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11. ACCIDENTS AND PERSONAL INJURY:

There was a considerable improvement in the total number of lost-time accidents reported during the year 1950. However, the record was clouded by a fatality which occurred on January 13th to a miner who was working in a sublevel stope. Due to varying degrees of hardness in the ore near the south side of the stope the accident resulted from a fall of ground immediately over a sublevel entrance. The stope was about 20 feet by 20 feet, and was nearing exhaustion.

During the remainder of the year there were four other compensable accidents in which the lost time in all cases was less than four months, and totaled 119 days. In 1949 the days lost due to personal injury was in excess of 310 days.

The following is a list of the number of compensable accidents classed as lost-time, where seven or more calendar days were lost:

	1950	1949
Fatal	1	0
Time lost - over 4 months	0	1
Time lost - 1 to 4 months	2	5
Time lost - less than 1 month	2	5
Total compensable accidents	5	11

On December 31, 1950 payments were being made on four accidents which occurred prior to January 1, 1950. Two are death claims, one receives full compensation and one occupational disease case is being paid.

No.	Date	Name	Injury	Days Lost
86	1-13-50	Nestor Blomquist	Fatal	-
87	2-6-50	Donald Tyni	Lac.2nd&3rd fingers,L.hand	11
88	5-10-50	Francis Anderson	Comp.frac.R.side,lower jaw	53
89	12-4-50	John Marta	Lac.1st&2nd fingers,R.hand	41
90	12-11-50	Arvid Ollila	and little finger,L.hand Lac.ring finger,R.hand	14
		Total		119

In February a rule requiring the wearing of goggles at all times during working hours was instituted. In the remaining ten months of the year and as a result of the adoption of this rule, only one minor eye injury was reported. The rule has been strictly enforced, and accepted by all employees.

12. NEW CONSTRUCTION AND PROPOSED NEW CONSTRUCTION:

There was very little new construction carried on during the year. Due to the limited life of the mine there is no proposed construction anticipated.

13. EQUIPMENT AND PROPOSED EQUIPMENT:

a. Underground Conveyor:

In November 1948 E. & A. No. CC-278 was authorized for the expenditure of $181,000.00 to cover the cost of driving an inclined drift, constructing pockets at the upper and lower levels, installing a conveyor, apron feeder and supply hoist. This project was completed in December 1950 and a total of $160,526.61 was expended, leaving an unexpended balance of $20,473.39.

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13. EQUIPMENT AND PROPOSED EQUIPMENT: (CONT'D)

a. Underground Conveyor: (Cont'd)

STATEMENT SHOWING EXPENDITURES E.&.A. NO. CC-278
DEVELOPMENT BELOW 7TH LEVEL

	Amount Authorized	Expended	Unexpended
Equipment and installation:			
Conveyor complete	80,000.00	49,479.17	30,520.83
Apron feeder	20,000.00	25,035.89	5,035.89
Supply hoist for incline	10,000.00	1,244.79	8,755.21
Drifting and excavation:			
Equipment	7,500.00	15,418.52	7,918.52
Pockets - 7th level	8,000.00	11,539.96	3,539.96
Storage drift - 7th level	3,500.00	4,412.49	912.49
Storage drift - 8th level	5,250.00	785.52	4,464.48
Tail room - 7th level	2,000.00	2,734.09	734.09
Belt incline - small	8,750.00	15,980.31	7,230.31
Belt incline - large	36,000.00	32,272.61	3,727.39
Social security taxes	-	1,623.26	1,623.26
Total	181,000.00*	160,526.61	20,473.39

*In 1949 the amount authorized was reported as $180,000.00. However in checking the records, it was found that the corrected figure amounts to $1,000.00 additional.

b. 8th Level Development:

E. & A. No. CC-373 was authorized in 1950 to cover the cost of rock development and equipment for the new 8th level. Work was started under this E. & A. in September 1950, and will continue through 1951.

As of December 31st, 1950, $18,015.93 was expended of the original $110,000.00. The balance is indicated in the table below:

STATEMENT SHOWING EXPENDITURES E.&A. NO. CC-373
DEVELOPMENT OF 8TH LEVEL

	Amount Authorized	Expended	Unexpended
Equipment	4,000.00	2,265.00	1,735.00
Rock drifting	96,000.00	15,557.68	80,442.32
Rock raising	10,000.00	-	10,000.00
Social security taxes	-	193.25	193.25
Total	110,000.00	18,015.93	91,984.07

It is very likely that this E. & A. will be overexpended, due to an increase of wages which went into effect December 1st, 1950. Added to this is the increased cost of materials, supplies and equipment, despite the fact that a considerable portion was purchased prior to the commencement date.

c. Scraper Hoists:

There were no new scraper hoists purchased in 1950. The total cost of repairs increased due to the fact that less mining contracts were active, and a number of these scraper hoists could be sent to surface for a complete overhaul in the general shops rather than minor repairs being made in the underground repair shop.

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13. EQUIPMENT AND PROPOSED EQUIPMENT: (CONT'D)

c. Scraper Hoists: (Cont'd)

Company	1950 Total Machines	1950 Total Machines Repaired	1950 Avg. Cost of Ea. Mach. Repaired	1949 Total Machines	1949 Avg. Cost of Ea. Mach. Repaired
Ing.-Rand 15-H.P.Elec.	17	5	357.96	1	1,218.54
Ing.-Rand 20-H.P.Elec.	2	-	-	1	411.53
Ing.-Rand 25-H.P.Elec.	2	1	48.12	-	-
Ing.-Rand Air Hoists	2	-	-	-	-
Sullivan 15-H.P.Elec.	17	7	315.31	4	185.14
Sullivan 25-H.P.Elec.	7	1	262.02	-	-
Total	47	14	4,307.07	6	2,370.62

d. Underground Tram Cars:

There were no additions or reductions during the year with reference to the underground 65 cubic foot tram cars. During the year a number of tram car trucks were sent to surface for repairs. Most of these trucks were parts of cars purchased from the Negaunee Mine several years ago which had seen considerable service, and were well over ten years old.

e. Skips and Cages:

There were no major repairs or replacements to the skips and cages during the year. Periodic changes were made when necessary.

f. Haulage Tracks:

The following is a comparison of costs of materials for haulage tracks for 1950 and 1949:

	1950	1949
60-lb. Rail	136.40	227.34
40-lb. Rail	570.38	51.92
Ties & Tie Plates	254.38	30.68
Total	961.16	309.94

g. Mine Trucks:

The 1947 Chevrolet 1-1/2-ton truck and the 1943 Dodge truck operated very satisfactorily during the year. As far as presently known, no major changes are anticipated in this equipment during 1951.

14. MAINTENANCE AND REPAIRS:

The maintenance and repair costs listed under "Underground Costs" were as follows:

	1950 Amount	1950 Cost per Ton	1949 Amount	1949 Cost per Ton
Compressors and Power Drills	3,039.81	.007	1,622.19	.004
Scraper Equipment	26,849.17	.060	27,885.25	.064
Electric Tram Equipment	21,175.91	.048	17,120.10	.039
Pumping Machinery	2,070.28	.004	2,626.22	.006
Total	53,135.17	.119	49,253.76	.113

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14. MAINTENANCE AND REPAIRS: (CONT'D)

The following is a list of purchases and repair costs for 1950, as compared with 1949:

	1950	1949
Sheave liners and bolts	37.20	424.56
Hoisting ropes	1,675.27	2,960.33
Compressor parts	810.20	676.23
Scraper hoist parts	1,690.66	1,908.00
Scraper rope	9,697.81	7,890.86
Truck repairs	671.42	1,126.88
Tractor repairs	2,421.76	189.23
Hydrocrane parts and repairs	697.59	350.60
Diesel shovel parts and repairs	1,080.92	655.54
Repairs to skip-cage hoist	1,082.12	146.46
Larry car parts	281.53	298.74
Welding machines	582.33	173.00
Pickhamers	1,048.30	620.00
Tram cars and parts	159.30	635.00
Prescott pump parts	33.00	710.52
Equipment for dry house	262.66	1,033.75
Repair transit for engineers	219.75	-
Jeffrey fan	564.68	-
Shaft cable	439.60	-
Oil furnace for blacksmith shop	65.86	-
Dies for blacksmith shop	325.40	-
Tugit hoist	59.00	-
Goodman locomotive parts	1,419.77	-
760 feet 2500-volt 2/0 cable	319.42	-
Shaft sets, portland cement, fir and hemlock	4,610.13	-
Cutting blowpipe for machine shop	17.80	-
Trestle legs	296.12	-
Unit heater for office	49.72	-
Moving rock - A. Lindberg & Sons, Inc.	256.25	-
Teletalks for underground tramming	398.05	-
Numbering machine for office	18.38	-
2 used scraper hoists from Princeton Mine	-	600.00
Lawn mower	-	23.95
4 "I" beams	-	165.40
Office plumbing	-	401.44
Roofing on larry car barn	-	70.20
Painting shafthouse	-	969.50
Monroe calculator	-	432.00
Stoker for engine house	-	292.99
Total purchases	31,292.00	22,755.18
Repairs to Motor-Generators	505.21	-
Repairs to Compressors and Power Drills	1,919.61	651.46
Repairs to Scraper Hoists	15,460.70	17,486.39
Repairs to Locomotives	3,063.03	4,226.24
Repairs to Trolley Wire	3,112.83	1,803.97
Repairs to Tracks	7,261.44	4,724.01
Repairs to Cars	5,654.33	5,319.99
Repairs to Pumping Machinery	1,750.86	1,915.70
Total repairs	38,728.01	36,127.76

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14. MAINTENANCE AND REPAIRS: (CONT'D)

The maintenance and repair costs under "Surface Costs" were as follows:

	1950		1949	
	Amount	Cost per Ton	Amount	Cost per Ton
Hoisting Equipment	15,452.35	.035	16,053.98	.037
Shaft	12,590.40	.028	4,467.03	.010
Top Tram Equipment	3,959.16	.009	2,852.78	.007
Docks, Trestles and Pockets	208.07	.001	-	-
Mine Buildings	5,158.63	.012	5,351.76	.012
Total	37,368.61	.085	28,725.55	.066

	1950	1949
Inspection of Hoisting Ropes	670.04	590.23
Repairs to Electric Hoists	3,257.92	1,894.34
Repairs to Skips, Cages, Etc.	8,668.74	9,770.26
Repairs to Sheaves and Pulley Stands	61.06	267.80
Repairs to Shaft	7,980.27	4,467.03
Repairs to Larry Cars and Tracks	3,641.34	2,396.06
Trestle Trolley Line	36.29	157.98
Repairs to Pockets, Chutes, Etc.	208.07	-
Repairs to Mine Buildings	5,158.63	4,146.66
Total	29,682.36	23,690.36

15. POWER:

The following is a detail of electric current purchased in 1950 and 1949, distribution of charges to various accounts, and other data:

	1950	Per Ton	1949	Per Ton
Stoping	715.33	.002	1,139.12	.003
Tramming	386.67	.001	460.03	.001
Ventilation	3,480.01	.008	3,040.40	.007
Pumping	17,610.61	.040	14,684.15	.034
Compressors	20,553.36	.046	17,637.83	.041
Hoisting	17,695.22	.040	15,650.50	.036
Stocking Ore	217.17	-	279.87	.001
Dry House	557.89	.001	502.91	.001
General Surface	-	-	218.28	.001
Telephones and Safety Devices	1,740.02	.004	1,052.58	.002
Mine Office	158.62	-	159.68	-
Electric Haulage	12,299.49	.028	9,522.40	.022
Shops	773.34	.002	580.29	.001
Tractor and Trucks	65.62	-	52.41	-
Loading at Pocket	56.49	-	27.60	-
E. & A. No. CC-278	495.65	.001	-	-
Mather Mine, "B" Shaft	-	-	837.30	-
Total	76,805.49	.173	65,845.35	.150
Power charged to Idle Expense	-	-	1,066.33*	-

* Included above.

	1950	1949
Main Line Meter - K. W.	4,772,800	4,395,200
Separate Meter Readings	4,772,800	4,395,200
Line Loss - K. W.	-0-	-0-
Product - Tons	445,071	434,210
K. W. per Ton - Inc. Line Loss	10.72	10.12
Cost per K. W. - Average	.0161	.0150
15 Min. Demand - K. W. - Average	1,068	1,026
Average Load Factor	-	49%

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15. POWER: (CONT'D)

Listed below is an itemized invoice on annual basis for 1950:

Energy Charge: 1068 x 864 =	922,752 x .041 =	37,832.82
	3,850,048 x .0096 =	36,960.45
		74,793.27
Fuel Adjustment: 4,772,800 x .224938=1,073,584x.0018743 =		2,012.22
Total		76,805.49

17. CONDITION OF GROUNDS:

The grounds surrounding the shaft, engine house and other buildings were maintained throughout the year. The area east of the parking lot was made into a lawn. The general appearance of the premises has been very good.

18. NATIONALITY OF EMPLOYEES:

As to Parentage:	1950	Percent	1949	Percent
Finnish	75	34.1	82	36.0
Italian	37	16.8	40	17.5
English	37	16.8	39	17.1
Swedish	27	12.3	27	11.9
French	25	11.4	20	8.8
Danish	6	2.7	6	2.6
German	4	1.8	4	1.8
Irish	3	1.4	3	1.3
Norwegian	3	1.4	3	1.3
Austrian	2	.9	3	1.3
Slovanian	1	.4	1	.4
Total	220	100.0	228	100.0

	American Born		Foreign Born	
As to Birth:	1950	1949	1950	1949
Finnish	55	57	20	25
English	31	33	6	6
Swedish	26	26	1	1
Italian	19	21	18	19
French	25	20	-	-
Danish	6	6	-	-
German	4	4	-	-
Irish	3	3	-	-
Norwegian	2	2	1	1
Austrian	1	1	1	2
Slovanian	1	1	-	-
Total	173	174	47	54
Percent	78.6%	76.3%	21.4%	23.7%

The above nationality record of employees is submitted in two forms, one as to parentage, the other as to country of birth.

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1. GENERAL

The Maas Mine operated on two 8-hour shifts, five days per week from the first of the year until August 27th when the operating schedule was increased to six days per week. A small tramming and hoisting crew was employed on the third shift throughout the year.

There was a general increase in wages effective December 1st of 12½ cents per hour and salaries were increased proportionately at the same time. There was also an agreement with the Union for a further increase in some rates to take car of any inequities, not to exceed a total average raise of 21 cents per hour. A study will be made of this matter and when accepted will be retroactive to December 1st.

A labor turnover of approximately 15% was necessitated by transfers of men to the Mather Mine, retirements, men quitting, etc., but the average number of men working was held to approximately 400. The men took a week's vacation with pay in August when the mine was idle, and about 50% took another week for deer hunting in November.

The total production for the year was 633,444 tons as compared with 603,306 tons in 1949, while shipments for the year were only 620,320 tons, leaving 140,672 tons in stock on December 31st, an increase of approximately 13,000 tons over the preceeding year. Only one grade of ore in stock was cleaned up, producing an overrun of 977 tons.

The winze was completed from the 6th to the 7th Level, permanent hoist and cages installed, and at the end of the year 112 feet of drift on the 7th Level had been completed. Block caving was introduced for the first time in the Maas Mine in a small area above the 4th Level, while the majority of the contracts were mining by the sub level caving system with a few sub level stopes in progress. The large amount of water in the working places continued to be the greatest handicap all along the cycle from contract to surface, causing delays, hoisting of partially loaded skips, a greater proportion of ore stocked during the shipping season, etc. Retimbering of main level drifts and raises kept a very large crew employed although an increasing amount of steel sets have been used in the last two years and accounted for almost one-third of the total underground cost.

A hydro-crane mounted on a Chevrolet truck was purchased late in the year and this greatly facilitated the handling of timber on surface.

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2. PRODUCTION, SHIPMENTS & INVENTORIES

a. Production by Grades

	1950	1949
Maas	253,490	244,453
Maas Special	198,016	167,209
Race Course	42,831	47,130
Race Course Special	139,107	144,514
Total	633,444	603,306
Rock	25,000	18,640
Total Hoist	658,444	621,946

b. Shipments

Grade of Ore	Pocket Tons	Stockpile Tons	Total Tons	Total Last Year
Maas	140,482	111,048	251,530	228,462
Maas Special	99,819	66,648	166,467	143,431
Race Course	23,116	28,913	52,029	51,733
Race Course Special	79,337	70,957	150,294	139,429
Total	342,754	277,566	620,320	563,055
Total Last Year	278,021	285,034	563,055	
Increase	64,733	7,468	57,265	

c. Stockpile Inventories

Grade of Ore	12-31-50	12-31-49
Maas	43,338	41,378
Maas Special	83,119	51,570
Race Course	717	9,915
Race Course Special	13,498	24,685
Total	140,672	127,548

d. Division of Product by Levels

	1950	%	1949	%
Fourth Level	202,748	32.0	195,737	32.6
Fifth Level	102,814	16.2	103,219	17.1
Sixth Level	327,882	51.8	304,350	50.3
Total	633,444	100.0	603,306	100.0

Ore mined on 4th. and 5th. Levels was all standard grade.
Ore mined on 6th. Level was all special grade.

