease	\$ 164.49		\$.001

Less welfare work done in 1923.

Special Expense,

1923 Amount	No charge
1922	\$107.03

Mine Office,

1923 Amount	\$11,023.99	- Cost per ton	\$.029
1922	9,707.11		.033
Increase	\$ 1,316.88	Decrease	\$.004

	Sub Division	
	Direct Charges	Mine Office
1923	\$3,803.72	\$7,420.27
1922	3,367.43	6,339.68
Incr.	436.29	1,080.59

Increase in both sub-divisions due to increase in wages.

Decrease cost per ton due to office force operated full time during half-time period.

MORRIS LLOYD MINES.

ANALYSIS OF COST SHEETS, EXPLAINING INCREASE OR
DECREASE IN VARIOUS ACCOUNTS BETWEEN THE YEAR 1922 and 1923.

UNDERGROUND COSTS

ACCOUNT
EXPLORING IN MINE

Year 1923	4,087.38	Cost Per Ton	.016
" 1922	<u>0</u>	" " "	<u>.000</u>
Increase	4,087.38	" " "	.016

A drill was placed on the 7th level in the Morris Mine in August 1923. This will account for the increase this year as no diamond drilling was done in 1922.

ACCOUNT
DEVELOPMENT IN ROCK

Year 1923	22,610.89	Cost Per Ton	.087
" 1922	<u>35,351.96</u>	" " "	<u>.159</u>
Decrease	12,741.07	" " "	.072

Decrease in this account is due to 1146 feet more rock drifting done in 1922 than 1923.

ACCOUNT
DEVELOPMENT IN ORE

Year 1923	36,588.28	Cost Per Ton	.141
" 1922	<u>20,134.40</u>	" " "	<u>.091</u>
Increase	16,453.88	" " "	.05

Increase in this account is due to developing territory above the 7th level in the Morris Mine and increase in wages.

ACCOUNT
STOPING

Year 1923	103,839.52	Cost Per Ton	.399
" 1922	<u>86,719.83</u>	" " "	<u>.390</u>
Increase	17,119.69	" " "	.009

The increase in this account is due to cost of mining the 38,356 tons additional product and the increase in wages. During 1922 the mines were on quarter time until June, and full time the balance of the year on one shift, whereas, in the year 1923 operations were carried on full time on one shift.

MORRIS LLOYD MINES.

UNDERGROUND COSTS

ACCOUNT
TIMBERING

Year 1923	56,220.90	Cost Per Ton	.216
" 1922	<u>41,861.51</u>	" " "	<u>.189</u>
Increase	14,359.39	" " "	.027

The increase in this account is due to cost of mining the 38,356 tons additional product and the increase in wages. During 1922 the mines were on quarter time until June, and full time the balance of the year on one shift, whereas, in the year 1923 operations were carried on full time on one shift.

ACCOUNT
TRAMMING

Year 1923	46,452.87	Cost Per Ton	.178
" 1922	<u>36,192.65</u>	" " "	<u>.163</u>
Increase	10,260.22	" " "	.015

Increase in this account is due to expense of tramming the increased tonnage and the increase in wages. Also, mine being worked full time on one shift all of 1923, compared with four hours per day for five months in 1922.

ACCOUNT
VENTILATION

Year 1923	1,646.97	Cost Per Ton	.006
" 1922	<u>1,541.58</u>	" " "	<u>.007</u>
Increase	105.39	Decrease	.001

No appreciable difference occurs in this account, a slight increase in the cost is due to repairs to ventilating equipment.

ACCOUNT
PUMPING

Year 1923	19,199.09	Cost Per Ton	.074
" 1922	<u>19,941.28</u>	" " "	<u>.090</u>
Decrease	741.19	" " "	.016

In 1922 - 525 gallons of water per minute were pumped by the mine pumps, as compared with 507 gallons per minute in 1923. This would show a slight decrease in the cost for year, the decrease in the cost per ton being due to the increase in the production.

MORRIS LLOYD MINES.

MAINTENANCE COSTS

ACCOUNT
COMPRESSORS AND
AIR PIPES

Year 1923	32,834.84	Cost Per Ton	.126
" 1922	<u>27,065.82</u>	" " "	<u>.122</u>
Increase	5,769.02	" " "	.004

Increase in this account is due to extension of 4" main air lines on the 6th and 7th levels in the Morris Mine, and the increased production and increase in wages.

ACCOUNT
UNDERGROUND SUPERINTENDENCE

Year 1923	13,578.17	Cost Per Ton	.052
" 1922	<u>11,812.47</u>	" " "	<u>.053</u>
Increase	1,765.70	Decrease	.001

Increase in expenditures in this account is due to the increase in wages, the increased production reducing the cost per ton. Mine worked full time all year on one shift whereas, in 1922 they were worked four hours per day only, until June month.

ACCOUNT
CAVE IN

Year 1923	97.68	Cost Per Ton	.000
" 1922	<u>2.20</u>	" " "	<u>.000</u>
Increase	95.48	" " "	.000

Increase in this account is due to fencing caved areas at Lloyd and Lloyd East ore bodies.

ACCOUNT
COMPRESSORS AND
POWER DRILLS

Year 1923	3,487.56	Cost Per Ton	.013
" 1922	<u>650.18</u>	" " "	<u>.003</u>
Increase	2,837.38	" " "	.01

Increase in this account is due to purchase of 13 Jack-hammer Drills and repairs to Nordberg compressor.

ACCOUNT
HAND TRAM EQUIPMENT

Year 1923	2,472.36	Cost Per Ton	.009
" 1922	<u>984.14</u>	" " "	<u>.005</u>
Increase	1,488.22	" " "	.004

Increase in this account is due to new sub-level cars built this year. Also to the purchase of six sets roller bearing trucks to change this equipment from plain to roller bearing.

MORRIS LLOYD MINES.

MAINTENANCE COSTS

ACCOUNT
ELECTRIC TRAM EQUIPMENT

Year 1923	19,989.99	Cost Per Ton	.077
" 1922	<u>14,649.02</u>	" " "	<u>.066</u>
Increase	5,340.97	" " "	.011

Increase in this account is due to rebuilding several motor cars and heavy repairs to locomotives, also to increase in wages and working time.

ACCOUNT
PUMPING MACHINERY

Year 1923	1,431.53	Cost Per Ton	.006
" 1922	<u>1,523.86</u>	" " "	<u>.007</u>
Decrease	92.33	" " "	.001

No appreciable difference occurs in this account. The amount expended is only for the general maintenance of this equipment and no extraordinary repairs or replacements were necessary during either year.

SURFACE COSTS

ACCOUNT
HOISTING

Year 1923	18,724.65	Cost Per Ton	.072
" 1922	<u>15,296.61</u>	" " "	<u>.069</u>
Increase	3,428.04	" " "	.003

Increase in this account is due to the increase in wages and cost of handling the increase in production and working time.

ACCOUNT
STOCKING ORE

Year 1923	8,257.86	Cost Per Ton	.032
" 1922	<u>5,727.22</u>	" " "	<u>.026</u>
Increase	2,530.64	" " "	.006

Increase in this account is for taking care of the increase in the production and erecting stocking trestles and the increase in wages and working time. Due to stocking grounds being filled, additional labor was necessary on the Morris stockpile in order to side dump from piles.

MORRIS LLOYD MINES

SURFACE COSTS

ACCOUNT
SCREENING AND
CRUSHING AT MINE

Year 1923	1,638.62	Cost Per Ton	.006
" 1922	<u>1,486.21</u>	" " "	<u>.007</u>
Increase	152.41	" " "	.001

Increase in this account is due to crushing more ore and increase in wages and working time.

ACCOUNT
DRY HOUSE EXPENSE

Year 1923	12,571.32	Cost Per Ton	.048
" 1922	<u>9,229.09</u>	" " "	<u>.042</u>
Increase	3,342.23	" " "	.006

Increase in this account is due to installing new boiler in Morris dry house and repairs to heating plant and increase in wages.

ACCOUNT
GENERAL SURFACE EXPENSE

Year 1923	15,611.31	Cost Per Ton	.022
" 1922	<u>4,982.17</u>	" " "	<u>.022</u>
Increase	629.14	" " "	.000

Increased expenditures in this account is for repairing surface grounds around Morris engine house and dry house and increase in wages and working time.

MAINTENANCE COSTS

ACCOUNT
HOISTING EQUIPMENT

Year 1923	4,213.49	Cost Per Ton	.016
" 1922	<u>7,118.39</u>	" " "	<u>.032</u>
Decrease	2,904.90	" " "	.016

Four "Lilly" overwind hoists installed on the hoists in 1922, and only ordinary repairs to machinery were necessary during 1923. During 1923, 5,250 feet of hoisting cable was placed in use at a cost of \$1,386.03.