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2. PRODUCTION, SHIPMENTS & INVENTORIES (Cont.)

e. Production by Months

Month	Maas	Maas Spcl.	Race Course	R.C. Spcl.	Total	Rock
January	19,661	13,600	3,927	9,789	46,977	2,235
February	16,620	16,135	2,687	10,657	46,099	2,405
March	20,536	17,015	4,375	11,112	53,048	2,205
April	16,933	13,459	3,600	12,000	45,992	2,715
May	17,645	18,735	4,915	11,537	52,832	1,810
June	18,876	19,034	3,923	14,382	56,215	1,465
July	17,754	12,980	2,890	10,340	43,964	2,155
August	19,413	14,487	3,452	9,008	47,360	1,990
September	27,289	20,446	4,690	10,420	62,845	2,255
October	29,059	18,818	2,925	12,842	63,644	1,945
November	24,237	18,369	3,348	13,742	59,696	1,205
December	25,467	13,938	1,122	13,268	53,795	1,615
Total	253,490	198,016	41,854	139,107	632,467	25,000
Cur. Year's Overrun			977		977	
Grand Total	253,490	198,016	42,831	139,107	633,444	

The product was distributed by leases as follows:

	1950	1949
George Maas Lease	450,509	411,662
Race Course Lease	181,938	191,644
Baldwin Kiln Road Lease	997	--
Total	633,444	603,306

f. Ore Statement

	Maas	Race Course	Maas Spcl.	R. C. Spcl.	Total	Total Last Year
On Hand 1-1-50	41,378	9,915	51,570	24,685	127,548	87,297
Product for Year	253,490	41,854	198,016	139,107	632,467	603,306
Cur. Year's Overrun		977			977	
Total	294,868	52,746	249,586	163,792	760,992	690,603
Shipments	251,530	52,029	166,467	150,294	620,320	563,055
Balance on Hand	43,338	717	83,119	13,498	140,672	127,548
Increase in Output					29,161	

h. Delays

On July 5th on the afternoon shift the South skip was pulled into the dump too fast, breaking the skip rope and causing the skip to fall to the bottom of the shaft. A considerable number of steel shaft sets had to be straightened, and, although the skip was not badly damaged, it had to be sent to the General Shops to be repaired. On account of the confined space, only a small crew could work and the repairs, carried out on a three 8-hour shift basis, were not completed until midnight on the 10th. The accident was due to the hoisting engineer moving the control lever in the reverse direction and hoisting the empty skip, which was only 100 feet below the dump, instead of the loaded one from the 5th Level. The additional weight of the loaded skip descending prevented the overwind control acting guide enough to avoid the wreck. Approximately 7,500 tons were lost in production.

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3. ANALYSIS

a. Average Mine Analysis on Output

	1950				1949			
	Iron	Phos.	Sil.	Sul.	Iron	Phos.	Sil.	Sul.
Maas	58.88	.109	9.90	.030	59.11	.111	9.55	.048
Maas Special	58.78	.094	9.03	.169	58.58	.098	9.49	.160
Race Course	58.89	.108	9.81	.030	58.63	.111	9.54	.044
Race Course Special	58.54	.096	8.96	.169	58.72	.098	9.17	.155

b. Average Mine Analysis on Ore Shipped

Grade	Iron	Phos.	Sil.	Mang.	Alum.	Lime	Mag.	Sul.	Loss	Moist.
Maas & Race Course	58.90	.110	10.06	.24	2.71	.62	.28	.030	1.62	13.08
Maas & R.C. Special	58.50	.095	9.20	.25	3.14	.81	.26	.169	2.03	13.40

c. Average Natural Analysis of Ore in Stock - December 31, 1950

Grade	Tons	Iron	Phos.	Sil.	Mang.	Alum.	Lime	Mag.	Sul.	Loss	Moist.
Maas	43,338	50.50	.090	9.38	.19	2.56	.59	.35	.030	1.68	13.06
Maas Special	83,119	51.02	.085	8.05	.19	2.66	.65	.22	.142	1.73	13.36
Race Course	717	51.40	.103	7.80	.18	2.60	.59	.35	.041	1.70	12.83
Race Course Spcl.	13,498	50.80	.068	8.20	.18	2.66	.65	.22	.124	1.82	13.56

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4. ESTIMATE OF ORE RESERVES

a. Developed Ore

Assumption: 12 Cu. Ft. equals one ton.
10% Decudtion for loss in mining and rock.

Standard Location	Race Course Lease	Maas Lease	B. K. Road City of Neg. Lease	Total Tons
3rd to 4th Levels	26,571	694,553	2,191	723,315
4th to 5th Levels	47,728	306,395		354,123
Gross Total 12-31-50	74,299	1,000,948	2,191	1,077,438
Less 10% for Mining & Rock (as of Oct. 1)	8,169	107,966	224	116,359
Net Total Standard Grade	66,130	892,982	1,967	961,079
Special				
4th to 5th Levels	92,723	325,017	30,300	448,040
5th to 6th Levels	498,638	1,747,595		2,246,233
Below 6th Level	18,542	1,163,542		1,182,084
Gross Total 12-31-50	609,903	3,236,154	30,300	3,876,357
Less 10% for Mining & Rock (as of Oct. 1)	64,976	328,728	3,030	396,734
Net Total Special Grade	544,927	2,907,426	27,270	3,479,623
Total All Grades	611,057	3,800,408	29,237	4,440,702

There was a decrease of approximately 107,000 tons in the estimate for 1950 as compared with 1949 after the mining for the year was deducted. This decrease was distributed as follows:

	Maas	Race Course	Total
Standard Grade	76,970 Tons	17,843 Tons	59,127 Tons
Special Grade	162,101 "	3,764 "	165,865 "
Total	85,131 Tons	21,607 Tons	106,738 Tons

The gain in the Maas Standard grade was due to the North footwall in the Eastern end above 4th Level being steeper than had originally been anticipated. The loss in the other grades was due to intrusions of jasper in areas which were formerly considered to be ore. It was also possible to include all of the ore mined above the 5th Level in the Standard product without raising the percentage of sulphur too high. Some of this ore near the level had been estimated as special grade.

c. Estimated Natural Reserve Analysis

Grade	Iron	Phos.	Sil.	Mang.	Alum.	Lime	Mag.	Sul.	Loss	Moist.
Maas & Race Course Standard	51.00	.100	8.25	.17	2.50	.430	.20	.050	1.60	13.50
Maas & Race Course Special	51.00	.090	8.05	.18	2.45	.600	.10	.200	1.40	13.50

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4. ESTIMATE OF ORE RESERVES

d. Estimated Production January 1st to December 31st, 1951

Grade	Estimated Production 12 Shifts Per Week
Maas & Race Course Standard	300,000
Maas & Race Course Special	372,000
Total	672,000

Grade	Iron	Phos.	Sil.	Sul.	Moist.
Maas & Race Course Standard	58.80	.110	9.50	.050	13.50
Maas & Race Course Special	58.80	.100	9.30	.200	13.50

5. LABOR & WAGES

a. Comments

There were 62 new men hired as against a loss of 51 during the year. Nearly all of the new men were without any previous mining experience. Unexcused absenteeism was only 3% which is a slight decrease over previous years.

There was an increase in wages of 12½¢ per hour effective December 1st, 1950 and also an agreement with the Union to adjust inequities by further raises not to exceed a total average of 21¢ her hour (including the 12½¢). There was also a proportional increase in salaries at the same time and the bosses received extra compensation at the end of the year.

Four men were retired who were 65 years of age or older and who had put in from 36 to 46 years of continuous service with the Company. One other retired voluntarily upon reaching 65 years of age but had only served 15 years. George Winter, Surface Boss, also retired after having been with the Company for 48 years and was replaced by Gust Rivers who had been his assistant. The average age of all the employees at the end of the year was 42 with 51 men being 60 years of age or over and of these latter 14 men had worked 40 years or more for the Company.

The mine was idle from August 20th to the 26th for vacation and the men's vacation pay, based on 40 hours per week, was distributed as follows:

53 Men, or 12.8% of the total, received one week's pay.
234 Men, or 56.5% of the total, received two week's pay.
88 Men, or 21.3% of the total, received three week's pay.
39 Men, or 9.4% of the total, were ineligible, having worked less than 1 yr.

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5. LABOR & WAGES

a. Comments (Cont.)

The following table shows a comparison in labor turnover for the last three years:

	1950	1949	1948
Died	3	3	2
Fatal Accident	1	1	0
Retired on Account of Age	6	12	5
Unable to Continue Work on Account of Ill Health	2	2	2
Transferred to other C.C.I.Co. Properties	21	23	4
Quit	15	4	19
Discharges & Lay-offs	0	1	4
Drafted	3	0	0
Total Loss	51	46	36
Hired or Transferred to Maas	62	60	42
Net Gain	11	14	6
Active Experienced Miners Included in Total Loss	8	4	3

Proportion of surface to underground men:

1950	1949	1948
1 - 5.0	1- 4.9	1 - 5.0

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5. LABOR & WAGES

b. Comparative Statement of Wages & Product

	1950	1949	Increase	Decrease
Product	633,444	603,306	30,138	
Number of Shifts & Hours	268	245	23	
1 8-hour	1		1	
2 8-hour	267	245	22	
AVERAGE NO. MEN WORKING				
Surface	65	63	2	
Underground	330	315	15	
Total	395	378	17	
AVERAGE WAGES PER DAY				
Surface	11.22	11.29		.07
Underground	12.85	12.88		.03
Total	12.56	12.62		.06
AVERAGE WAGES PER MONTH 25 Days per month 12 Shifts per Week				
Surface	280.50	248.38	32.12	
Underground	321.25	283.36	37.89	
Total	314.00	277.64	36.36	
PRODUCT PER MAN PER DAY				
Surface	36.75	35.79		.04
Underground	7.16	7.79		.63
Total	6.00	6.40		.40
LABOR COST PER TON				
Surface	.299	.321		.022
Underground	1.793	1.657		.136
Total	2.092	1.978		.114
AVERAGE PRODUCT MINING				
Stoping	24.75	25.13		.38
Ore Development	9.99	12.27		2.28
Total	24.66	24.83		.17
AVERAGE WAGES CONTRACT LABOR	13.94	13.73	.21	
TOTAL NUMBER OF DAYS				
Surface	17,237 1/2	16,857 3/4	379 3/4	
Underground	88,409 1/2	77,420 1/4	10,989 1/4	
Total	105,647	94,278	11,369	
AMOUNT FOR LABOR				
Surface	189,325.11	193,896.90		4,571.79
Underground	1,136,017.57	999,540.71	136,476.86	
Total	1,325,342.68	1,193,437.61	131,905.07	
AVERAGE WAGES PER MONTH BASED ON MEN CARRIED ON MINE PAYROLL				
Surface	280.50	248.38	32.12	
Underground	321.25	283.36	37.89	
Total	314.00	277.64	36.36	

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5. LABOR & WAGES

c. Nationality of Employees

As to Parentage	1950	%	1949	%
Finnish	146	35.9	149	37.8
American	102	25.2	84	21.2
English	65	15.9	69	17.5
Italian	36	8.9	36	9.1
Swedish	24	5.9	24	6.1
French (Canadian)	17	4.3	17	4.3
Norwegian	7	1.7	7	1.8
German	4	1.0	5	1.3
Austrian	2	.5	2	.5
Danish	1	.2	1	.2
Irish	2	.5	1	.2
Total	406	100.0	395	100.0

As to Birth	American Born		Foreign Born	
	1950	1949	1950	1949
Finnish	114	111	32	38
American	102	84		
English	48	46	17	23
Italian	18	16	18	20
Swedish	19	20	5	4
French (Canadian)	17	17		
Norwegian	6	6	1	1
German	4	4		1
Austrian	1	1	1	1
Danish	1	1		
Irish	2	1		
Total	332	307	74	88

6. SURFACE

a. Buildings & Repairs

The erection of the saw mill, moved from the Negaunee Mine, was completed early in the year and has operated intermittently as required for the balance of the year. The needs of some of the other mines as well as the Maas have been taken care of in sawing ties, plank, sills, oak for timber trucks, etc.

There were very few repairs made to the mine buildings during the year as the patching of the Shop roof was the most extensive operation.

The timber treating plant did not operate in 1950 as there were no requirements for treated timber.

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6. SURFACE

b. Location Buildings & Repairs

There were major repairs to ten of the rented buildings during 1950 and this work together with some interior decoration and minor repairs occupied the crew of three men for the entire year.

Maas House #168, located on Lot 15, Block 6 of the C.C.I.Co. 1st Addition, was sold to Jalmer Hill, an employee of the Maas Mine on August 1, 1950. There were no houses purchased, leaving a total of 45 rented buildings.

Two houses near the West edge of the caved area were moved to other locations, described as follows and the cost of moving, etc. was covered by E & A, CC-378.

The increased rate of taxation in the City of Negaunee and also the increased cost of labor and supplies necessitated the raising of the rents. This raise of approximately 20% became effective January 1, 1950.

c. Stockpiles

Loading from stockpile was late due to weather conditions and did not start until May 6th, but continued intermittently until early in December with both the #45 Steam Powered Caterpillar and the #67 Electric Shovels being used. The steel trestles had sufficient capacity and no wooden trestles were erected. The Race Course standard ore was the only grade cleaned up and this developed an overrun of 977 tons or 3.5% of the tonnage stocked.

e. Timber Yard

The handling of timber, etc. was greatly facilitated by the operation of a Hydro-crane purchased in September. There was sufficient material on hand at all times received by both railroad cars and trucks. There was no timber treated during the year.

f. Drainage

Due to the area to the North of the main L. S. & I. Railroad tracks being lowered to cut down the grade between the Baldwin Kiln Road and the East line of the Maas property as well as to install more tracks for yardage room, it was necessary to change the Maas Mine discharge line. An excavation was made in the North and South banks of this cut and a new line installed 3 feet below the new grade of the tracks. The line then was extended on surface from the North bank to a manhole in the storm sewer system near the South side of the fill for the crusher track.

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7. UNDERGROUND

a. Shaft-Sinking

The winze from the 6th to the 7th Level started in September, 1949 was completed in February, 1950 and very satisfactory progress was made. Carset bits were used in drilling and a Hydro-mucker for handling the broken rock. Despite the delays caused by having to maintain production, the 112 feet of the double compartment winze, 15' x 18' in size, was completed in 88 shifts, or 1.27 feet per shift. The cost was $25,446.45, or $227.10 per foot.

b. Development

Except for a few raises on the 6th Level, there was no development in the mine during 1950 outside of the 7th Level.

The drifting on the 7th Level was held to a single shift operation on account of not being able to handle more rock and still maintain production. The winze plat was excavated sufficiently wide to take care of three tracks for 100' North and South of the winze and entrances to Pump house, 20' to the North, and to the Sump 215' to the South were started. The North drift was advanced a total of 320' with a motor barn cut near the breast and the last 100' was in very hard slate and quartzite. By the end of the year the South drift had advanced a total of 355 feet in rather soft slate, completing the curve to the West for the start of the North footwall drift. Tracks and trolley wire were installed and a motor and cars lowered to the 7th Level late in December. As soon as the first cross-cut is turned off to the South, there will be two contracts employed here on single shift.

c. Stoping
General

Mining was continuous at various elevations from the plus 215' Sub Level, approximately 100' above the 4th Level to the minus 100' Sub Level immediately above the 6th Level. Approximately 90% of the mining was by the sub level caving method with the remainder by sub level stoping and block caving.

Block caving was introduced at the Maas Mine when an area on the North footwall above the 4th Level was chosen and plans outlined. An East and West transfer was driven in the foot rock on the 150' elevation and then cross-cuts from top timber on 160' elevation were driven South to the dike at 25' centers. Mill raises were put up and the block undercut in the East end. Before any caving started the area became extremely heavy and by the end of the year the transfer and cross-cut had been completely repaired twice. A large amount of water started to flow in as soon as caving started and this, together with the continuing of the block to hang up, has cut down the anticipated production. The ground to the West seems more adaptable and if the water can be held in the Eastern section the results should show considerable improvement. Caving started in September and by the end of the year 14,000 tons had been produced. It was estimated that there were approximately 130,000 tons in the block, but this amount will be reduced by a large seam of jasper found to lie over the Eastern end with ore above and below it, necessitating the pulling of the rock from the mills.

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7. UNDERGROUND

c. Stoping

Detail

215' & 200' Sub Levels

Four contracts were sub caving in the Northeast footwall pillar on these two elevations with the ore being transferred on the 150' Sub Level. There occurred a decided bulge to the North in the footwall and considerable extra tonnage was recovered. Production from this area is also handicapped by a large flow of water.

185' to 215' Sub Level

Mining was carried on in the small area between the North footwall and the dike in the Race Course Lease on various sub levels between the 185' and 215' elevations. The pillar was cut up by several small seams of dike and an old transfer drift on the 200' elevation. However, it was possible to recover all of the estimated ore in the Race Course Lease and also approximately 1,000 tons from the City of Negaunee Lease. Mining will be completed in this territory on the 160' Sub Level as the footwall intersects the dike at approximately that elevation.

160' Sub Level

It was at this elevation that the development, consisting of 7 cross-cuts or grizzlie subs, were driven from which to cave the ore in the block cave already described.

100' to 130' Sub Level

The block of ore being mined on these two elevations lied South of the main East-West dike and to the East of the 5300 Block. The ore has to be transferred as the East footwall is very flat and would have required a new cross-cut in rock on the 5th Level and the raises would have been approximately 100' in rock before encountering the ore. There were several sharp droppers from the hanging and some of this material had to be excavated to reach the ore beyond.

25' & 50' Sub Levels

This territory lying on the South footwall was reopened from the Maas Mine after the Negaunee Mine ceased operations in 1949. Two contracts have been sub caving under a considerable handicap as the manner in which the Negaunee Mine completed mining did not permit sufficient covering. Due to the excessive water the fine rock was constantly causing runs and often drifts had to be bulkheaded and abandoned. It was also necessary to do a considerable amount of development in rock and lean ore to reach the ore lying above on the flat footwall. The South end of 5300 Cross-cut was very heavy and costly to maintain and the raises were shallow with very little storage capacity.

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7. UNDERGROUND

c. Stoping

Detail (Cont.)

00' & 10' Sub Levels

Three contracts spent most of the year mining along the North footwall just above the 5th Level in the Race Course Lease and also in the Maas Lease to the West. When the 00' Sub Level, 15' above the level was completed, the contracts moved to the 6th Level and put up new raises from which they resumed mining in this area.