ACCOUNT
SHAFT

Year 1923	1,941.60	Cost Per Ton	.007
" 1922	<u>1,212.61</u>	" " "	<u>.005</u>
Increase	728.99	" " "	.002

Increase in this account is due to repairs to shaft, timbering and pockets.

MORRIS LLOYD MINES

MAINTENANCE COSTS

ACCOUNT

TOP TRAM EQUIPMENT

Year 1923	3,186.59	Cost Per Ton	.012
" 1922	<u>2,839.97</u>	" " "	<u>.013</u>
Increase	346.62	Decrease	.001

Increase in this account is for building a new side dump car and the increase in wages.

ACCOUNT

DOCKS, TRESTLES
AND POCKETS

Year 1923	2,807.88	Cost Per Ton	.011
" 1922	<u>1,183.35</u>	" " "	<u>.005</u>
Increase	1,624.53	" " "	.006

Increase in this account is for grading new stockpile grounds on account of having to provide additional room for the coming winter's product, due to small shipments having been made this year. We moved 11,000 cubic yards of material from stocking grounds which gives us a larger area for stockpile purposes.

ACCOUNT

MINE BUILDINGS

Year 1923	2,503.10	Cost Per Ton	.010
" 1922	<u>2,015.00</u>	" " "	<u>.009</u>
Increase	488.10	" " "	.001

Increase in this account is due to changing the heating plant building at the Morris Mine to house the new boiler installed there, and also repairs to Morris engine house on account of fire.

GENERAL MINE ACCOUNTS

ACCOUNT

INSURANCE

Year 1923	113.40	Cost Per Ton	.000
" 1922	<u>120.59</u>	" " "	<u>.001</u>
Decrease	7.19	" " "	.001

ACCOUNT

ENGINEERING

Year 1923	3,885.63	Cost Per Ton	.015
" 1922	<u>2,884.88</u>	" " "	<u>.013</u>
Increase	1,000.75	" " "	.002

Increase in 1923 is due to increase in salary of engineer and our proportion of General Office Engineering Expense.

MORRIS LLOYD MINES

GENERAL MINE ACCOUNTS

ACCOUNT
ANALYSIS

Year 1923	7,924.83	Cost Per Ton	.030
" 1922	<u>8,253.20</u>	" " "	<u>.037</u>
Decrease	328.37	" " "	.007

Electrical equipment installed in the laboratory in 1922 and only regular expenditures in 1923 accounts for the decrease this year.

ACCOUNT
PERSONAL INJURY EXPENSE

Year 1923	2,747.42	Cost Per Ton	.011
" 1922	<u>4,197.14</u>	" " "	<u>.019</u>
Decrease	1,449.72	" " "	.008

Less expenditure for compensation and medical attendance account for this decrease in 1923.

ACCOUNT
SAFETY DEPARTMENT

Year 1923	245.22	Cost Per Ton	.001
" 1922	<u>214.92</u>	" " "	<u>.001</u>
Increase	30.30	" " "	.000

No appreciable difference is noted here. The cost for the current year being only for the usual first aid practice work.

ACCOUNT
TELEPHONE AND
SAFETY DEVICES

Year 1923	1,269.76	Cost Per Ton	.005
" 1922	<u>290.05</u>	" " "	<u>.001</u>
Increase	979.71	" " "	.004

Increase in this account is due to purchase of fire helmet equipment and safety appliances.

ACCOUNT
LOCAL GENERAL WELFARE

Year 1923	3,311.17	Cost Per Ton	.013
" 1922	<u>2,696.47</u>	" " "	<u>.012</u>
Increase	614.70	" " "	.001

ACCOUNT
MINE OFFICE

Year 1923	13,963.81	Cost Per Ton	.054
" 1922	<u>13,161.49</u>	" " "	<u>.059</u>
Increase	802.32	Decrease	.005

Increase in expenditure is due to increase in wages. The cost per ton shows a decrease due to the increased tonnage.

ANALYSIS OF HILL-TRUMBULL COSTS FOR THE SEASONS OF 1922 & 1923

Inasmuch as there was a large amount of track work done during 1922 for a very small tonnage of direct ore, the mining cost for 1922 was excessive. The amount of track work done and the tonnage secured in 1923 was about normal and the mining cost was in line with that for 1921 and less than half that of 1922. We mined 3,084 tons of direct ore in 1922, as compared with 44,723 tons in 1923.

The following table shows the cost on cars for the ore shipped (Direct and Concentrates) from the Hill-Trumbull properties during the years 1922 and 1923:

	1922 <u>SEASON</u>	1923 <u>SEASON</u>
Mining Cost-----	\$.175	\$.261
Concentrating-----	.143	.171
Mine Superintendence-----	.006	.007
Stripping-----	.560	.560
Insurance-----	.001	.003
District Office-----	.012	.014
Central Office-----	.018	.045
Contingent Expense-----	.000	.031
Special Expense-----	.002	.003
Occupational Tax-----	.000	.089
Taxes-----	.337	.459
Winter Expense-----	.146	.161
Depreciation-----	.200	.200
Cost Adjustment-----	.003	.005
TOTAL-----	<u>\$1.603</u>	<u>\$2.011</u>
Less Misc. Debits & Credits---	.010 Cr.	.003 Cr.
	<u>\$1.593</u>	<u>\$2.008</u>

The "MINING COST" for 1923 shows an increase of \$.086 per ton over that for the previous season. While the cost on the direct ore was much lower in 1923, the 1922 tonnage was so small that the effect per ton on the total shipment was comparatively light. The increased wages during 1923 and the fact that we shipped 50,000 tons less ore, were two items affecting the increase, but the principal cause of the increase was due to the fact that we were obliged to operate two shovels during the entire season of 1923 and to maintain a comparatively large track force, whereas in 1922 but one shovel was worked and the track crew was very small. During the season of 1922 we worked on a 30' bank of ore almost continuously, but last year we were engaged in taking shallow cuts, which necessitated frequent

moves of our shovels and a large amount of track shifting.

The increase of \$.028 per ton in the cost of "CONCENTRATING" was due to the fact that our force at the washing plant was increased to handle the poorer grade of wash ore fed into the mill. The quantity of rock sorted during 1923 was greater than for the previous year and the various machines required closer attention. We did quite an extensive amount of repair work on our dyke during the summer of 1923 and this was taken up in the monthly operating costs. The higher wages paid in 1923 and the small tonnage of concentrates realized per shift were also important factors resulting in the increased cost.

The small increase of \$.001 per ton for "MINE SUPERINTENDENCE" is the result of a smaller output in 1923.

There was an increase of \$.002 per ton against "INSURANCE". This was the result of increasing the amount of insurance carried, against a smaller production.

The "DISTRICT OFFICE" charges were about the same for the two years, the smaller tonnage produced in 1923 explaining the increase of \$.002 against this caption.

The items "CENTRAL OFFICE", "CONTINGENT EXPENSE" and "SPECIAL EXPENSE" are Ishpeming charges.

There was a charge of \$.089 per ton for "OCCUPATIONAL TAX" in 1923, covering payments for the years 1921 and 1922. There was no charge to this account in 1922, as the mining companies were testing the constitutionality of this tax in the courts.

Under "TAXES", there was an increase of \$.122 per ton in 1923. While the total tonnage in the properties was lower in 1923, due to the 1922 shipments, the rate of valuation on one of the Trumbull forties was increased and the taxes were spread against 300,000 tons, as compared with 350,000 tons the previous year.

The increase of \$.015 per ton for "WINTER EXPENSE" is explained by the decreased output. The total charges against winter expense were less in 1923 than the previous year.

ANALYSIS OF BOEING MINE OPEN PIT ORE COST FOR THE YEAR 1923

As underground operations were only started late in the year 1922, there is no basis for comparing such costs to those of 1923.

In the case of open pit mining, our ore was loaded by the Winston-Dear Company during 1922 on a cost plus 10% basis. In 1923 we loaded the ore with our own equipment and below is shown the analysis of such cost, as compared with our estimated figures, made August, 1922:

<u>PIT OPERATING ACCOUNTS:</u>	<u>COST ESTIMATE</u> <u>AUGUST - 1922</u>	<u>1923</u> <u>ACTUAL COST</u>
Steam Shovels, Operating-----		\$.047
" " Repairs-----		.005
Locos. & Cars, Operating-----		.066
" " Repairs-----		.002
Track Expense-----		.029
Pumping & Drainage-----		.016
Water Supply-----		.003
General Open Pit Expense-----		.018
Open Pit Superintendence-----		<u>.003</u>
TOTAL-----	<u>\$.118</u>	<u>\$.189</u>
 <u>GENERAL ACCOUNTS:</u>		
Engineering-----	.004	.002
Assaying-----	.010	.010
Personal Injury-----	.001	.001
Mine Superintendent-----	.009	- *
Mine Office-----	.007	.006
District Office-----	<u>.012</u>	<u>.005</u>
TOTAL GENERAL ACCOUNTS----	<u>.043</u>	<u>.024</u>
GRAND TOTAL-----	<u>\$.161</u>	<u>\$.213</u>

*Under "Actual Cost", Mine Superintendent is included in "Open Pit Superintendence".