All of the above mentioned areas were producing standard grade ore and except where mentioned otherwise they were in the Maas Lease. The remaining descriptions are of work below the 5th Level where the ore contained more sulphur and was hoisted as special grade.

-25' to -90' Sub Level

Mining between these elevations consisted of the main ore body in the Race Course Lease South of the dike and another area in the Maas Lease to the West of the Race Course Lease and East of the same dike as it turns to the Southwest. The ore in the Race Course Lease in being rapidly cut off by the very flat footwall on the East and South and only a very small pillar will remain to be recovered from the 7th Level. It is in this territory that lean ore areas exist and have to be driven through to reach better ore beyond. The lean ore averages about 57.00 in iron but 12.00 or over in silica and in appearance looks high enough to be hoisted for ore.

The jasper hanging in the area to the West is very sharply folded and therefore instead of the ore pillars increasing in size as mining descends, the jasper is found below the ore in several places thus necessitating the removal of considerable rock to reach the ore beyond the fold or dropper in the hanging. Mining here is approaching the 6th Level elevation and soon the contracts will have to be moved elsewhere until the 7th Level is developed.

Along the North footwall there is another area being mined by sub level caving and one sub level stope. There were three sub level stopes started but the dilution from the hanging due to the back not remaining in place caused the two Eastern ones to be changed to sub level caving. Very good results have been obtained in the stope at the extreme West end of the mine although here also there is a large amount of water.

Two small sub level stopes were in progress during the year, one along the South Mining Limit and the other between the dike and a former stope. These were at the South end of the 6700 Cross-cut and were limited by the jasper hanging being only some 50' above the transfer. At the end of the year another stope was being developed just North of the dike and to the West of the same cross-cut. Here the ore has been found to extend to over 100' in height and as yet the Western limit has not been reached although exploration is well in advance of the anticipated contact. The main transfers for all of the above mentioned stopes were driven at top timber elevation above the 6th Level and the ore is scraped directly into the cars.

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7. UNDERGROUND

c. Stoping

Detail (Cont.)

6th Level

There were no extensions of the main drifts on the 6th Level during the year but four raises were put up in ore from the North footwall drift to just below the 5th Level.

7th Level

The development of the 7th Level for the year 1950 has already been described in a previous paragraph.

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7. UNDERGROUND

d. Timbering

TIMBER STATEMENT FOR THE YEAR 1950

Kind	Lineal Ft.	Avg. Price Per Ft.	Amount 1950	Amount 1949
6" x 8" Cribbing Timber	49,979	.0695	3,471.79	5,371.94
8" x 10" Stulls	42,139	.1281	5,397.63	4,027.43
10" x 12" Stulls	87,668	.1804	15,811.52	11,629.29
12" x 14" Stulls	44,757	.2644	11,835.97	12,356.23
9' Steel Sets	7,875	.0609	4,794.57	4,750.06
Total 1950	232,418	.1777	41,311.48	
Total 1949	209,461	.1645		38,134.95
		Per 100 Ft.		
7' Lagging	1,238,664	1.499	18,562.43	19,862.22
9½' Poles	575,325	2.954	16,992.65	19,908.56
Mine Crete Back Poles				278.72
10' Steel Spiling Poles	2,220	.633	1,406.58	3,920.57
Total 1950	1,816,209	2.035	36,961.66	
Total 1949	1,846,166	2.382		43,970.07
Grand Total 1950			78,273.14	
Grand Total 1949				82,105.02

Product, Tons	633,444	603,306
Feet of Timber per Ton of Ore - Stulls & Cribbing	.3669	.3472
Feet of Stull Timber Only per Ton of Ore	.2880	.2229
Feet of Lagging per Ton of Ore	1.955	1.988
Feet of Poles per Ton of Ore	.9118	1.072
Feet of Lagging per Foot of Timber	5.329	5.724
Feet of Poles per Foot of Timber	2.485	3.089
Cost per Ton for Timber	.0652	.0632
Cost per Ton for Lagging	.0293	.0329
Cost per Ton for Poles	.0291	.0400
Cost per Ton for All Timber	.1236	.1361

Total Cost for Timber, Lagging, Poles, etc. and Cost per Ton

Year	Amount	Cost per Ton
1950	78,273.14	.1236
1949	82,105.02	.1361
1948	99,949.06	.1485
1947	81,240.99	.1125
1946	70,147.24	.1473

A reduction in cost per foot for timber in 1950 is due to receiving a much larger proportion by truck and not having as much freight to pay for. The actual price to the jobbers was increased approximately 10%. There was more retimbering of main level drifts and transfers and steel used to replace timber showed an increase of 22%.

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7. UNDERGROUND

f. Explosives, Drilling and Blasting

EXPLOSIVES STATEMENT FOR THE YEAR 1950

Stoping and Ore Development

Kind	Quantity	Average Price		Amount 1950	Amount 1949
1¼" Gelamite #1	285,820	.1564	lb.	44,716.37	26,481.15
1¼" 60% Gelatin	1,750	.1987	lb.	347.75	390.00
1¼" Hercomite 2X	550	.1450	lb.	79.75	12,861.50
1¼" Hercomite 5X					14.50
Hercomite 2 x 24					336.25
Total Powder 1950	288,120	.1567		45,143.87	
Total Powder 1949	266,300	.1505			40,083.40
Fuse	973,200	8.44	M'	8,212.19	7,521.24
#6 Blasting Caps	106,794	13.76	M	1,469.87	1,623.60
Electric Blasting Caps	2,253	19.11	C	430.63	145.05
Powder Bags	21	5.01	Ea.	105.30	130.50
Fuse Lighters	22,500	9.00	M	202.50	190.01
Primacord	57,000	32.00	M'	1,824.00	1,376.00
#20 Connecting Wire	86	8.16		70.20	41.10
Total Fuse, Caps, Etc.				12,314.69	11,027.50
Total All Explosives				57,458.56	51,110.90
Product, Tons				633,444	603,306
Pounds Powder per Ton of Ore				.4548	.4414
Cost per Ton for Powder				.0716	.0664
Cost per Ton for Fuse, Caps, Etc.				.0194	.0183
Cost per Ton for All Explosives				.0910	.0847

Rock Development

Hercomite 2X					103.50
1¼" Gelamite 1X	460	.1525	lb.	70.15	
Total Powder 1950	460	.1525		70.15	
Total Powder 1949	600	.1725			103.50
Fuse	3,240			27.22	
Electric Blasting Caps					45.84
#6 Blasting Caps	360			5.29	
Total Fuse, Caps, Etc.				32.51	45.84
Total All Explosives				102.66	149.34

The increased cost per ton was due entirely to the increase in the price of powder and supplies.

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7. UNDERGROUND

h. Mining & Loading

The following table shows the proportion of the product based on the various types of mining.

	Percentage Based on Number of Contracts		Percentage Based on Product	
	1950	1949	1950	1949
Sub Level Stoping	9%	15%	9%	11.0%
Sub Level Caving	88%	84%	88%	88.5%
Block Caving (Development Inc.)	3%	-	3%	-
Top Slicing	-	1%	-	.5%

Both the sub level stoping and the block cave should have produced a larger percentage of the product but two of the stopes were very small while water, weight, and refusal to cave reduced the product from the block.

There were no decided changes in methods of mining or drilling during the year and hoisting continued to be the limiting factor as the large number of cars of wet ore having to be held at the plat and dumped singly into the skip caused considerable delay. This condition is remedied on the 6th Level by having a trench to mix wet and dry ore but the ore remaining on the 4th and 5th Levels was not sufficient to warrant the extra expense.

i. Ventilation

The two main airways in rock from the Negaunee Mine proved adequate for sufficient ventilation and the only work necessary was maintaining the equipment, local airways, and control doors.

j. Pumping

The amount of water being pumped from underground showed an average increase of approximately 100 gallons per minute as compared with 1949 with a maximum discharge of 1,336 gallons per minute in October. More of the water is coming through the working places and less on the footwall where extensive development was done in the past years to control the flow.

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8. COST OF OPERATING

a. Comparative Mining Cost

	1950	1949
Product	633,444	603.306
Underground Cost	2.439	2.304
Surface Cost	.207	.222
General Mine Expense	.499	.441
Cost of Production	3.145	2.967
Depletion - Original Cost	.028	.031
Depreciation - Plant & Equipment	.020	.006
Development	.010	.017
Movable Equipment	.002	.002
Taxes	.244	.220
Loading & Shipping	.062	.055
Total Cost at Mine	3.511	3.298
Budget, Estimated Cost per Ton	3.459	3.336
Number of Days Operated	268	245
1 8-hour	1	0
2 8-hour	267	245
Average Daily Product	2,364	2,462

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8. COST OF OPERATING

b. Detailed Cost Comparison

	1950 Amount	1950 Per Ton	1949 Amount	1949 Per Ton
Underground Costs				
1. Exploring in Mine	50.17	.000	276.92	.000
3. Development in Rock	1,547.80	.002	1,328.87	.002
4. Development in Ore	3,168.74	.005	10,125.90	.017
5. Stoping	532,829.04	.841	481,499.08	.799
6. Timbering	485,365.06	.766	435,662.90	.722
7. Tramming	180,623.74	.286	154,508.32	.256
8. Ventilation	33,342.80	.053	25,861.68	.043
9. Pumping	75,614.27	.119	60,426.70	.100
10. Compressors & Air Pipes	69,257.53	.109	58,141.58	.097
12. Underground Superintendence	52,344.00	.084	44,316.71	.073
14. Maintenance, Compr. & Drills	4,014.43	.006	3,709.96	.006
15. Scrapers & Mechanical Loaders	59,986.14	.095	70,120.84	.116
16. Electric Tram Equipment	36,146.24	.057	31,957.69	.053
17. Pumping Machinery	10,403.23	.016	12,230.24	.020
Total Underground Costs	1,544,693.19	2.439	1,390,167.39	2.304
Surface Costs				
18. Hoisting	47,847.16	.076	48,629.59	.081
19. Stocking Ore	22,267.04	.035	23,043.19	.038
20. Screening-Crushing at Mine	460.56	.001	5.65	.000
21. Dry House	17,266.91	.027	14,271.00	.024
22. General Surface	13,630.14	.022	11,518.45	.019
23. Maintenance Hoisting Equipment	3,731.44	.006	8,439.33	.014
24. Shaft	12,245.19	.019	8,721.92	.014
25. Top Tram Equipment	1,710.26	.003	2,657.09	.004
26. Docks, Trestles, & Pockets	1,517.77	.002	5,892.65	.010
27. Mine Buildings	10,297.68	.016	10,930.85	.018
Total Surface Costs	130,974.15	.207	134,109.72	.222
General Mine Expense				
Geological	828.67	.001	890.68	.001
28. Insurance	8,676.51	.014	24,755.44	.041
29. Mining Engineering	5,870.81	.009	8,553.10	.014
30. Mechanical & Electrical Engineering	36,926.54	.058	6,180.66	.010
31. Analysis & Grading	4,395.53	.007	29,059.10	.048
32. Personal Injury	4,755.30	.008	38,517.72	.064
33. Safety Department	5,316.30	.008	4,129.13	.007
34. Telephones & Safety Devices	10,634.51	.017	3,439.56	.006
35. Local & General Welfare	33,655.49	.053	4,585.58	.008
36. Sp. Exp., Pensions & Allowances	34,429.28	.054	11,132.91	.018
37. Ishpeming Office	32,352.62	.051	24,580.62	.041
39. Mine Office	39,898.26	.063	31,856.08	.053
Social Security Taxes	33,217.84	.052	25,981.22	.043
Employees' Vacation Pay	59,100.00	.094	50,685.64	.084
Additional Wage Adjustment	6,358.17	.010		
E & A, CC-324, Seismic Servey			1,598.00	.003
Research Laboratory			13.81	.000
Total General Mine Expense	316,415.83	.499	265,959.25	.441
Cost of Production	2,223,897.58	3.511	1,790,236.36	2.967

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8. COST OF OPERATING

b. Detailed Cost Comparison (Cont.)

(1) Days and Shifts

Year	Days Worked	Shifts & Hours	Men Employed	Total Days Worked
1950	268	1 & 2-8	394	105,647
1949	245	1 & 2-8	383	94,278
Increase	23		11	11,369

Total Men Employed in December of Each Year

	1950	1949	1948
Surface	61	65	59½
Underground	326	321½	295 3/4
Total	387	386½	355¼

(2) Wages

There was an increase in wages of 12½¢ per hour effective December 1st and a further increase not to exceed an average of 8½¢ per hour agreed upon to adjust any inequities. This latter will have to be worked out and when authorized will be retroactive to December 1st.

(3) Comparison of Production

Year	Production	Average Daily Product
1950	633,444	2,364
1949	603,306	2,462
Increase	30,138	
Decrease		98

(4) Comparison of Number of Men & Wages

Year	No. Men	No. Days	Amount	Rate Per Day
1950	394	105,647	1,325,342.68	12.54
1949	383	94,278	1,193,437.61	12.66
Increase	11	11,369	131,905.07	
Decrease				.12

(5) Tons Per Man Per Day

	1950	1949	Increase	Decrease
Surface	36.75	35.79		.96
Underground	7.16	7.79		.63
Total	6.00	6.40		.40

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8. COST OF OPERATING

b. Detailed Cost Comparison (Cont.)

(6) Cost of Production

Year	Amount	Cost Per Ton
1950	1,992,083.17	3.145
1949	1,790,230.36	2.967
Increase	201,852.81	.178

	Amount				Cost per Ton		
Year	Labor	%	Supplies	%	Labor	Supplies	Total
1950	1,383,152.10	69.4	608,931.07	30.6	2.183	.962	3.145
1949	1,246,213.94	69.5	544,022.42	30.5	2.063	.904	2.967
Increase	136,938.16		64,908.65	.1	.120	.058	.178
Decrease		.1					

There was a gradual increase in the price paid for supplies and also an increase in wages of approximately 15% effective December 1, 1950.

The change in schedule from 5 to 6 days per week on August 27th necessitated considerable more overtime which more than offset the decrease in overhead caused by increased tonnage.

The tons per man per day were lower due to more adverse conditions and this naturally raised the cost per ton.

A few accounts are listed below for special comment.

(7) Detail of Accounts

UNDERGROUND COSTS

5. Stoping

	Labor	Cost Per Ton	Supplies	Cost Per Ton	Total
1950	450,397.41	.713	82,431.63	.128	.841
1949	409,919.03	.681	71,580.05	.118	.799
Increase	40,478.38	.032	10,851.58	.010	.042

The decrease in tons per man per day and the increase in wages and price of supplies accounts for the increase. As mining descended there were more short raises with very little storage and this delayed the miners when the trammers were unable to remove the ore.

6. Timbering

	Labor	Cost Per Ton	Supplies	Cost Per Ton	Total Cost Per Ton
1950	384,649.82	.608	100,715.24	.158	.766
1949	334,984.86	.555	100,678.04	.167	.722
Increase	49,664.96	.053	37.20		.044
Decrease				.009	

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8. COST OF OPERATING

b. Detailed Cost Comparison

(7) Detail of Accounts (Cont.)

7. Tramming

	Amount	Cost Per Ton
1950	180,623.74	.286
1949	154,508.32	.256
Increase	26,115.42	.030

The increase in cost of tramming was due to more delays at the shaft on account of more wet ore and as a consequence approximately 100 tons per day were lost. There was also an increase in the electric power rate which raised the supply cost to this account by approximately $300.00 per month.

Total Underground Costs

	Labor	Cost Per Ton	Supplies	Cost Per Ton	Total
1950	1,148,857.08	1.814	395,836.11	.625	2.439
1949	1,025,556.80	1.701	364,610.61	.603	2.304
Increase	123,300.28	.113	31,225.50	.022	.135

This table was inserted to show the percentage of Labor to Supplies. The separate accounts which caused most of the increase have been explained.

Total Surface Costs

	Labor	Cost Per Ton	Supplies	Cost Per Ton	Total
1950	89,408.07	.141	41,564.08	.066	.207
1949	83,213.24	.138	50,896.48	.084	.222
Increase	6,194.83	.003			
Decrease			9,332.40	.018	.015

This table was also inserted to show the percentage of labor to supplies. There is very little difference in any of the separate Surface accounts. Labor did not show a proportional increase on account of using less men due to the Hydrocrane and saw mill. The supply cost for the two years would have been nearly identical except that a credit of approximately $11,000.00 was made in July to the Hoisting account. A new motor and controlls installed on the skip hoist in 1949 had been charge directly to Hoisting and this charge was transferred to Plant and Equipment.

Total General Mine Expense

	Amount	Cost Per Ton
1950	316,415.83	.499
1949	265,959.25	.441
Increase	50,456.58	.058

The increase in General Mine Expense was due mostly to three accounts, i.e. Analysis, Ishpeming Office, and Insurance, all of which showed increased charges from the Ishpeming office. Personal Injury was high both years on account of having a fatality both in 1949 and 1950.

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8. COST OF OPERATING

b. Detailed Cost Comparison

Analysis of Supplies Used

	1950		1949	
	Amount	Per Ton	Amount	Per Ton
General Supplies	61,400.80	.097	51,038.48	.085
Iron & Steel	23,335.37	.037	26,069.46	.043
Oil & Grease	5,700.66	.010	3,998.09	.007
Machinery Supplies	38,711.30	.061	47,599.40	.079
Explosives	58,362.01	.092	51,687.95	.086
Lumber & Timber	82,134.14	.129	84,155.80	.139
Fuel	16,636.46	.026	10,039.92	.017
Electric Power	157,829.05	.249	135,388.06	.224
Total	444,109.79	.701	409,976.76	.680

The increase in cost per ton for Supplies was due almost entirely to the increase in their purchase price.