The increase in the cost of mining our open pit ore over our estimated figure, amounting to \$.052 per ton, is explained as follows:

First: At the time of making our estimate (August, 1922), common labor was being paid \$3.25 per day, whereas during the operating season of 1923 common labor was paid \$4.20. We figure that the increase in labor affected the cost per ton \$.0282.

Second: When the August, 1922, estimate was made, we supposed that the Contractor would complete the stripping job by midsummer of 1923. The fact that the Contractor continued stripping throughout the ore season led to some congestion and necessitated our doing a considerable amount of track work that had not been

anticipated. On account of the congestion and extra track work, we feel that the cost per ton was increased \$.015, or was practically double what we had allowed for this expense.

Third: The charging of a proportion of the expense of moving the Susquehanna coal dock approach track and the moving of the Captain's house and one of the boarding houses was charged to open pit ore. We did not contemplate this expense when making our estimate. This charge amounted to \$.013 per ton of open pit ore.

The sum of the above increases amounts to \$.0562, which added to the original estimate shows \$.2172 and is very close to the actual cost obtained.

The car service at the Boeing Mine during 1923 was more unsatisfactory than in 1922. We feel that if the car service had been the same as in 1922, our open pit mining costs would have been lowered approximately \$.010 per ton.

CLIFFS SHAFT MINE

COMPARISON OF COST SHEETS FOR 1922 AND 1923

In 1922 the mine was idle until June 26, and thereafter worked on single shift. The number of contracts was increased until there were 50, and the average operation was equivalent to six months with 48 contracts. The mine worked 152 days.

In 1923 the mine worked 299 days with an average of 48 contracts.

Wages were reduced 10% on June 1, 1922, but were raised 45¢ a day, or approximately 11-1/2%, on September 1, 1922, and were raised again 10% on May 1, 1923.

Production in 1923 was more than double that of 1922, so that a satisfactory comparison of gross charges is impossible.

PRODUCTION

	<u>1922</u>	<u>1923</u>
Days Worked	152	299
	Tons	Tons
Ore	131,502	290,615
Rock	<u>7,190</u>	<u>15,112</u>
Ore and Rock	138,692	305,727
Ore per Day	865	972
Rock per Day	<u>47</u>	<u>50</u>
Ore and Rock per Day	912	1,022

LABOR

	<u>1922</u>	<u>1923</u>
Average Number of Men	249	246
Average Rate per Day	4.19	4.74

TONS PER MAN PER DAY

	<u>1922</u>		<u>1923</u>
	6 Mos.	Year	
Surface	16.19	14.47	17.32
Underground	<u>4.50</u>	<u>4.28</u>	<u>5.15</u>
Total	3.52	3.30	3.97

COST OF PRODUCTION

	<u>1922</u>	<u>1923</u>
	Labor	1.207	1.199
Supplies	<u>.626</u>	<u>.641</u>
Total	1.833	1.840

UNDERGROUND COSTS

Exploring in Mine

1922	\$	- - - -	\$	- -
1923		2,175.26		.008
Increase	\$	2,175.26	\$	.008

There was no diamond drilling in 1922. Underground drilling started in the fall of 1923.

Development in Rock

1922	\$	15,607.39	\$	.119
1923		31,920.11		.110
Increase	\$	16,312.72		
Decrease			\$	.009

In 1922 921 feet of rock drift cost \$ 16.94 per foot. In 1923 2453 feet cost \$ 13.01 per foot. In 1922 cost per foot was higher on account of raising in hard jasper.

Development in Ore

1922	\$	11,426.13	\$	.087
1923		24,800.76		.085
Increase	\$	13,374.63		
Decrease			\$	.002

The increase is in raising in ore, and double operating time.

Stoping

1922	\$	58,326.90	\$	.443
1923		131,714.72		.453
Increase	\$	73,387.82	\$	.010

The increase is due to six months more work in 1923. Cost per ton higher on account of increase in wages May 1-1923.

Timbering

1922	\$	2,387.12	\$	.018
1923		6,296.64		.022
Increase	\$	3,909.52	\$	.004

In 1922 timbering cost \$ 397.85 per month and in 1923 it cost \$ 524.72 per month. The increase is due to building more chutes.