10. TAXES

	1950		1949	
	VALUATION	TAXES	VALUATION	TAXES
Maas Mine	$ 2,200,000	104,390.00	$ 1,605,000	84,044.70
Race Course	375,000	17,793.75	350,000	18,327.51
Stockpile & Equipment	640,000	30,368.00	900,000	47,127.87
Miscellaneous Parcels	11,470	544.30	11,770	616.36
Total Oprtg. Maas Mine	3,226,470	153,096.05	2,866,770	150,116.44
Collection Fees		1,530.96		1,501.16
Total		154,627.01		151,617.60
Tax Rate		4,745.00		5,236.43
Total City of Negaunee Tax		667,585.43		720,387.61
Maas Mine % of City Tax		23.2%		21.0%
Maas Mine Rented Houses	110,050	5,221.97	113,050	5,919.77
Mineral Lands, Etc.	11,530	547.09	13,300	696.51
Total Houses & Lands	121,580	5,769.06	126,350	6,616.28
Collection Fees		57.69		66.16
Total		5,826.75		6,682.44

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11. ACCIDENTS AND PERSONAL INJURY

	1950	1949
Fatal	1	1
Time Lost, over 4 months	0	2
Time Lost, 1 to 4 months	8	9
Time Lost, less than 1 month	13	4
Total Compensable Accidents	22	16

In addition, Frank Niemi was accepted as an occupational disease case on 7/23/50.

On December 31, 1950 payments were being made on eight cases which occurred prior to January 1, 1950.

The total amount paid out for accidents occurring within the year was $3,024.99 as compared with $2,748.00 in 1949.

The following is a brief description of the more serious accidents.

Date of Accident	Name of Injured Man	Description of Accident
4-21-50	James Royea	Royea was helping to lift a cap and while pushing it on the stage with the help of the puffer, one end swung around. Royea jumped back and struck his leg against the scraper causing a fracture. He lost slightly over 2 months and the accident could have been avoided by not using the puffer in such a confined space.
4-27-50	Leo Romback	Romback was drilling the back of a rock raise when several pieces fell and one rolled on his foot causing a fracture. He lost approximately 3 months and the accident could have been avoided by using better judgement and supporting the back.
5-23-50	Erick Turunen	Turunen was hit by a piece of timber being pulled into the breast by the puffer. His leg was fractured causing him to lose approximately 3 months. He should have been standing in the clear.
10-28-50	Jack Hill	Hill and his partner were enlarging a drift from 7 to 9 foot timber. They had stood the left leg and were about to stand the right one approximately 2' ahead of the last 7' set. Hill was standing under this set when some ground fell from the back and apparently struck him on the legs causing him to fall forward where he was struck by another piece of ore which caused instant death. Both miners felt that the opening was so small, protective covering was not needed but there was a seam of hard steel ore at this spot which fell away from the softer material surrounding it. In a normal 5' advance, spiling would have been used and should have been here, thus avoiding the accident.

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11. ACCIDENTS AND PERSONAL INJURY (Cont.)

The accidents, their causes and classification as to responsibility, are tabulated as follows:

Causes	
Slipping	6
Struck by moving objects	4
Barring chutes	3
Falls of Ground	3
Falling Material	2
Squeezed between two objects	2
Lifting material	1
Burned	1
Total	22

Responsibility	
Injured Man	11
Injured & Others	8
Trade Risk	3
Total	22

The Frequency and Severity rates for the Maas Mine as compared with the average for all mines is as follows:

	Hours of Labor	Compensable Days Lost	Non-Compensable Days Lost	Frequency Rate	Severity Rate
Maas	855,879	594	32	45.57	.742 (Excl. Fatal)
		6,000 (Fatal)			
	Total	6,594	32	45.57	7.743
All Mines		6,482	444	52.89	1.038 (Excl. Fatal)
		24,000 (Fatal)			
	Total	30,482	444	52.89	4.942

12. NEW CONSTRUCTION AND PROPOSED NEW CONSTRUCTION

E & A CC-285

Total Estimate		$225,350.00
Expended to Dec. 31, 1949	$33,405.99	
Expended in 1950	56,720.58	
Total expended		90,126.57
Balance December 31, 1950		$135,223.43

The purpose of this E & A was the sinking of a winze from the 6th to the 7th Level and the development of the 7th Level. At the end of the year the winze had been completed, leaving a balance in that account of approximately $2,000.00. It was found that the hoist, intended for hoisting the cages, was in need of repairs and consequently this account is approximately $5,000.00 in the red. This E & A will probably not be completed before the spring of 1953.

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12. NEW CONSTRUCTION AND PROPOSED NEW CONSTRUCTION (Cont.)

E & A CC-353

Total Estimate	$4,400.00
Total Expended	3,469.07
Balance December 31, 1950	$ 930.93

This E & A was authorized for the purchase and installation of a pump for the 7th Level. The pump has been received but will not be installed until some time in 1951 when the Pump house and Sump have been completed.

E & A CC-374

Total Estimate	$21,100.00
Total Expended	157.89
Balance December 31, 1950	$20,942.11

The purpose of this E & A was to provide adequate 250 Volt D.C. power for the underground operations by installing an additional motor generator set underground on the 5th Level near the winze. Work is now in progress for this installation.

E & A CC-378

Total Estimate	$12,000.00
Total Expended	11,984.43
Balance December 31, 1950	$ 15.57

This expense was to cover the moving and repairing of two houses from the prospective caved area to new locations away from the ore body. There still remains some repairing to do and this E & A cannot be closed until 1951.

E & A CC-386

Total Estimate	$11,370.00
Total Expended	11,437.58
Balance December 31, 1950	$ 67.58

This E & A was for the purchase of a truck-mounted Hydro-crane to facilitate handling of material and the E & A was closed in December. The over-cost was due to traveling expenses of operator to transport crane which had not been anticipated.

MATHER MINE "B" SHAFT
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GENERAL:

With the completion of the excellent new buildings and final grading of the main mine entrance road and parking lot, the year 1950 changed the Mather "B" Shaft from a rough looking torn-up construction site to an outstanding landmark for the Marquette Iron Range.

During the early part of the year, the permanent engine house was the main point of interest as each mechanical unit was placed into operation. Including foundation work some of these units had been worked on for over two years which made the initial operation an event which had been looked forward to for a long time.

With the beginning of operation of the skip hoist in March, underground construction of plats, trenches and measuring pockets was accelerated. By the first week in May the 6th Level plat was completed to a point where sufficient drifting equipment could be installed to begin driving west to meet the Mather "A" crew which had been drifting ahead toward "B" Shaft for several months. The connection with Mather "A" Shaft was completed early in June proving a commendable engineering job in holing through.

The biggest milestone of the "B" Shaft construction era was passed upon driving of the first cross-cut into ore. After the first cross-cut had penetrated 220 feet of ore, the drift crew was pulled out to allow the ore development crews to begin their work above the level. Ore development crews were added continuously throughout the balance of the year as new men with mining experience were hired or transferred from Mather "A" Shaft and other Cleveland-Cliffs Iron Co. properties. In several instances mining contracts were also made up by teaming willing, ambitious young employees with partners backed up with some mining experience. Besides Mather "A" Shaft, one other Cleveland-Cliffs Iron Co. property was very generous in transferring men with mining experience, although a few men who had requested transfers came to Mather "B" from two other C. C. I. Co. mines.

The Mather Mine "B" Shaft was very fortunate in obtaining from Mather "A" Shaft supervisors who know all phases of underground development work. The rapid development of the mine can be credited to these men who have the experience and "know how".

To give an account of progress at the mine through 1950, the E & A NM-44 outline will be followed.

MATHER MINE "B" SHAFT
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44-B PREPARING SITE:

Backfilling and grading around the shaft, over the tunnels, and on the stockpile area were carried on intermittently throughout the year. A new road was built with underground development rock, from the shaft house up along the south side of the engine house to the permanent rock dump south and west of the engine house.

A. Lindberg and Sons, a local general contractor, was awarded a contract in September to complete grading and gravel surfacing of the main mine entrance road and parking lot by November 15, 1951. This Contractor, who has worked on the heavy yardage grading during the development of both Mather "A" and Mather "B" Shafts, beat the completion date by a few days on this last contract. Grading of the mine road and parking lot involved excavation of approximately 35,000 cu. yds. of earth. (Both the road and parking lot were surfaced with six inches of crushed road gravel.) The typical cross section as established by the mine engineers called for a roadway 36 feet wide with 1 on 4 fill slopes on fills up to six feet in depth and a 40 foot roadway with 1 on 2 fill slopes on fills over six feet allowing the four feet of additional width for guard rail. Field engineering which involved slope staking and general inspection was carried on by the mine engineers.

A contract will be let early in 1951 to construct guard rail along the steep embankments of the road and parking area. Some sodding of embankments subject to erosion will also be contracted along with a cobble stone gutter designed to carry run-off water from the high elevation of the parking area down the embankment to the L. S. & I. R.R. track ditch.

Hard surfacing of the roadway and parking lot with asphalt, planting of shrubbery and lawns along with general landscaping are planned for completion early in the summer of 1951.

44-C TEMPORARY BUILDINGS:

With completion of the new dry building for occupancy in June, the temporary dry quarters were jammed with supplies and warehouse stock for the balance of the year, until December month when the shop and warehouse wing of the new buildings was completed. Dismantling and salvaging of all the temporary buildings excepting the temporary engine house were begun immediately after completion and occupancy of the excellent new office and shops. It is hoped that the temporary engine house and equipment can be

MATHER MINE "B" SHAFT
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44-C TEMPORARY BUILDINGS: (CONT'D)

dismantled and moved early in 1951 which will allow cleaning up this temporary building area.

Although the temporary quarters had well served their purpose, the salvage value of this expenditure is negligible as most of the expense is in foundations of large concrete content which have no value after abandonment.

This portion of the E & A was considered as closed out as of the first of the year 1949.

44-D INITIAL EQUIPMENT:

This portion of the E & A estimate to purchase equipment at the start of development of the property was closed as of the first of the year 1949.

44-E SINKING SHAFT:

Although actual sinking was completed in 1949, installation of permanent cage and skip guides, discharge column, 12 inch air line, and power cables was completed in 1950.

With the permanent cage hoist in operation the last week of January, installation of the permanent skip and cage guides was carried on simultaneously by using this hoist and the sinking hoist. The new cage hoist was used for runner installation in the cage compartment and the sinking hoist was used for this work in each of the skip compartments. Working around the clock with excellent previous preparations and planning, the entire job of bolting 25,000 linear feet of guides into place required about one week.

Beginning at the bottom of the shaft and working up, the ten inch discharge column was installed by dropping a 70 foot section at a time. Because of the weight of the pipe, the sinking hoist was used for this work rather than the 50 H.P. auxiliary hoist used to install the counterweight pipe and 12 inch airline. Using the sinking hoist, a 70 foot section of pipe could be lowered to the bottom of the shaft in about 15 or 20 minutes. This short period which was usually between shifts, did not hold up underground operations. With completion of installation of the discharge column, the sinking hoist and all the other temporary engine house equipment had served its purpose at Mather "B" Shaft.

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44-F ENGINE HOUSE:

Although the mechanical work in connection with the erection of the two Nordberg hoists had been completed in 1949, delayed delivery and installation of electrical equipment postponed the actual operation of the cage hoist until the last week in January. The skip hoist went into operation the first week in March.

The engine house looked like a beehive the first two months of the year with workmen of various skills each performing his own specialized phase of the work. Included in this group were mechanical men setting up and aligning the M.G. sets, pipe fitters laying and hanging conduits for electric cables, carpenters building forms for grouting in equipment, and the electricians themselves who did a commendable job in wiring the complicated switchboards and control equipment.

The beginning of operation of both hoists climaxed two years of work by construction crews, mechanical men and electricians. Witnessing the smooth operation of all this equipment brings to mind the fact that all the technicians did a fine job of working together.

44-G SHOPS, OFFICE AND DRY BUILDINGS:

During the early part of the year the Contractors concentrated their men towards completing the heating plant wing and equipment garage. This portion of the main buildings was completed early in the year.

Pending completion of the shop wing and due to the overcrowded conditions in the temporary shop because of increased demands of the underground development for shop work, a temporary welding shop was set up in the coal entry of the equipment garage. This served well until occupancy of the permanent shops could be made.

The permanent dry quarters were second on the priority list for completion because of the crowded condition in the temporary dry. Some delay due to a strike in the salt glazed tile industry was experienced in completing the dry wing. This strike was settled in April and the interior tile began to arrive at the mine immediately after the settlement of this labor dispute.

A mine crew commenced installing clothes hanging facilities which included chain hooks, baskets and benches, the latter part of April after the Contractor had made the final concrete pour over the radiant heating pipes laid on the structural concrete floor.

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44-G SHOPS, OFFICE AND DRY BUILDINGS: (CONT'D)

After the various tradesmen including plumbers, electricians, painters, etc. had completed their work in the dry, occupancy was finally made on June 26th. This was an event that had been looked forward to for a long time as every square inch of wall and floor space was in use to accomodate the expanding underground crew.

With completion of the heating plant and dry wings, the Contractors then directed their efforts toward completing the other buildings. Practically all of the structural steel for the shop wing was erected but not riveted by the end of July. While the brick layers were bringing up the walls on the shop wing a mine crew was installing the cranes for the various shops and the warehouse. The purchase and erection of these cranes were not a part of the Proksch Co. contract.

Due to the numerous building projects underway in the locality, The Proksch Construction Co. experienced a shortage of brick layers. With a sufficient number of brick layers all the exterior face brick would have been completed by the end of August. All exterior face brick work was completed by the end of September. The Contractor then went to work on interior partition walls, the hanging of doors and general interior finishing, but was again delayed in the shipment of acoustical ceiling tile for the office. This ceiling tile finally arrived at the mine in November and an all out effort was made to complete both the shop and warehouse wing at the same time as the office wing so that both the office and warehouse personnel could move simultaneously from the temporary quarters.

The mine mechanics began installing drill shop equipment in November although this shop was not entirely completed. Moving of warehouse stock and new equipment into the new buildings was underway continuously throughout November month.

Although all the rooms in the new office were not completed, the exodus from the old quarters to the new office, warehouse and shops took place in the week-end of December 9th. Immediately after completion of moving, everyone realized that the past three year's efforts had not been in vain but that we were working in a convenient, well laid out, workable mine plant. Word quickly spread about the range concerning the fine mine plant at Mather "B" and a flood of requests for transfers of workers from other properties was experienced which was an ace in the hole in expanding underground operations.

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44-G SHOPS, OFFICE AND DRY BUILDINGS: (CONT'D)

At the end of the year the building contractor had outside work such as grading, etc. to complete. The Proksch Construction Co. will complete the outside work as early as possible in the Spring of 1951 so landscaping, paving and planting of shrubbery, etc. can be accomplished by early summer.

44-H HEADFRAME:

Although erection of steel work for the headframe construction was completed in 1949, final enclosing of the structure with Galbestos sheeting was not completed until July 1950. Sheeting work, which was contract let to the Proksch Construction Co. who in turn sub-let the work to Reinke & Schomann, Inc. of Milwaukee, Wisconsin, required a greater length of time to complete than was originally anticipated. The C.I.O. strike of 1949 was again the main contributing factor in the delay of this work. The Proksch Construction Co. who also had the contract for the masonry work on the crusher building, were not permitted to work during the strike which in turn held up the sheeting contractors who could not begin their phase of the work until the masonry work was completed.

After several attempts at installing sheeting in the dead of winter with temperatures below zero, the Reinke & Schomann Co. suspended operations (against our wishes as we could not begin lining up and installing machinery in the crusher building until enclosure work was completed) until the first of April. This Contractor ran into a spell of bad weather again in April and suspended work a second time until the second week of June. The headframe sheeting contract was finally completed the second week in July.

The efforts of the mine mechanical crew were directed towards placing the headframe in operation for handling rock and ore through the rock pocket as soon as the skips went into operation which was in the first week of March. Again the mine mechanical crew did a fine job on installing and aligning scroll work, etc. for the skips as the first skips went into the dump without the least bit of trouble.

All rock and ore hoisted for the year was handled through the rock pocket and thence hauled by Euclid truck pending erection of the conveyor gallery and belt equipment therein. At the end of the year The Bethlehem Steel Co. erection crew had about 50% of the structural steel in place for the conveyor gallery.

MATHER MINE "B" SHAFT
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44-H HEADFRAME: (CONT'D)

An ore loading ramp was constructed in July of old Princeton Mine timber and temporary shaft runners used in sinking the shaft. This loading ramp served for the past year's shipping season to load ore directly into ore cars from the Euclid trucks.

A concrete foundation was formed and poured in October for the shaft air heating equipment. A contract for this installation was awarded to The Walker-Jamar Co. of Duluth, Minnesota. This organization had made a similar installation at the Mather Mine "A" Shaft which has served very satisfactorily.

44-I SERVICE TUNNELS:

Work on this item of the surface construction was done in between other concrete jobs. As the building Contractor's tunnels connected up with the tunnels adjacent to the shaft built by the mine crews, permanent tracks and switches were installed and grouted into place.

The last section of the upper supply tunnel was poured in the early part of the summer in preparation for the increased underground demands for timber and other supplies.

Cold weather set in and forced suspension of formwork for an aggregate and sand bin which was being constructed a short distance to the east of the northeast corner of the engine house over the upper tunnel track. This work will be resumed early next summer.

The ore conveyor tunnel was formed and poured during June and July months.

One additional section of the lower timber tunnel remains to be formed and poured. This final section, which will be completed in the 1951 construction season, will complete all of the work outlined in this E&A account.

44-J PUMPING PLANT:

The first week in April marked the beginning of operation of the two Ingersoll-Rand 100 g.p.m. centrifugal pumps on the 4th Level elevation. Operation of these pumps made it possible to remove eight small motor pumps which were placed in pairs at 450 foot intervals in the shaft. Although these small pumps had done an excellent job during the sinking of the shaft, it was impractical to do the pumping in stages after the shaft sinking was done.

MATHER MINE "B" SHAFT
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44-J PUMPING PLANT: (CONT'D)

To provide storage for these pumps and a sump, a double drift was driven from the cage compartment for a distance of approximately 100 feet to the west. About 30 feet from the shaft hitches were cut in the floor and ribs of the drift for a dam which was formed and poured early in the year. This dam provided storage capacity of approximately 30,000 or 35,000 gallons of water. As this water is mostly clean drainage water collected in the shaft above the 4th Level elevation, this water has been used for drilling in the development of the mine on the lower levels. Towards the end of the year practically all the water collected on 4th Level was used on the levels below as the pump on this level worked only about 20 minutes to ½ hour in 24 hours.

Towards the end of the year plans were being made and preparations were underway to construct the main pumping plant for the mine on 10th Level. At the present time water from the skip pit and the bottom of the shaft is still being relayed by two motor pumps in the shaft to the ditch on 6th Level. The water pumped from the skip pit along with the water from the 6th Level development, flows the 8,000 plus feet to the "A" Shaft pump-house along the main level drift. After completion of the tenth level pump-house, water from the skip pit will be pumped 70 feet to the sumps on 10th Level and thence by Worthington Pumps directly to surface. The water encountered in development of the levels above 10th Level will also be diverted to the 10th Level sumps to be pumped directly to surface.

44-K ELECTRIC HAULAGE:

Three new combination trolley-battery locomotives, two of Jeffery manufacture and one Goodman, were ordered late in the year to keep pace with the rapid development of the underground operations. The ten locomotives of this type in operation at the mine are doing an excellent job.

Thirty additional Lake Shore Lo-Hed cars were ordered for early delivery in 1951. The Lo-Hed cars in operation at the mine have proven to be an excellent lot of equipment with no maintenance outside of periodical lubrication.

Timber trucks used at Mather "B" are of C. C. I. Co. design and manufacture. The Mechanical Department designed an all-steel timber truck with Willison couplers which are the same type used on the Lo-Hed ore cars. This new type timber truck replaces the wooden timber trucks formerly built at the carpenter shop of the General Shops.

MATHER MINE "B" SHAFT
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44-K ELECTRIC HAULAGE: (CONT'D)

The all-steel trucks can be pulled or pushed and also mixed into a train of ore cars. This is a definite advantage over the old type trucks which had to trail a train of cars, or be pulled in a separate train.

Towards the end of the year an area on 7th Level, east of the cage compartment of the shaft, had been opened up to accomodate the motor generator set acquired from The Negaunee Mine. Due to the increasing demand for d.c. current for locomotive operation, it is imperative to have this set in operation at an early date.

44-L MAIN LEVEL DEVELOPMENT:

Due to the limited amount of rock that could be hoisted with the old sinking hoist and sinking cage, along with the rock car used in sinking the shaft, work accomplished during the first three months of the year was limited to opening up the plats adjacent to the shaft and making the excavation for the skip measuring pockets. The main objective was to have the skip measuring pockets and related equipment in place with the beginning of operation of the Nordberg skip hoist.

Small two cubic yard measuring pockets were installed at the end of the cage road compartments at each level in order to load the rock cars on the sinking cage. Double drum air hoists along with small scrapers were also installed to fill these measuring pockets. To load the rock from the pocket excavation into the car on the sinking cage, temporary chutes had to be made over the skip road and ladder way compartments of the shaft.

A great deal of time was saved in constructing the pockets underground as the pockets had been pre-cut and assembled on surface before being sent underground for actual installation. Pocket plates were also pre-cut to size and shape on surface which accelerated underground installation. Hanging of air cylinders and other control equipment was done simultaneously with other work on the pockets.

Full scale plat excavation was in progress after March 20th on which date the skip hoist went into operation. The procedure followed was to complete portions of the west trench, on 6th and 7th Levels adjacent to the measuring pockets, for storage of rock from driving and stripping of the skip and cage road plats. By the first of May, sufficient facilities were ready on 6th Level to permit a crew to begin drifting west toward the Mather Mine "A" Shaft crew, that had advanced a heading to within approximately 450 feet of "B" Shaft. After drifting full size, approximately 340 feet west of the center of the shaft, the Mather "B"

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44-L MAIN LEVEL DEVELOPMENT: (CONT'D)

drift crew drove small drift size and completed the holing through on 6th Level between the Mather "A" and "B" Shafts on June 6, 1950. An immediate survey and check indicated that the entire project was a very commendable engineering job both on surface and underground.

The actual connection was made 452 feet west of the center of Mather Mine "B" Shaft. The small connecting drift was stripped to full size and supported with steel sets. The Mather "B" track was also connected with the Mather "A" track. This connection along with completion of the west half of the cage and skip plats had been rushed for the Cleveland-Cliffs Iron Company's centennial celebration on June 29, 1950. On that day the first three skips of ore were hoisted up from the Mather Mine "B" Shaft.

In July drifting operations were started in the 6100 and 6200 Cross-cuts and in August the first ore was encountered. By the end of August sufficient ore had been intersected in the 6100 and 6200 Cross-cuts to begin mining development. Advance in the headings of these cross-cuts was stopped with the beginning of mining development, so that these crews would not interfere with the mining development gangs. The 6300, 6000 and 6400 Cross-cuts were started in August, November and December respectively.

The same preparatory procedure was followed on the 7th Level, as had been done on the 6th Level plats, before drifting to the ore body was started, although plat work was farther advanced before the beginning of the actual drifting. Drifting towards the ore body was started in October.

In May it was decided to excavate and install pockets along with regular plat work on 8th Level, while the amount of material hoisted in the shaft was at a minimum. By the end of the year the west trench was completed and the greater portion of the skip plat west of the center of the shaft was stripped and supported with steel sets.

The main objective on 10th Level was to complete the west half of the plat in order to handle material scraped up an inclined raise from the skip pit and dumped into the 10th Level trench. This plat work also would assist in driving the pump house and pump house sump. The first half of the year was spent in excavating, forming and pouring the trench on this plat. The foot of the skip pit raise from the skip pit elevation to 10th Level was also formed and poured with concrete in conjunction with installation of other facilities for cleaning the skip pit.

MATHER MINE "B" SHAFT
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44-L MAIN LEVEL DEVELOPMENT: (CONT'D)

By July 1st the skip pit cleaning facilities were in operation and we found that we had a very efficient means of handling spillage in the shaft. Without proper means of handling this spillage, shaft bottom cleaning can be a very expensive item in an operating mine.

Progress for the last half of the year on 10th Level included stripping of both the cage and skip plats. The west trench was also extended to provide storage for two pump house sumps which were to be driven to the north at right angles from the trench and under the cage plat. By driving these sumps directly from the trench, blasted rock from the sump excavation can be scraped directly into the trench and thence into the measuring pockets by the regular trench tugger hoist. Cleaning up the sump after the pump house is in operation can be done in this same fashion. By the end of the year plans were underway to drive the pump house sumps.

Other miscellaneous items necessary for development of the various levels included excavation and installation of sub-stations and equipment, battery charging and changing stations and excavations for motor generator set rooms.

44-Q SEWERS:

Work accomplished in this portion of the E&A accounts consisted of connecting the sewers from the new buildings and adjacent area into the sanitary and storm sewers which were constructed in 1949 under a separate contract.

Two manholes and a section of 12 inch sewer remain to be constructed. This section of sewer will cross the three tracks near the proposed railroad pockets under the conveyor gallery from the headframe to the stockpile grounds. The purpose of this sewer is to drain the low portion of the crusher building under the tail pulley of the 36 inch conveyor belt. The section of this sewer from the crusher building to the pocket tracks was laid early in the year by mine surface labor. The section under the tracks would not be laid until the new mine entrance road and parking lot were completed as it would interfere with the temporary road to the mine from the north end of the stockpile grounds. This final section of sewer will be laid in 1951 completing all the proposed work in this account.

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44-R CONVEYOR AND POCKETS:

Mine crews formed and poured concrete foundations for the conveyor gallery during the summer months and made the final pour on this work in September.

The contract for fabrication and erection of steel work for the conveyor gallery from the headframe to the north side of the stockpile area was awarded to the Bethlehem Steel Co. in May month. Operation of the headframe flow sheet which includes the pan feeders, screen, jaw crusher and conveyor belts was dependent on completion of the conveyor gallery. Early hopes were pinned on having the steel erected the latter part of the summer so this equipment could be in operation during the stockpiling season of 1950 and 1951 but the first steel for this project did not arrive at the mine until November month. Inclement weather which resulted in a great deal of lost time delayed completion of the steel work and by the end of the year some of the steel still remained to be erected.

The conveyor equipment for the conveyor gallery was set in place immediately behind the steel erection crew. By the end of the year the mine mechanical crew was well along with this work although this work could not be entirely completed until all the steel was erected and the structure was enclosed by the sheeting contractor.

A contract for the heating equipment was awarded to the Walker Jamar Co. late in the year. This installation will be similar in aspects to the shaft air heating set-up but of about one-third as great capacity. This equipment will be in operation for the 1951 - 1952 stockpiling season.

44-S TIMBER YARD:

With the increased demand for timber and supplies underground, it was necessary to place the timber yard in condition to meet these demands. Although the 1950 construction season was not long enough to complete all the work contemplated in the timber yard, this area was completed to a point where timber and supplies could be handled in a fairly efficient manner before winter set in.

Two 30 inch gauge tracks were laid the full length of the timber yard on the upper tunnel elevation. One of these tracks serves for loading and transporting stull timber while the other is used to transport poles and lagging.

Two battery locomotives will be used to transport timber and supplies from the timber yard to the shaft. These battery locomotives are equipment acquired from Mather "A"

MATHER MINE "B" SHAFT
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44-S TIMBER YARD: (CONT'D)

Shaft. Pending arrival at the mine of battery charging equipment to charge the batteries on these locomotives, a Jeffery combination locomotive has been used for timber tunnel haulage.

Two electrically operated chain saws were purchased and placed into operation in the timber yard to cut the bevels and joggles in the stull timber. These saws increased the output of two men about 100 per-cent and have thereby proven to be a worthy investment.

44-T STOCKING EQUIPMENT:

With increased hoisting of development rock and anticipation of hoisting of ore during the latter part of the year, it was decided to purchase a new Euclid truck and use the rebuilt Euclid obtained from the Mesaba Range as a standby or spare. This new Euclid arrived at the mine the first week in May. This new piece of equipment has done a fine job working three shifts to keep the development rock and ore hauled away from the shaft.

A Merrick weightometer has been purchased and arrived at the mine in July month. This equipment will be installed on the 36 inch belt line running from the shaft house to the stocking area. With weighing accuracy of belted material in the neighborhood of one per-cent this installation will offer a check on the amount of material conveyed over the belt.

Ralph E. Boeck, our structural design engineer, worked on plans for the east extension stockpile conveyor gallery. Plans and specifications for this work will be completed early in 1951 at which time this project will go out for bids to structural steel fabricators and erectors.

44-U MINING EQUIPMENT:

Drill machines purchased during the year included the Ingersoll-Rand RB-12 which is the standard conventional machine for auger work in soft ore. In the hard, high-sulphur ore north of #22 Dike the RB-12 with auger steel could not drill this material. Due to high dust counts it was also necessary to revert to wet machines. To accomplish this several Cleveland HC-20 machines were purchased along with some Chicago Pneumatic No. 32 Jackhammers. These machines did a fine job of drilling and the dust counts were brought down within reasonable limits.

MATHER MINE "B" SHAFT
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44-U MINING EQUIPMENT: (CONT'D)

Nineteen Ingersoll-Rand L-54 chunk breakers were also purchased.

Hoists to equip mining contracts included purchase of twenty 25 h.p. Ingersoll-Rand and Joy tuggers, twenty-six Ingersoll-Rand HU hoists, eight Ingersoll-Rand K4U hoists and twenty-three Ingersoll-Rand D6U hoists. Six Ingersoll-Rand H5NN1H double drum air hoists were purchased to move development ore and rock mined in small drift work. Scrapers of Holcomb manufacture were also purchased in sufficient number to go along with the scraper hoists.

Due to information required to plan mining work it was also necessary to purchase one Chicago Pneumatic #15 diamond drill and necessary rods, couplings, etc. Performance of this machine has been very satisfactory to date.

44-V FIRE PROTECTION EQUIPMENT:

With occupancy of the new buildings it was necessary to purchase 300 feet of 1½" fire hose mounted on reels and hung in both the surface and underground drys. Six Pyrene fire extinguishers, 1½ quart size, and eighteen DuGas 30B fire extinguishers were also purchased and installed in various places in the new buildings.

44-W SKIPS, CAGES & HOISTING ROPES:

One Kimberly type skip was purchased from The National Iron Works in Duluth, Minnesota. The National Iron Works was the low bidder on the manufacture of this skip.

Two hoisting ropes totaling 7800 feet in length, 1 7/8" diameter, 6 x 27 Langlay flattened strand were also purchased in 1950.

AUTHORIZATIONS AND EXPENDITURES
MATHER MINE "B" SHAFT DEVELOPMENT:

The following tabulation shows the amount authorized since the beginning of development at Mather "B", expenditures for the year 1950 and total expenditures to December 31, 1950.

Account 44-J, Pumping Plant, ran 14,777.48 over the authorization, due to the beginning of pumphouse work which was actually scheduled for 1951. The rapid development of the mine necessitated purchase of additional haulage equipment which ran account 44-K, Electric Haulage, 72,000.00 over the 1950 estimate.

AUTHORIZATIONS AND EXPENDITURES MATHER MINE "B" SHAFT DEVELOPMENT:	TOTAL AUTHORIZED	EXPENDITURES TO DEC. 31, 1950	UNEXPENDED BALANCE	1950 EXPENDITURES
44-A GENERAL EXPENSE:				
a. Insurance		$17,562.14		$5,959.12
b. Engineering		71,134.33		16,156.02
c. Analysis		6,794.35		4,983.61
d. Mine Office		62,315.02		14,161.90
e. Ishpeming Office		29,169.57		67.16
f. Superintendence		51,406.92		10,145.22
g. Legal		635 30		114.00
h. Personal Injury		12,886.13		692.25
j. Taxes - Social Security		34,777.01		13,939.25
k. Vacation Expense		20,861.52		-
m. Safety Department		5,174.52		909.57
n. Geological		6,959.32		1,000.09
o. Policing		30,531.18		6,237.89
p. Compensation Department		1,541.87		318.00
q. General Surface & Misc.		28,683.37		8,978.64
r. General & District Welfare		5,019.24		948.00
s. Special Expense		1,298.92		264.00
t. Pensions & Retirements		8,339.95		1,842.00
u. Hospital Loss		9,383.22		1,552.57
v. Examinations		540.00		130.00
TOTAL	$480,000.00	$405,013.88	$74,986.12	$88,399.29
44-B PREPARING SITE:				
a. Building Roads		14,999.83		14,444.17
b. Grading For Site		51,675.80		3,497.38
c. Purchase & Moving Dwellings		22,198.72		-
d. Landscaping		505.01		190.72
e. Drainage		12,969.37		.62
f. Water Meter		1,653.38		1,653.38
p. Prop. of Distribution Exp.		2,122.21		-
TOTAL	126,000.00	106,124.32	19,875.68	19,786.26
44-C TEMP. BUILDINGS & TEMP. EQUIPMENT:				
a. Tool Shed		413.64		-
b. Office & Dry		19,591.30		-
d. Engine House		12,735.46		-
e. Headframe		4,876.01		-
f. Shop Buildings		3,146.57		-
g. Heating Plant		3,418.70		-
h. Rotary Dump & Cars		3,631.75		-
i. Ventilating Fans		1,093.31		-
j. Sinking Hoists & Accessories		22,843.75		-
k. Compressors & Accessories		14,863.38		-
l. Air Lines		2,915.96		-
m. Power Lines		2,460.47		-
n. Water Lines		1,623.47		-
o. Sewer Lines		1,460.70		-
p. Electrician's Shed		137.01		-
r. Machine Shop		1,054.47		-
s. Lamp Room		1,025.32		-
t. Rock Trestle		258.38		-
TOTAL	$97,575.00	$97,540.65	$34.35	-

AUTHORIZATIONS AND EXPENDITURES MATHER MINE "B" SHAFT DEVELOPMENT:	TOTAL AUTHORIZED	EXPENDITURES TO DEC. 31, 1950	UNEXPENDED BALANCE	1950 EXPENDITURES
44-D INITIAL EQUIPMENT:				
a. Tractor, Trailbuilder & Athey Wagon		$13,449.28		-
b. ½ Yd. Comb. Crane & Clamshell		12,960.89		-
c. 5 Ton Truck		6,091.58		-
d. ½ Ton Pickup Truck		2,689.96		$1,475.75
e. Shop Equipment		17,489.30		-
f. Fuel Tanks		123.15		-
h. Water Main		327.49		-
j. Hopper		1,817.14		-
k. Concrete Mixer		3,676.93		-
l. Pumpcrete		9,512.00		-
m. Ford Dump Truck		2,604.55		2,604.55
TOTAL	$67,500.00	$70,747.27	$3,247.27	$4,080.30
44-E SINKING SHAFT:				
a. Equipment		$31,478.31		-
b.-1 Shaft Sinking		660,381.98		$679.99
b.-2 Stocking Rock		1,136.07		-
b.-3 Temp. Air Lines		1,786.80		-
c. Steel Sets, Sheathing & Skip Guides		267,608.44		250.03
d. Installing Sets, " " "		103,928.95		2,704.44
e. Concreting & Guniting		93,484.59		-
f. Ventilating Seal		52,466.23		807.63
g. Discharge Line		27,794.71		27,794.71
h. Counterweight Pipe		32,878.21		1,082.82
i. Air Lines		19,246.27		267.20
j. Power Cables		37,559.77		15,325.83
k. Water Lines		747.79		719.23
l. Cage Guides		21,259.70		11,868.99
m. Signal Cables		7,908.74		7,403.30
TOTAL	$1,379,000.00	$1,359,666.56	$19,333.44	$68,904.17
44-F ENGINE HOUSE:				
a. Foundations		$41,114.96		-
b. Main Buildings		193,677.55		$4,425.24
c. Heating, Plumbing & Wiring		32,994.12		1,053.98
d. Traveling Cranes		29,576.93		215.13
e. Skip Hoist - Foundations		10,675.73		238.01
f. Skip Hoist - Mechanical		149,701.73		5,399.31
g. Skip Hoist - Electrical		56,969.84		9,290.61
h. Cage Hoist - Foundations		9,148.54		62.82
i. Cage Hoist - Mechanical		137,071.47		4,556.39
j. Cage Hoist - Electrical		26,641.49		5,610.99
k. Compressors - Foundations		11,923.03		32.04
l. Compressors - Mechanical		65,652.49		6,754.96
m. Compressors - Electrical		5,782.52		1,041.13
n. Compressors - Air Lines		1,917.83		129.81
o. Main Switchboards & Power Cables		32,417.28		4,879.16
q. Bell Lines & Signals		2,652.33		2,652.33
r. Motor Generator Sets		168,176.08		38,864.55
TOTAL	$999,425.00	$976,093.92	$23,331.08	$85,206.46