Tramming

1922	\$	59,919.11	\$	.455
1923		129,297.00		.445
Increase	\$	69,377.89		
Decrease			\$	.010

The increase is due to operating full-time in 1923. The cost per ton was lower on account of using more scrapers and locomotives.

Ventilation

1922	\$	- - -	\$	- -
1923		100.23		.000
Increase	\$	100.23	\$	.000

The charges for 1923 are for doors.

Pumping

1922	\$	14,683.65	\$	.112
1923		27,370.47		.094
Increase	\$	12,686.82		
Decrease			\$	.018

In 1923 the cost for the first six months was charged to idle expense.

Compressors and Air-Pipes

1922	\$	16,783.26	\$	.128
1923		33,715.08		.116
Increase	\$	16,931.82		
Decrease			\$	.012

The increase in compressors is due to double operating time in 1923. Reduction in cost per ton is due to increase in tons per day. Air-pipes cost \$ 3496 in 1923 and \$ 2072 in 1922.

Back-Filling

1922	\$	3,723.74	\$	.028
1923		<u>5,260.20</u>		<u>.018</u>
Increase	\$	1,536.46		
Decrease			\$	.010

The increase is due to double operating time in 1923.

Underground Superintendence

1922	\$	6,282.01	\$	.048
1923		<u>13,523.05</u>		<u>.047</u>
Increase	\$	7,241.04		
Decrease			\$	.001

The mine worked 152 days in 1922 and 299 in 1923. Wages were 11% higher in 1923, and there were fewer bosses at first in 1922.

Compressors and Power Drills

1922	\$	148.83	\$	.001
1923		<u>5,991.12</u>		<u>.021</u>
Increase	\$	5,842.29	\$	.020

In 1923 Compressor-repairs were \$ 865, and 14 power-drills cost \$ 5115.25.

Hand Trammig Equipment

1922	\$	5,093.20	\$	.039
1923		<u>14,322.81</u>		<u>.049</u>
Increase	\$	9,229.61	\$	.010

In 1923 cars cost \$ 4349 and scrapers, hoists, and power-cables \$ 5143. In 1922 cars and scrapers together cost \$ 2409.

In 1923 tracks cost \$ 4830 and in 1922 \$ 2743.

Electric Tram Equipment

1922	\$	8,002.24	\$	.061
1923		<u>20,460.64</u>		<u>.070</u>
Increase	\$	12,458.40	\$	.009

In 1923 the motor-generator set was moved over from the Lake Mine at a cost of \$ 1000. Locomotive repairs were \$ 1083 in 1923 and \$ 582 in 1922. Wiring cost \$ 1853 in 1923 and \$ 1089 in 1922. Tracks cost \$ 8600 in 1923 and \$ 5448 in 1922, both years being high on account of electrifying the eighth level in A shaft and the tenth level in B shaft. Main line cars cost \$ 7911 in 1923 and \$ 932 in 1922. All the old cars were repaired and 14 new ones built.

Pumping Machinery

1922	\$	500.13	\$	.004
1923		<u>895.96</u>		<u>.003</u>
Increase	\$	395.83		
Decrease			\$	.001

In 1922 pump repairs cost \$ 707 and in 1923 \$ 896. In 1922-the first half-year's charges were absorbed in idle expense.

SURFACE COSTS

Hoisting

1922	\$	7,517.84	\$	.057
1923		<u>16,888.21</u>		<u>.058</u>
Increase	\$	9,370.37	\$	.001

The increase is due to more operating days in 1923.

Stocking Ore

1922	\$	4,235.66	\$	.032
1923		<u>7,826.87</u>		<u>.027</u>
Increase	\$	3,591.21		
Decrease			\$	.005

Erecting portable trestles cost \$ 124 more in 1923.

The tram-plant for crushed ore was operated all the year in 1922 and only 5 months in 1923. The tram plant for lump ore was operated 1½ months in 1922 and 5 months in 1923. Charges for a new motor were \$ 1125 in this account in 1923.

Screening-Crushing at Mine

1922	\$	3,579.56	\$	.027
1923		<u>9,468.38</u>		<u>.033</u>
Increase	\$	5,888.82	\$	.006

Dry House

1922	\$	3,362.58	\$	.025
1923		<u>7,925.02</u>		<u>.027</u>
Increase	\$	4,562.44	\$	.002

General Surface Expense

1922	\$	2,727.57	\$	.021
1923		<u>6,882.84</u>		<u>.024</u>
Increase	\$	4,155.27	\$	.003

MAINTENANCE ACCOUNTS

Hoisting Equipment

1922	\$	1,967.31	\$	.015
1923		<u>6,894.79</u>		<u>.024</u>
Increase	\$	4,927.48	\$	.009

Shaft

1922	\$	511.34	\$	.004
1923		<u>838.25</u>		<u>.003</u>
Increase	\$	326.91		
Decrease			\$	.001

Top Tram Equipment

1922	\$	3,032.01	\$	.023
1923		<u>1,924.87</u>		<u>.006</u>
Decrease	\$	1,107.14	\$	.017

Docks, Trestles and Pockets

1922	\$	265.92	\$	.002
1923		<u>776.21</u>		<u>.002</u>
Increase	\$	510.29	\$	.000

Mine Buildings

1922	\$	1,294.48	\$	.010
1923		<u>4,008.83</u>		<u>.014</u>
Increase	\$	2,714.35	\$	.004

GENERAL MINE ACCOUNTS

Insurance

1922	\$	107.40	\$	.001
1923		<u>245.76</u>		<u>.001</u>
Increase	\$	138.36	\$	.000

Maintenance in 1922 was \$ 958 and \$ 2962 in 1923, the principal items of increase being screens and chutes, \$ 1503, and tram cars and rope, \$ 500. Operating screens increased \$ 2459, power increased \$ 667, and tramping charges increased \$ 760.

In 1922 the monthly average cost was \$ 190 labor, \$ 368 supplies, mostly fuel, total \$ 558. In 1923 the average was \$ 200 labor, \$ 460 supplies, total \$ 660, due mostly to heating in the colder months.

Supplies increased \$ 445, of which \$ 380 was teaming expense. Maintenance of grounds was higher in 1923, and regular labor worked twice as many months.

In 1923 two Lilly Hoist Controls cost \$ 2199, wire-rope cost \$ 471, and repairs to skips, cages and skip-roads increased \$ 1733, and repairs to hoists increased \$ 499.

The increase is in repairs to pockets etc. underground.

Motors increased \$ 543 including part payment on a new motor in 1923. Tracks and cars decreased \$ 222 and wire-rope increased \$ 28. The principal decrease was in the cost of the new floor for the high trestle, most of which was put on in 1922.

Grading and planking increased \$ 141 in 1923. Permanent trestles decreased \$ 108 and repairs to pockets, chutes, etc. increased \$ 477.

In 1922 all the buildings except the crusher-building were painted. In 1923 repairs to the coal-dock cost \$ 2950.

The first half-year's insurance in 1922 was charged to idle expense.

Engineering

1922	\$	778.30	\$	.006
1923		<u>2,613.99</u>		<u>.009</u>
Increase	\$	1,835.69	\$	.003

This is a Central Office charge. Not much work was done in 1922.

Analysis

1922	\$	946.63	\$	.007
1923		<u>2,468.80</u>		<u>.008</u>
Increase	\$	1,522.17	\$	.001

Central Laboratory charges increased \$ 887 in 1923, and labor charges increased \$656 on account of full year's operation and heavy shipments from stock-piles.

Personal Injury Expense

1922	\$	1,702.44	\$	.013
1923		<u>3,921.91</u>		<u>.014</u>
Increase	\$	2,219.47	\$	.001

The increase is due to longer operating time in 1923.

Telephones and Safety Devices

1922	\$	641.62	\$	.005
1923		<u>1,942.47</u>		<u>.007</u>
Increase	\$	1,300.85	\$	.002

Labor increased \$ 400 on account of increased operating time, and supplies increased \$ 901. The principal items were First aid supplies, \$ 61, Fire-extinguishers and buckets, \$ 100, Bulletin boards and signs \$ 88, and Fire-helmets \$ 500. The balance is lumber and miscellaneous supplies.

Local General Welfare

1922	\$	550.94	\$	.004
1923		<u>957.05</u>		<u>.003</u>
Increase	\$	406.11		
Decrease			\$	.001

This is a Central Office charge.

Mine Office

1922	\$	5,027.27	\$	.038
1923		<u>11,268.07</u>		<u>.039</u>
Increase	\$	6,240.80	\$	.001

Charges at the mine increased \$ 1978, the principal items of increase being

Choreman	\$	288
Printing		58
Janitor and Heat, etc.		868
Telephones		32
Garage and Mileage		541
Exchange		<u>191</u>
	\$	1978

Direct charges increased \$ 1807. The balance was absorbed by idle expense from 1922 charges.