AUTHORIZATIONS AND EXPENDITURES MATHER MINE "B" SHAFT DEVELOPMENT:	TOTAL AUTHORIZED	EXPENDITURES TO DEC. 31, 1950	UNEXPENDED BALANCE	1950 EXPENDITURES
44-G SHOPS, OFFICE & DRY BUILDINGS:				
a. Shop Wing		$321,094.12		$189,461.65
b. Dry Wing		395,727.36		218,189.48
c. Office Wing		151,533.99		81,933.63
d. Heating Plant Wing		217,482.51		121,739.10
TOTAL	$1,092,000.00	$1,085,837.98	$6,162.02	$611,323.86
44-H HEADFRAME:				
a. Headframe Foundations		$10,733.46		-
b. Main Structure		156,545.90		$1,843.75
c. Shaft House Foundations		13,052.37		-
d. Shaft House		81,470.33		31,797.34
e. Shaft House Ore Handling Machinery		115,202.59		19,607.32
f. Hold Down & Idler Sheaves		40,123.69		154.92
g. Shaft Air Heating Equipment		8,783.22		8,783.22
TOTAL	$449,000.00	$425,911.56	$23,088.44	$62,186.55
44-I SERVICE TUNNELS:				
a. Shops to Shaft		$23,047.02		$2,473.89
b. Shaft to Timber Yard		79,974.82		13,463.35
c. Shaft to Engine House		29,675.65		266.37
d. Ore Conveyor Tunnel		514.21		377.97
e. Heating Tunnel		1,520.79		86.62
TOTAL	$148,500.00	$134,732.49	$13,767.51	$16,668.20
44-J PUMPING PLANT:				
a. Pump House & Sump		$15,214.15		$8,924.87
b. Pumps & Erecting		14,563.33		14,456.15
TOTAL	$15,000.00	$29,777.48	$14,777.48	$23,381.02
44-K ELECTRIC HAULAGE:				
a. Locomotives		$154,830.83		$7,041.83
b. Cars		118,537.15		32,213.21
c. Timber Trucks		29,748.97		29,748.97
d. Signals		286.47		286.47
e. Motor Generator Set		1,342.17		1,342.17
f. Trolley Line		2,697.51		2,697.51
TOTAL	$235,000.00	$307,443.10	$72,443.10	$73,330.16
44-L MAIN LEVEL DEVELOPMENT:				
b. Pockets, Trenches & Equip.		$602,051.35		$502,966.22
c. Timbering		67,412.61		37,939.30
d. Drifting		264,280.48		164,678.90
e. Drifting Equipment		113,686.51		68,911.13
f. Installed Drift Equip.		69,132.27		53,624.23
g. Sub-station		4,804.78		4,795.98
h. Battery Station		32.20		32.20
j. Exploration		45,239.15		33,039.78
m. Pumping Station		6,526.98		2,041.18
n. Pumping Equipment		3,240.00		50.00
s. Skip Pit		43,676.38		25,228.49
t. Pumping		17,183.59		7,378.74
u. Communication System		841.05		841.05
TOTAL	$1,355,000.00	$1,238,107.35	$116,892.65	$901,427.20

AUTHORIZATIONS AND EXPENDITURES MATHER MINE "B" SHAFT DEVELOPMENT:	TOTAL AUTHORIZED	EXPENDITURES TO DEC. 31, 1950	UNEXPENDED BALANCE	1950 EXPENDITURES
44-Q SEWERS:				
a. Sanitary		$5,403.82		$51.06
b. Storm		8,593.22		-
TOTAL	$25,000.00	$13,997.04	$11,002.96	$51.06
44-R CONVEYOR & POCKETS:				
a. Trestle		$30,890.05		$30,890.05
b. Conveyor		44,436.60		24,227.80
c. Heating Equipment		1,113.39		1,113.39
TOTAL	$232,000.00	$76,440.04	$155,559.96	$56,231.24
44-S TIMBER YARD:				
a. Tunnel		$4,011.50		$4,011.50
b. Tracks		4,934.26		3,240.98
c. Haulage Equipment		5,339.28		3,252.93
d. Timber Handling Equipment		23,162.84		10,376.03
TOTAL	$85,000.00	$37,447.88	$47,552.12	$20,881.44
44-T STOCKING AND LOADING:				
a. Haulage Equipment		$35,612.20		$33,928.54
c. Weightometer		2,947.52		2,947.52
TOTAL	$45,000.00	$38,559.72	$6,440.28	$36,876.06
44-U MINING EQUIPMENT:				
a. Drill Machines & Accessories		$27,213.91		$27,213.91
b. Scrapers, Hoists & Accessories		145,852.31		145,852.31
c. Exploratory Drill Equipment		12,273.60		12,273.60
d. Miscellaneous Equipment		3,505.68		3,323.85
TOTAL	$315,000.00	$188,845.50	$126,154.50	$188,663.67
44-V FIRE PROTECTION EQUIPMENT:				
a. Surface Hydrants, Mains & Hoses		$1,325.14		$565.01
b. Portable Fire Extinguishers		1,911.34		1,363.69
c. Undg. Fire Protection Equip.		375.06		126.74
TOTAL	$8,000.00	$3,611.54	$4,388.46	$2,055.44
44-W SKIPS, CAGES & HOISTING ROPES:				
a. Skips		$18,709.19		$13,781.58
b. Cages		13,044.83		7,039.60
c. Hoisting Ropes		29,336.94		17,265.23
TOTAL	$94,000.00	$61,090.96	$32,909.04	$38,086.41
GRAND TOTAL E&A NM-44	$7,248,000.00	$6,656,989.24	$591,010.76	$2,297,538.79

MATHER MINE "B" SHAFT
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UNDERGROUND:

Development:

In July month the mine went on a partial operating basis as the first cross-cuts entered ore. The basic plan was to advance three cross-cuts a sufficient distance into the ore to enable starting of mining development. The 6100 Cross-cut entered ore in August 1950. This cross-cut was driven through approximately 160 feet of high-sulphur ore at which point a 10 foot dike was encountered. The cross-cut was then advanced an additional 60 feet south of the dike through first class standard ore at which point further advance in this cross-cut was temporarily stopped and the drift crew then started to drive the 6300 Cross-cut. The 6200 Cross-cut, which was being driven simultaneously with the 6100, was also advanced to a point 50 feet south of the #22 Dike. Geology in the 6200 Cross-cut was identical to the structure in the 6100 Cross-cut. By the end of the year the 6100 and 6200 Cross-cuts had been driven 60 and 50 feet south of #22 Dike respectively, the 6300 Cross-cut had been advanced to a point approximately 30 feet south of #22 Dike, the 6000 Cross-cut had been advanced to a point 235 feet south of the main line and the 6400 Cross-cut switch had been completed and the cross-cut advanced about 20 feet beyond the king post.

In the latter part of August month after advance had been stopped in the 6100 Cross-cut, two mining crews started cutting out two top timber transfer drifts approximately 40 and 90 feet north of #22 Dike in high-sulphur ore. Two top timber transfers were also cut out in the 6200 Cross-cut directly west of the cut-outs in the 6100 Cross-cut during the latter part of September. By the end of the year the top timber transfer drifts between the 6100 and 6200 Cross-cuts were driven through and connected. Top timber transfer drifts were also advanced east of the 6100 Cross-cut and west of the 6200 Cross-cut.

Immediately after connecting the top timber transfers between the 6100 and 6200 Cross-cuts, exploration above these transfers was carried on by means of small raises and small drifts. From information obtained in surface drill holes #137 and #139 it was assumed that the jasper capping would be reached approximately 75 or 80 feet above the level. The exploration raise finally reached jasper capping approximately 160 feet above the 6th level elevation. Due to the great height of this ore, actual mining could not be started during 1950.

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UNDERGROUND: CONT'D

Development: (Cont'd)

At the end of the year mining sub development had been completed on the -675' Sub and about 75 per-cent completed on the -650' Sub between the 6100 and 6200 Cross-cuts. Mining sub development drifts had also been driven on the -675' Sub between the 6000 and 6100 Cross-cuts. Several single cribbed raises were completed between the top timber transfer drifts and the -675', -650' and -625' Subs.

Plans at the end of the year were to complete development of the ore body between the 6100 and 6200 Cross-cuts adjacent to and north of #22 Dike in high-sulphur ore for early mining.

Timbering:

The cost per ton for timbering supplies was high because all of the ore produced was development ore.

Statement of Timber Used
Under Operating Account "Timbering"

	LINEAL FEET	AVG PRICE PER FOOT	AMOUNT 1950
5'4" Cribbing	7,947	.0741	$589.30
8' Stulls	10,659	.42453	4,525.13
Total	18,606	.2748	$5,114.43
7' Lagging	150,787	.030207	$3,061.68
9½' Poles	29,259	.03529	1,032.82
Total	180,046	.02274	$4,094.50
4" x 4" "H" Beam 13#	5,487	.8241	$4,522.36
4" x 4" x 8' I-Beam 23#	283	1.035	292.91
6½" x 6½" x 8' I-Beam 24#	1,579	1.1837	1,869.14
3/8" x 2 x 2 Angle Iron	19,330#	.0496	959.38
Misc. (Bolts, Plates etc.)			709.33
Total			$8,353.12
GRAND TOTAL INCLUDING STEEL			$17,562.05

Product for Year

	1950
Ft. Timber per Ton of Ore	.2215
Ft. Lagging per ton of Ore	3.1336
Ft. Poles per Ton of Ore	.60806
Ft. Lagging per ft. of Timber	14.1464
Cost per Ton for Lagging	.09404
Cost per Ton for Poles	.02146
Cost per Ton for Steel	.17359
Cost per Ton for all Timbering Supplies, Inc. Steel	.36497

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UNDERGROUND: CONT'D

Explosives:

The high cost per ton for explosives was due to the fact that all ore produced was solely development ore.

Statement of Explosives Used Under Operating Account "Development In Ore"

	QUANTITY	AVG PRICE	AMOUNT 1950
Hercomite 2, 2" x 24"	90#	15.50 CWT	$13.95
Gelamite 1-x, 1¼" x 8"	66,475#	17.10 CWT	11,367.97
Total Powder	66,565#	16.30 CWT	$11,381.92
#6 Blasting Caps	22,590	1.53505 C	$346.77
Blasting Fuse	342,000'	8.4754 M	2,898.62
Electric Caps	5,036	22.801 C	1,148.26
Ignitacord	1,000'	.755 C	7.55
#14 Lead Wire	4,000'	24.345 M	97.38
Powder Bags	77	2.7564 ea.	212.25
7" Fuse Lighters	12,500	9.000 M	112.50
Tamping Shells	2,160	6.449 M	13.93
Ignitacord Connectors	500	2.000 C	10.00
Total Caps, Wire, Fuse, Etc.			$4,847.26
GRAND TOTAL EXPLOSIVES.....			$16,229.18

Product	1950
Pounds of Powder per Ton of Ore	1.3833
Tons of Ore per Pound of Powder	.7228
Cost per Ton for Powder	.2365
Cost per Ton for Fuse, Caps, Etc.	.1007
Cost per Ton for all Explosives	.3372

ESTIMATE OF ORE RESERVES:

The first estimate of ore reserves at Mather Mine "B" Shaft was made to the Michigan State Tax Commission as of September 30, 1950. This estimate had to be substantially increased in an estimate presented to the Tax Commission as of December 31, 1950.

The significance of information obtained from the exploration program for the last quarter of 1950 was to extend to the South the known limits of a portion of the ore body on and above the 6th Level.

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ESTIMATE OF ORE RESERVES: (CONT'D)

The estimate of ore reserves as reported to the Tax Commission as of December 31, 1950 is as follows:

Total high sulphur ore above 6th Level	2,838,854 Tons
Total standard ore above 6th Level	1,445,208 "
Total high sulphur ore below 6th Level	3,603,854 "
Total standard ore below 6th Level	3,536,458 "

	UNDERGROUND DIAMOND DRILLING AND DEVELOPMENT			SURFACE DIAMOND DRILLING	TOTAL TONS
	STANDARD	HI-SULPHUR	TOTAL		
Total gross as of Sept. 30, 1950	2,504,351	3,452,807	5,957,158	3,348,415	9,305,573
Tonnage increase as proven by Diamond Drilling 9-30-50 to 12-31-50.	1,032,107	151,047	1,183,154	0	1,183,154
Total as of Dec. 31, 1950	3,536,458	3,603,854	7,140,312	3,348,415	10,488,727
Less production between 9-30-50 & 12-31-50		34,534	34,534		34,534
Total gross as of Dec. 31, 1950	3,536,458	3,569,320	7,105,778	3,348,415	10,454,193
Less 10% for mining and rock	353,646	360,385	714,031	334,842	1,048,873
Net Total as of Dec. 31, 1950	3,182,812	3,208,935	6,391,747	3,013,573	9,405,320

PRODUCTION, SHIPMENTS & INVENTORIES:

Production by Grades:

	Product	Stockpile Overrun	Total
Mather Standard	1,066	-	1,066
Mather Special	47,052	-	47,052
Total	48,118	-	48,118
Rock			90,028

Shipments:

	Pocket Tons	Stockpile Tons	Total Tons
Mather Standard	1,066	-	1,066
Mather Special	33,780	1,598	35,378
Total	34,846	1,598	36,444

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PRODUCTION, SHIPMENTS & INVENTORIES: (CONT'D)

Production by Months:

Months	Mather Standard	Mather Special	Total	Rock
January	-	-	-	1,410
February	-	-	-	1,657
March	-	-	-	6,133
April	-	-	-	7,332
May	-	-	-	6,120
June	-	-	-	5,094
July	-	-	-	8,532
August	1,066	3,590	4,656	12,110
September	-	8,928	8,928	9,396
October	-	14,293	14,293	13,032
November	-	9,105	9,105	8,076
December	-	11,136	11,136	11,136
Total	1,066	47,052	48,118	90,028

Ore Statement:

	Mather Standard	Mather Special	Total
On Hand January 1, 1950	-	-	-
Output for Year	1,066	47,052	48,118
Transfers	-	-	-
Overrun	-	-	-
Total	1,066	47,052	48,118
Shipments	1,066	35,378	36,444
Balance on Hand	-	11,674	11,674

LABOR AND WAGES:

No. of Men 1-1-1950	132
Added During Year	264
Total	396
Separations	48
Total	348
Net Gain	216

Additions Include:

144	New Hires
87	Mather "A" Transfers
9	Maas Transfers
7	Storehouse Transfers
5	Camb-Jackson Transfers
5	Lloyd Transfers
4	Cliffs Shaft Transfers
2	Athens Transfers
1	Negaunee Transfer
264	

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LABOR AND WAGES: (CONT'D)

Statement of Wages	1950	1949
Average No. Men Working		
Surface	91	66
Underground	115	38
Total	206	104
Average Wages Per Day		
Surface	$11.34	$11.19
Underground	14.22	19.94
Total	$12.98	$14.42
Wages Per Mo. of 25 Days		
Surface	$283.50	$279.75
Underground	$355.50	498.50
Total	$324.50	$360.50
Total No. Days		
Surface	24,733 3/4	17,882
Underground	32,426 3/4	10,415
Total	57,160 1/2	28,297
Amount for Labor		
Surface	$280,558.50	$200,094.77
Underground	461,314.73	208,123.96
Total	$741,873.23	$408,218.73

EXPLORATION AND FUTURE EXPLORATION:

The progress attained in cutting the main drift of the 6th Level was closely followed by exploration of the ore bodies available for mining from the 6th Level. This exploration was conducted principally by diamond drilling. Geologic mapping of the structure cut in the drifting operation was valuable in making preliminary interpretation of the structure and in selecting favorable sites for the diamond drilling.

The drill sites were cut adjacent to the 6th Level drift in the footwall Siamo formation at horizontal intervals of from 200 feet to 300 feet.

As was noted in the annual report for 1949, the drilling completed for that year was disappointing in that the ore bodies encountered were not extensive and were for the most part of high sulphur content. As the exploration program progressed into the year 1950, and moved eastward following the 6th Level heading, the ore bodies encountered began to assume more extensive proportions. The horizontal

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EXPLORATION AND FUTURE EXPLORATION: (CONT'D)

drill holes that encountered substantial ore runs were supplemented by positively inclined holes drilled along the same meridian. These positively inclined holes were planned to test the width of the ore body normal to the dip and to ascertain if the enrichment continued up the dip to sufficient height for mining operation from the 6th Level.

The information obtained from drilling and from underground geologic mapping was assembled and plotted on plan maps and on north-south vertical sections. From these plans and sections further interpretation of the structure and of the limits of the ore body was possible. Contour maps of the footwall formation at the various level elevations were prepared and will be available for planning the most advantageous positions for locating the main drifts on the other level elevations.

Underground Diamond Drill Holes #8 through #15 were drilled during the year 1950 and with them the initial phase of the exploration was completed. This drilling defines the principal areas of ore concentration on and adjacent to the 6th Level operation.

Chemical analyses of the samples obtained during the drilling have furnished information as to the probable grade of the product with respect to iron, phosphorus and sulphur that can be expected from mining in any given area. These analysis figures indicate that mining from the 6th Level elevation and above will be principally in a high sulphur ore body. Small areas of standard ore do exist at the 6th Level elevation and above but the amount available for mining will be only a small percentage of the total.

With the principal areas of ore concentration outlined, it was possible to plan the development for the start of actual mining operations. With the start of this development the second phase of the exploration was begun. This phase will consist of determining the exact dimensions of the ore body, ie. the height and width of ore concentration over the area where mining will begin. This exploration will be accomplished by diamond drilling in conjunction with exploration raises and drifts. Underground Diamond Drill Holes #16 and #18 were completed during 1950 and numerous exploration raises were begun. This exploration was continued at the end of the year.

The logs of the drill holes advanced during the year 1950 are outlined as follows:

MATHER MINE "B" SHAFT EXPLORATION
YEAR 1950

NO.	COURSE	INCLINATION	LOCATION	COLLAR ELEV.	DATE STARTED	DATE FINISHED
8	S. 00°06' W.	+2°00'	S.769.21 & 8305.90W.	-711.90	Jan. 16	Feb. 27

0 - 139	Slate	413 - 420	1st Class Hi-Sulphur Ore
139 - 155	Ferruginous Slate	420 - 453	1st Class Ore
155 - 193	Jasper	453 - 460	Dike
193 - 232	Ferruginous Slate	460 - 467	1st Class Ore
232 - 239	Jasper	467 - 469	Dike
239 - 241	Second Class Ore	469 - 490	1st Class Ore
241 - 254	2nd Class Argillaceous Ore	490 - 495	2nd Class Ore
254 - 270	1st Class Argillaceous Ore	495 - 515	Jasper
270 - 383	1st Class Ore	515 - 521	1st Class Ore
383 - 390	1st Class Sulphur Ore	521 - 523	Jasper
390 - 413	1st Class Ore		

9	S. 00°31' E.	+2°15'	S.764.60 & 7996.56W.	-710.53	Feb. 20	Mar. 28

0 - 29	Slate and Graywacke	207 - 417	1st Class Sulphurous Ore
29 - 30	Dike	417 - 428	Dike
30 - 118	Slate and Graywacke	428 - 545	1st Class Ore
118 - 125	Quartz Vein	545 - 550	Jasper
125 - 202	Ferruginous Slate	550 - 699	1st Class Soft Ore
202 - 207	Jasper	699 - 710	2nd Class Soft Ore

10	S. 00°09' E.	+45°	S.764.60 & 8305.07W.	-704.14	Feb. 27	Apr. 12

0 - 50	Slate and Graywacke	323 - 328	2nd Class Hi-Sulphurous Ore
50 - 54	1st Class Sulphurous Ore	328 - 370	Jasper
54 - 103	Ferruginous Slate	370 - 380	1st Class Ore
103 - 137	2nd Class Hi-Sulphur Ore	380 - 385	2nd Class Ore
137 - 302	1st Class Hi-Sulphurous Ore	385 - 404	Lean Ore
302 - 313	Lean Ore	404 - 410	Jasper
313 - 318	2nd Class Hi-Sulphurous Ore	410 - 425	Lean Ore
318 - 323	Jasper	425 - 445	Jasper

MATHER MINE "B" SHAFT EXPLORATION
YEAR 1950

NO.	COURSE	INCLINATION	LOCATION	COLLAR ELEV.	DATE STARTED	DATE FINISHED
11	S. 00°32' W.	+45°	S.761.36 & 7995.93W.	-703.31	Mar. 28	Apr. 13

0 - 30	Slate and Graywacke	233 - 240	Lean Ore
30 - 31	Dike	240 - 245	2nd Class Hi-Sulphur Ore
31 - 116	Slate and Graywacke	245 - 250	1st Class Hi-Sulphur Ore
116 - 135	2nd Class Hi-Sulphur Ore	250 - 260	2nd Class Hi-Sulphur Ore
135 - 233	1st Class Hi-Sulphur Ore	260 - 316	Jasper

NO.	COURSE	INCLINATION	LOCATION	COLLAR ELEV.	DATE STARTED	DATE FINISHED
12	S. 00°16' E.	+2000'	S.812.80 & 7670.76W.	-711.83	Apr. 14	May 24

0 - 104	Slate and Graywacke	228 - 341	1st Class Hi-Sulphur Ore
104 - 128	Ferruginous Slate	341 - 350	Dike
128 - 145	Slate and Jasper	350 - 415	1st Class Ore
145 - 182	Jasper	415 - 504	Lean Ore and Jasper
182 - 215	Slate and Jasper	504 - 550	Jasper
215 - 228	Jasper		

NO.	COURSE	INCLINATION	LOCATION	COLLAR ELEV.	DATE STARTED	DATE FINISHED
13	S. 00°16' W.	+13°30'	S.768.54 & 8305.87W.	-707.52	May 1	June 6

0 - 114	Slate and Graywacke	205 - 207	2nd Class Hi-Sulphur Ore
114 - 169	Ferruginous Slate	207 - 210	Jasper and Quartz Vein
169 - 189	Jasper	210 - 220	Jasper
189 - 193	Ferruginous Slate	220 - 296	1st Class Sulphur Ore
193 - 195	Lean Ore	296 - 334	Lean Ore and Jasper
195 - 205	Jasper	334 - 427	Jasper

MATHER MINE "B" SHAFT EXPLORATION
YEAR 1950

NO.	COURSE	INCLINATION	LOCATION	COLLAR ELEV.	DATE STARTED	DATE FINISHED
14	S. 13°37' W.	+2°48'	S.745.81 & 8420.85W.	-709.60	June 5	July 21

0 - 60	Slate and Graywacke
60 - 72	Ferruginous Slate
72 - 79	1st Class Sulphur Ore
79 - 85	Ferruginous Slate
85 - 100	First Class Ore
100 - 155	Ferruginous Slate
155 - 170	Jasper
170 - 180	Ferruginous Slate
180 - 218	Ferruginous Slate & Jasper
218 - 219	Dike
219 - 224	Ferruginous Slate
224 - 228	2nd Class Ore
228 - 237	1st Class Ore
237 - 250	Ferruginous Slate & Lean Ore
250 - 290	Ferruginous Slate & Graywacke
290 - 310	2nd Class Ore
310 - 315	1st Class Ore
315 - 330	2nd Class Ore
330 - 365	Lean Ore & Jasper
365 - 370	1st Class Ore
370 - 462	Lean Ore and Jasper
462 - 640	Jasper
640 - 650	2nd Class Ore
650 - 656	Jasper

NO.	COURSE	INCLINATION	LOCATION	COLLAR ELEV.	DATE STARTED	DATE FINISHED
15	S.25°22' E.	+45°00'	S.808.87 & 7669.10W.	-698.04	July 25	Aug. 22

0 - 97	Slate and Graywacke
97 - 187	Ferruginous Slate
187 - 210	Jasper
210 - 214	2nd Class Ore
214 - 219	1st Class Ore
219 - 325	1st Class Hi-Sulphur Ore
325 - 355	Jasper

NO.	COURSE	INCLINATION	LOCATION	COLLAR ELEV.	DATE STARTED	DATE FINISHED
16	Due South	+19°20'	S.1254.83 & 7784.78W.	-707.28	Oct. 3	Dec. 5

0 - 170	1st Class Ore
170 - 202	Lean Ore
202 - 240	Jasper
240 - 245	Lean Ore
245 - 277	1st Class Ore
277 - 282	Lean Ore
282 - 310	1st Class Ore
310 - 311	Jasper
311 - 312	Lean Ore
312 - 317	2nd Class Ore
317 - 319	Dike
319 - 349	1st Class Ore
349 - 350	Jasper
350 - 375	1st Class Hi-Sulphur Ore

NO.	COURSE	INCLINATION	LOCATION	COLLAR ELEV.	DATE STARTED	DATE FINISHED
18	S 1°00' E.	+44°30'	S.1140.63 & 7906.72W.	-611.6	Nov. 29	Dec. 28

0 - 23	1st Class Hi-Sulphur Ore
23 - 29	Dike
29 - 145	Jasper

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EXPLORATION AND FUTURE EXPLORATION: (CONT'D)

The exploration during both the initial phase and the second phase of the operation was not carried out without difficulty. This difficulty can be attributed to the excessive amount of water that was encountered whenever a drill hole or an exploration raise approached the vicinity of the hanging jasper. Needless to say, this water is the source of much concern to the operating personnel as it will present many difficulties from a production viewpoint as well as from an exploration angle. The possibilities as to the source of this water are as follows:

(1) The area concerned is a huge reservoir without any substantial recharge and that it will drain in time.

(2) That the area is being recharged along faults and fractures from the water which has accumulated in the old Jackson Mine pits and the associated underground workings.

(3) That the area is being recharged directly from the ground water drainage valley which exists almost directly above our exploration on the 6th Level.

Indications from recorded readings of water drainage from drill holes and underground openings seem to support the first theory as in general the total discharge has lowered even with the advent of additional openings into the water bearing formation.

The disappointing extent of the known ore bodies at the end of 1949 had been reversed by the end of 1950. At this time, it was apparent that the reserves above, adjacent to, and below 6th Level, were considerably more than was at first anticipated. The need for further exploration to determine the structure of the upper and lower reaches of the ore bodies is recognized and exploration plans are proceeding with these facts in mind.

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ANALYSIS

Average Mine Analysis on Output

Grade	Tons	Iron	Phos.	Silica	Sulphur
Mather Special	48,118	58.24	.110	5.76	.717

The ore produced during 1950 was all obtained from the high sulphur areas north of #22 Dike. The product for 1951 will have a lower sulphur content due to the beginning of mining south of #22 Dike, which is in the Standard ore area. By mixing the ore from the north side of the dike with the ore from the south side into a mine run grade, the average sulphur analysis of the product for 1951 will be in the neighborhood of 0.400%.

The iron content of the product for the year was low due to the large amount of exploration by means of small drifts and raises in the ore body and along the contacts to locate the outlines of the ore. As the ore body south of #22 Dike comes into production, the average iron content of the mine product will increase. Exploration has proven that the Standard ore south of #22 Dike is high in iron.

Complete Analysis of Ore in Stock (Dried)

Grade	Tons	Iron	Phos.	Sil.	Mang.	Alum.	Lime	Mag.	Sulph.	Loss	Moist.
Mather Special	11,674	56.21	.106	7.67	.43	2.58	1.69	.72	1.209	2.91	11.07

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COST OF OPERATING

Comparative Mining Costs

The cost per ton of ore produced in 1950 was exceedingly high because all of the ore produced was development ore obtained largely from small exploration drifts and raises. No actual mining was started in 1950.

	1950	1949
Product	48,118	
Underground Costs	6.010	
Surface Costs	.484	
General Mine Expense	2.807	
Cost of Production	9.301	
Depreciation - Plant & Equipment	.148	
Movable Equipment	.120	
Amortization of Development after 12/31/44	.164	
Amortization of Development Pre-Production	.023	
Loading & Shipping	.155	
Total Cost at Mine	9.911	
Budget Estimate	-	
Average Daily Product	341	

Not on Operating Cost Sheet

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COST OF OPERATING (Continued)

Detailed Cost Comparison

	1950		1949	
	Amount	Per Ton	Amount	Per Ton
Exploring in Mine	7,586.39	.158		
Development in Rock	8,074.35	.168		
Development in Ore	201,946.48	4.197		
Timbering	36,831.96	.765		
Tramming	22,938.52	.477		
Pumping	2,187.01	.045		
Compressors and Air Pipes	4,189.60	.087		
Underground Superintendence	4,746.76	.099		
Maint: Tramming Equipment	672.66	.014		
Total Underground Costs	289,173.73	6.010		
Hoisting	5,961.93	.124		
Stocking Ore	1,648.82	.034		
Dry House	1,695.09	.035		
General Surface Expense	13,911.06	.289		
Maint: Hoisting Equipment	70.73	.002		
Total Surface Costs	23,287.63	.484		
Geological	3,318.48	.069		
Mining Engineering	11,733.51	.244		
Mechanical & Electrical Engineering	4,948.53	.103		
Analysis & Grading	1,705.87	.035		
Safety Department	2,494.69	.052		
Telephones & Safety Devices	966.84	.020		
Local & General Welfare	2,094.54	.044		
Special Expense, Pensions & Allowances	3,746.74	.078		
Ishpeming Office	13,846.19	.288		
Mine Office	24,357.90	.506		
Insurance	10,833.12	.225		
Personal Injury	20,045.01	.417		
Social Security Taxes	12,137.33	.252		
Employees Vacation Pay	17,760.00	.369		
Additional Wage	5,089.01	.105		
Total General Mine Expenses	135,077.76	2.807		
COST OF PRODUCTION	447,539.12	9.301		

Not on Operating Cost Sheet

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TAXES

Valuation and taxes assessed Mather "B" for the year 1950 are given below and compared with 1949. These taxes were taken up by Mather Mine "A" Shaft.

	VALUATION	1950 RATE	TAXES
Jackson Sec. 1, 47-27			
Real	$980,000		$46,501.00
Personal	215,000		10,201.75
Total	$1,195,000	$47.4500	$56,702.75
Coll. Fee 1%		.4745	567.03
Total Mather "B" (Sec. 1, City of Negaunee)	$1,195,000	$47.9245	$57,269.78

	VALUATION	1949 RATE	TAXES
Jackson Sec. 1, 47-27			
Real	$605,000		$31,680.40
Personal	150,000		7,854.65
Total	$755,000	$52.3643	$39,535.05
Coll. Fee 1%		.5236	395.35
Total Mather "B" (Sec. 1, City of Negaunee)	$755,000	$52.8879	$39,930.40

ACCIDENTS AND PERSONAL INJURY:

There were 10 compensable injuries during the year, which occasioned lost time of 1,184 days, and one fatality which added 6,000 statistical days, for a total of 7,184. There were also 12 non-compensable injuries which added 34 days lost time, for a grand total of 7,218. This resulted in a frequency rate of 49.14 injuries per million man hours, and a severity rate of 15.423 days lost per thousand man hours, compared with Company averages for underground mines of 52.89 and 4.942. The total hours worked were 468,073 as compared with 235,619-3/4 last year. The following is a brief summary of the compensable accidents.

DATE	NAME	NATURE OF INJURY
3/24/50	John Peltonen	Dislocation of 2nd joint on 4th finger, right hand.
7/24/50	Sam Carilli	Swelling and bruise on left leg above the knee.
8/3/50	Ralph Nadeau, Jr.	Abrasion of left leg above the knee.
8/10/50	Frank Guizzetti	Cut on upper left arm.

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ACCIDENTS AND PERSONAL INJURY: (CONT'D)

DATE	NAME	NATURE OF INJURY
9/15/50	Sam Carilli	Bruised right leg below the knee and upper part of leg.
10/30/50	Howard Varvil	Tip of middle finger on right hand cut off (flesh).
11/17/50	Arthur Moore	Cuts on forehead and top of head and swelling of right forearm.
12/5/50	Matt Laitinen	Fractured left thumb.
12/11/50	Wilho Priuska	2nd and 3rd finger, left hand, cut off at first joint.
12/12/50	Wallace Hewitt	Fatally injured.
12/16/50	Kenneth Mattson	Femur bone broken in right leg, cuts on left side of face and behind right knee, and bruise on right shoulder.

NATIONALITY OF EMPLOYEES:

	AMERICAN BORN	FOREIGN BORN	TOTAL
Finnish	126	10	136
English	45	7	52
Italian	44	-	44
Swedish	38	-	38
French	44	1	45
Irish	8	-	8
German	7	-	7
Belgian	3	-	3
Slovenian	1	-	1
Norwegian	7	-	7
Manx	1	-	1
Bohemian	1	-	1
Danish	2	-	2
Polish	3	-	3
	330	18	348
	94.8%	5.2%	100%

NEGAUNEE MINE
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1. GENERAL:

The Negaunee Mine was idle until August 1950. The only operation carried on was pumping requiring a crew of 6 pumpmen and 3 hoisting engineers.

Plans for sinking the present shaft to a depth of 3500' and repair of the surface plant to replace the Athens Mine which is affected by subsidence were underway during the year. In order to go to greater depths it was necessary to obtain mine hoists with greater capacities. A second hand hoist was located in Martell, California and was purchased from the Cate Equipment Company. It was dismantled and shipped here early in the year with the major parts going to Lake Shore Engineering Company for repair. The drums were rescored for 1 3/8" ropes and extensive repairs were made on the clutches and spiders. This hoist will be permanently installed as a skip hoist and will be used first for the sinking operations. The old Republic Mine hoist which was used to sink Mather "B" Shaft will be moved to the Negaunee Shaft and installed as a permanent cage hoist.

During December transactions were completed whereby the Cleveland Cliffs Iron Company purchased Bethlehem Steel Company's interest in the Negaunee Mine. All plant and equipment was evaluated and the transfer was made on the basis of this estimate. All supplies were purchased in November by the Cleveland Cliffs Iron Company.

2. LABOR AND WAGES:

Average Number Men Working:	1950	1949
Surface	11 1/2	34
Underground	6 3/4	75 1/2
Total	18 1/4	109 1/2
Average Wages Per Day:		
Surface	12.43	11.90
Underground	12.49	14.44
Total	12.46	13.18
Total Number of Days:		
Surface	3128	3773
Underground	1831	11414
Total	4959	14187
Amount For Labor:		
Surface	38,893.76	44,606.26
Underground	22,863.66	155,595.35
Total	61,757.42	200,201.61

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3. SURFACE:

To rehabilitate the Negaunee Mine surface plant for the deeper operations and longer life it is necessary to do considerable remodeling, repair and construction work.