RECAPITULATION

	Year 1922		Year 1923		Increase		Decrease	
	Total	Per Ton	Total	Per Ton	Total	Per Ton	Total	Per Ton
Underground Costs	202883.71	1.543	447844.05	1.541	244960.34			.002
Surface Costs	28494.27	.216	63434.27	.218	34940.00	.002		
Gen. Mine Accounts	9754.60	.074	23418.05	.081	13663.45	.007		
Cost of Production	241132.58	1.833	534696.37	1.840	293563.79	.007		

HOLMES MINE

COMPARISON OF COST SHEETS FOR 1922 AND 1923

In 1922 the mine worked on single shift up to June 5, and thereafter on double shift. 130 days were worked on single shift and 172 on double shift. There were 29 contracts up to June 5, and 31 thereafter.

In 1923 the mine worked 300 days on double-shift with 31 contracts.

In 1922 wages were decreased 10% on June 1, and were increased 45¢ a day, or approximately 11-1/2%, on September 1. In 1923 there was another increase of 10% on May 1. Calculating averages for the year wages were 9.6% higher in 1923 than in 1922, and on this basis taking into account changes in intensity of operation, gross labor charges should have been 40% greater in 1923. Changes in the respective proportions of underground and surface labor, however, made the average wage 16% higher than in 1922, which was partly offset by a slightly higher number of tons per man.

PRODUCTION

	<u>1922</u>	<u>1923</u>
Days Worked	302	300
	Tons	Tons
Ore	218,066	276,672
Rock	<u>13,730</u>	<u>13,308</u>
Ore and Rock	231,796	289,980
Ore per Day	722	922
Rock per Day	<u>45</u>	<u>44</u>
Ore and Rock per Day	767	966

LABOR

	<u>1922</u>	<u>1923</u>
Average Number of Men	177	221
Average Rate per Day	4.15	4.81

TONS PER MAN PER DAY

	<u>1922</u>	<u>1923</u>
Surface	15.68	16.88
Underground	<u>5.51</u>	<u>5.53</u>
Total	4.08	4.17

COST OF PRODUCTION

	<u>1922</u>	<u>1923</u>
Labor	1.029	1.152
Supplies	<u>.541</u>	<u>.549</u>
Total	1.570	1.701

UNDERGROUND COSTS

Development in Rock

1922	\$ 16,169.35	\$.074
1923	20,982.86	.076
Increase	4,813.51	.002

In 1922 2,189 feet cost \$ 7.39 per foot, and in 1923 2,588 feet cost \$ 8.11 per foot. The increase is due mostly to higher wages.

Development in Ore

1922	957.64	\$.004
1923	4,232.86	.015
Increase	3,275.22	\$.011

In 1923 all of the raising was charged to this account, but this was not the case in 1922.

Stoping

1922	\$ 143,878.99	\$.660
1923	205,975.70	.744
Increase	62,096.71	\$.084

Production was greater in 1923, and wages were higher.

Timbering

1922	\$ 50,051.40	\$.229
1923	64,332.33	.233
Increase	14,280.93	\$.004

In 1922 mine timber cost \$ 24,192, and in 1923 \$ 27,860, an increase of \$ 3,668. The balance is labor on surface and underground, and repairing.

Tramming

1922	\$ 21,263.43	\$.098
1923	27,500.90	.099
Increase	6,237.47	\$.001

The increase is due to greater production in 1923.

Ventilation

1922	\$ 250.11	\$.001
1923	198.44	.001
Decrease	51.67	\$.000

Pumping

1922	\$ 7,074.76	\$.032
1923	8,466.37	.031
Increase	1,391.61	\$.001
Decrease		\$.001

In 1923 supplies, mostly power, increased nearly \$ 1,000 on account of more water, and cleaning sump increased \$ 217.

Compressors and Air-Pipes

1922	\$ 16,189.46	\$.074
1923	20,119.69	.073
Increase	3,930.23	\$.001
Decrease		\$.001

In 1923 supplies for operating the compressor increased \$ 2,753 and labor increased \$ 360. Labor on air-pipes increased \$ 873.

Underground Superintendence

1922	\$ 7,721.60	\$.036
1923	10,082.72	.036
Increase	2,361.12	\$.000

The increase is due to greater output in 1923.

Cave-In

1922	\$ 31.19	\$.000
1923	74.88	.000
Increase	43.69	\$.000

HOLMES MINE