In order to accommodate the larger hoists necessary for 3500' depth an addition to the engine house was necessary. The small east wing which housed the M.G. set was razed and the new addition was located to the east of the main section of the old engine house. The contract was awarded to MacDonald & Kaake, inc. of Marquette late in November and construction was started immediately. This addition will house the skip hoists, M.G. set and electrical equipment. Concurrently with the engine house work our surface crew constructed the forms for the machine foundations. The hoist foundation was poured on December 1, 1950 and late in December assembly of the Kennedy Mine hoist was started.

A new headframe will also be needed to replace the old one which has deteriorated over the years to the point where it is no longer sound. Late in the year the old headframe was stripped of equipment preparatory to taking it down. In December a new collar was poured on the shaft including foundation piers for the new headframe. The lower portions of the new headframe will be erected early in 1951 to be used for the shaft sinking operation.

The two boilers in the dry house were overhauled in October and are now in good condition. All other work on surface was general with normal maintenance of building and equipment.

4. UNDERGROUND:

a. Shaft:

A shaft repair crew was organized during the month of August to repair the old Negaunee Shaft. Considerable repair work was necessary to put it in first class condition for the future operations. The steel in the upper 950 feet was in bad condition and needed replacement. New steel was ordered for the skip compartments including the long divider and installation of this was started about the middle of October. One half of this section was completed by mid-November and the second shipment of steel failed to arrive as promised so it was necessary to postpone this work until early 1951. The crews continued work in the timber sections which comprise the lower 450 feet of the old shaft. Considerable work is necessary in this section including installation of new shaft guides. By the middle of October there was a total of 15 men on shaft repair, working 3 shifts per day.

b. Ventilation:

The ventilating plant and all airways were maintained by the Maas Mine during the year as they were the sole users of the ventilating plant.

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4. UNDERGROUND: (CONT'D)

c. Pumping:

The number of gallons pumped per minute in each month of the year for the past four years is indicated in the following statement:

Month	1950	1949	1948	1947
January	1090	776	787	659
February	1086	781	616	633
March	1063	771	764	631
April	1084	750	763	653
May	1201	781	775	710
June	1359	818	723	811
July	1407	776	790	818
August	1400	932	812	814
September	1323	1034	764	816
October	1162	1031	766	807
November	1165	1046	753	792
December	1210	1068	773	792
Total Average	1212	880	757	745

The following statement shows the average number of gallons pumped per minute for the past ten years:

Year	Gallons Per Minute
1950	1212
1949	880
1948	757
1947	745
1946	682
1945	681
1944	713
1943	770
1942	656
1941	645

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5. IDLE EXPENSE:

		1950 Amount
	UNDERGROUND COSTS:	
8	Ventilation	359.78
9	Pumping	64503.89
10	Compressors and Air Pipes	5190.73
12	Underground Superintendence	2869.95
13	Cave-in, or Fire in Mine	97.39
14	Maint: Comp. & Power Drills	65.73
17	Pumping Machinery	2582.78
	Total Underground Costs	75670.25
	SURFACE COSTS:	
18	Hoisting	15943.74
21	Dry House	7587.34
22	General Surface Expense	16442.38
23	Maint: Hoisting Equipment	2134.59
24	Shaft	39.73
27	Mine Buildings	416.17
	Total Surface Costs:	42563.95
	GENERAL MINE EXPENSE:	
28	Geological	87.14
29	Mine Engineering	360.59
30	Mech. & Elec. Engineering	2131.47
31	Analysis & Grading	225.77
32	Safety Department	411.58
33	Tel. & Safety Devices	825.21
34	Local & General Welfare	240.46
35	Spec. Exp., Pensions, All.	505.63
36	Ishpeming Office	1521.08
37	Mine Office	9297.76
38	Insurance	3323.88
39	Personal Injury	12679.72
40	Soc. Sec. Taxes	1321.50
41	Employees Vacation Pay	9284.54
43	Additional Wage Adjustment	764.98
44	Flooding Lands Rental	125.00
	Total General Mine Expenses	43106.31
	COST OF PRODUCTION	161340.51

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6. TAXES:

Following is a comparative statement of taxes for 1950 and 1949:

Description:	1950 Valuation	1950 Taxes	1949 Valuation	1949 Taxes
CITY OF NEGAUNEE				
Negaunee Mine, including stkple, Supplies, & Equip. as placed by State Tax. Comm.				
Real Estate	180,000	8,541.00	200,000	10,472.86
Personal Property	20,000	949.00	290,000	15,185.65
Collection Fee		94.90		256.59
Total Negaunee Mine	200,000	9,584.90	490,000	25,915.10
Mather B Shaft, including Stkple, Supplies, & Equip. as placed by State Tax. Comm.				
Real Estate	980,000	46,966.01	605,000	31,997.20
Personal Property	215,000	10,303.77	150,000	7,933.20
Total Mather B	1,195,000	57,269.78	755,000	39,930.40
Operating Neg. & Jackson Rented Bldgs.	71,740	3,438.16	63,000	3,331.91
TOTAL CITY OF NEGAUNEE	1,466,740	70,292.84	1,308,000	69,177.41
CITY OF ISHPEMING:				
Mather A Mine, including stckple, Supplies & Equip. as placed by State Tax. Comm.				
Real Estate	4,350,000	164,570.94	2,640,000	98,475.70
Personal Property	950,000	35,940.78	1,660,000	61,920.32
Pipe Line "Cloverdale Tract"	650	24.59	650	24.25
TOTAL CITY OF ISHPEMING	5,300,650	200,536.31	4,300,650	160,420.27
TOTAL NEGAUNEE MINE COMPANY	6,767,390	270,829.15	5,608,650	229,597.68
DISTRIBUTION BY ACCOUNTS				
Operating Negaunee Mine	200,000	9,584.90	490,000	25,915.10
Operating Mather Mine				
Mather Mine "A"	5,300,650	200,536.31	4,300,650	160,420.27
Mather Mine "B"	1,195,000	57,269.78	755,000	39,930.40
Total Operating Mather Mines	6,495,650	257,806.09	5,055,650	200,350.67
Operating Negaunee Rented Buildings	71,740	3,438.16	63,000	3,331.91
TOTAL NEGAUNEE MINE COMPANY	6,767,390	270,829.15	5,608,650	229,597.68

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6. TAXES: (CONT'D)

		1950		1949	
		Valuation	Taxes	Valuation	Taxes
TOTAL NEGAUNEE RENTED BLDGS:					
No. 1	Jackson Office, Lot 30 W. Iron St.	2,400	113.88	2,400	125.67
2	Penhale House W½ " 13 Block 4	2,900	137.61	2,900	151.86
3	Uren " " 3 " 7	1,950	92.53	1,950	102.11
4	Abbott " " 12 " 6	1,600	75.92	1,600	83.78
5	Toms " W½ " 36 " 5	1,350	64.06	1,350	70.69
6	Portale " " 2 " 9	4,100	194.55	4,100	214.69
7	Bowden " " 21 " 8	2,600	123.37	2,600	136.15
8	Letcher " " 16 " 5	1,600	75.92	1,600	83.78
9	Senobe " " 9 " 7	2,050	97.27	2,050	107.35
10	Leaf " " 7 " 10	1,600	75.92	1,600	83.78
11	Harris " " 4 " 8	2,400	113.88	2,400	235.67
12	Dyer " " 1 " 5	2,000	94.90	2,000	104.73
13	Peterson " Parcel 39	1,400	66.43	1,400	73.31
14	Stark " " 1 Block 15	1,850	87.78	1,850	96.87
15	Kutchie " " 14 " 7	2,250	106.76	2,250	117.82
16	Jandron " Parcel A-17, 2	3,450	163.70	3,450	180.66
17	Cory " " 7 Block 6	2,300	109.14	2,300	120.44
18	Paavala " " 9 & 10 " 8	1,350	64.06	1,350	70.69
19	Crowe " Parcel 79	1,300	61.69	1,300	68.07
20, 21, 22	Hall Houses " 12 Block 2	6,500	308.43	6,500	340.37
23	Kronberg " " 8 " 2	3,400	161.33	3,400	178.04
24	O'Leary Coyle " " 1 " 6	1,050	49.82	1,050	54.98
25	Cory " " 17 " 2D	3,150	149.47	3,150	164.95
26	Kronberg " " 17 " 2L	1,400	66.43	1,400	73.31
27	Kronberg " " 17 " 2M	1,400	66.43	1,400	73.31
28	Ellis " " 4 " 13	2,100	99.65	2,100	109.96
29	Kivisto " " 9 " 3	1,650	78.29	1,650	86.40
30	Denofre House, Part Lot 1, Block 9	1,250	59.32	1,250	65.46
32	Saastamoinen House N 50 Lot 3 " 6 (Jackson Iron Co Add.	3,700	175.57		
112	Garceau House, Lot 6½ W. Co. Road	1,300	61.69		
113	O'Connor " " 29, Cornishtown & N Jackson	400	18.98		
127	Warmee " " 26 Bl. 4, Am. Jack. Iron Cols Add.	1,550	73.55		
33	Anderson " Parcel F L. 17 Bl. 2	190	9.02		
34	Tonkin " Lot 25, Block 7	350	16.61		
37	CCI First Addition Parcel 7 Bl. 2	1,900	90.16	1,900	99.49
	Total Negaunee Rented Bldgs.	71,740	3,404.12	64,250	3,364.39
	Collection Fee		34.04		33.63
	TOTAL	71,740	3,438.16	64,250	3,398.02

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7. ACCIDENTS AND PERSONAL INJURY:

The accident record for Nagaunee Mine was excellent during 1950. The total hours of labor amount to 62,915¾ and there were no lost time accidents.

8. NEW CONSTRUCTION AND PROPOSED NEW CONSTRUCTION:

It was mentioned earlier in this report that the Negaunee Mine surface plant must be rehabilitated. Some of this work such as the engine house addition and razing of the old headframe preparatory to erecting a new one was started late in 1950. In 1951 the engine house addition will be completed.

Final drawings for the headframe, screening and crushing plant will proceed with erection scheduled for early 1952. The lower section of the main columns will be erected early in 1951 and serve temporarily for sinking.

An addition to the dry house to improve the surface dry and provide office and change room for the mining captain, foremen, underground bosses, and surface bosses is planned for 1951. This addition will connect to the main dry extending south of the old surface dry.

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1. GENERAL

The production was 205,619 tons and this is the largest annual tonnage realized since mining was started in the East Deposit. Shipments from the mine were considerably larger and totalled 257,838 tons. An operating schedule of two eight-hour shifts per day, four days per week was in effect until May 22nd when the schedule was increased to five days per week and on August 21st the schedule was again increased to six days per week. The size of the labor force has remained practically the same.

A drilling program was conducted throughout the year exploring the extent of ore below the 6th Level and also for a possible continuation of the orebody south along the strike. A continuation of the narrow deposit to the 8th Level elevation was proven indicating sufficient reserves to warrant development of the 8th Level. The proven tonnage, however, is relatively small. Exploration and development to the south along the strike was very disappointing when it was proven the ore pinches out completely near the south end of the level.

Late in the year the preliminary work in connection with the development of the 8th Level was started. A new skippit was constructed at the bottom of the shaft and, before drifting to the orebody is started, new loading pockets and a storage trench will be constructed. Work will be rushed on this project in the coming year to bring the level into production before the reserves above the 6th Level are depleted.

A wage increase of 12½¢ per hour was granted hourly rate employees effective December 1st and a deferred adjustment averaging 8½¢ per hour was also negotiated with the Union. There were six regular holidays observed during the year and a one-week vacation was allowed employees during the week of August 14th. There was no production during this period.

2. PRODUCTION, SHIPMENTS AND INVENTORIES

a. Production by Grades

	1950	1949
Spies	205,619	150,022

There was no high-sulphur grade produced and in the coming year production again will be on the basis of one grade.

b. Shipments

The following table shows the shipments for the past five years:

Year	Spies	Spies Hi-Sulphur	Virgil
1950	257,838	-	-
1949	88,453	-	-
1948	183,574	-	-
1947	151,670	-	-
1946	45,120	2,394	3,987

There was a large increase in the shipments and most of the tonnage was loaded from the stockpile. The bulk of the shipment was again mixed with Cliffs Group cargoes.

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2. PRODUCTION, SHIPMENTS AND INVENTORIES (Cont'd)

c. Stockpile Inventories

Grade	Tons
Spies	47,524

The large shipment from stockpile reduced the inventory considerably compared with the previous year.

d. Division of Product by Levels

4th Level	877
6th Level	204,742
Total	205,619

e. Production by Months

Month	Days	Spies Grade Tons	Total Rock Tons	Tons Per Man Per Day
January	18	17,115	636	7.44
February	16	13,612	956	6.49
March	18	13,293	836	5.91
April	16	12,536	444	6.38
May	20	16,840	132	7.90
June	22	19,526	8	9.30
July	20	17,024	92	8.93
August	15½	12,979	-	5.83
September	23	17,063	64	6.87
October	25¼	24,323	620	9.23
November	25	21,568	688	8.29
December	22	19,740	404	7.45
	240¾	205,619	4,880	7.52

f. Ore Statement

	Spies Grade	Total	Total Last Year
On Hand January 1, 1950	99,743	99,743	38,174
Output for Year	205,619	205,619	150,022
Total	305,362	305,362	188,196
Shipments	257,838	257,838	88,453
Balance on Hand	47,524	47,524	99,743
Increase in Output		55,597	
Increase in Shipments		169,385	
Decrease in Ore on Hand		52,219	

The operating schedule for the past five years follows:

1950 - Hoisting and mining operations two eight-hour shifts per day, four days per week, Jan. 1 to May 15. Schedule increased to five days per week effective May 15, and later to six days per week effective August 21.

1949 - Hoisting and mining operations two eight-hour shifts per day, six days per week Jan. 1 to June 27. Schedule decreased to five days per week effective June 27, and later to four days per week effective Sept. 1.

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2. PRODUCTION, SHIPMENTS AND INVENTORIES (Cont'd)

f. Ore Statement (Cont'd)

1948 - Hoisting and mining operations two eight-hour shifts per day, six days per week.

1947 - Hoisting and mining operations two eight-hour shifts per day, six days per week.

1946 - Two eight-hour shifts per day mining and one eight-hour shift per day hoisting, six days per week Jan. 1 to Aug. 8. Effective Aug. 8 hoisting and mining operations two eight-hour shifts per day, six days per week.

g. Delays

There were a number of minor delays to operations that were of no serious consequence but the delays listed below were more serious in nature and caused some loss in production.

On the afternoon shift August 28th several bad leaks broke out in the pump discharge line in the shaft and no pumping could be done while 300' of new pipe was installed. A dam was placed in the 6th Level haulage drift for storage of water while the repair work was done. A delay of six days to hoisting occurred before repairs were completed and the accumulated water on the 6th Level was removed. The discharge line was damaged by corrosion caused by acid water. Estimated loss in production was 4,800 tons.

On October 30th a twelve-hour delay to hoisting occurred when the main pump on the 6th Level went out of order. The dam was again placed in the 6th Level haulage drift for storing water while repairs were made. Severe corrosion of the working parts of the pump caused by acid water was responsible for the break-down. Estimated loss in production was 600 tons.

3. ANALYSIS

a. Average Mine Analysis on Output

Grade	Tons	Iron	Phos.	Sil.	Sul.
Spies	205,619	56.82	.239	7.90	.085

b. Analysis of Ore in Stock

Grade	Iron	Phos.	Sil.	Mang.	Alum.	Lime	Mag.	Sul.	Loss	Moist.
Spies Dried	57.31	.246	6.91	.23	2.45	.09	.31	.091	7.02	
Spies Nat'l.	51.79	.222	6.24	.21	2.21	.08	.28	.082	6.34	9.64

c. Analysis of Shipments

Grade	Iron	Phos.	Sil.	Mang.	Alum.	Lime	Mag.	Sul.	Loss	Moist.
Spies	57.20	.260	7.30	.30	2.17	.15	.42	.076	7.24	9.64

d. High Sulphur Ore

There was no high sulphur grade produced.

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4. ESTIMATE OF ORE RESERVES

a. Developed Ore

The following is an estimate of the reserves made as of December 31, 1950 using a factor of 12 cubic feet per ton:

	Spies	Total
Between 4th and 6th Levels	344,937	344,937
Between 6th and 8th Levels	285,292	285,292
Total Gross as of Sept. 1, 1950	630,229	630,229
Less Sept. - Dec. 31, 1950 Production	82,694	82,694
Total Gross as of Dec. 31, 1950	547,535	547,535
Less 10% for Mining and Rock	61,317	61,317
Net Total as of Dec. 31, 1950	486,218	486,218

The reserves are slightly larger than a year ago due to including the ore that was proven by drilling between the 6th and 8th Levels. The reserves include only ore that is available for mining and excluded is a substantial tonnage that must be left in place as pillars. The persistent narrow width of the deposit continues to be very disappointing from the standpoint of both reserves and mining. Another disappointing factor is that drilling and development proved the orebody pinches out completely near the south end of the 6th Level where the possibility of proving additional reserves had been considered favorable.

A comparison of the reserves with a year ago shows a net loss of approximately 10,000 tons of mineable ore despite the new ore proven below the 6th Level. This is due to outlining the ore limits more completely by the mining and development above the 6th Level.

b. Estimated Analysis of Ore Reserves

Grade	Iron	Phos.	Sil.	Mang.	Alum.	Lime	Mag.	Sul.	Loss	Moist.
Spies Dried	57.00	.250	7.50	.23	2.67	.24	.21	.080	7.56	
Spies Nat'l.	51.30	.225	6.75	.21	2.40	.22	.19	.072	6.80	10.00

5. LABOR AND WAGES

a. General

Employee membership in the Union has remained at 100%, the same as in the past several years. The grievance committee has been quite active in submitting complaints and on occasions have demonstrated a very unreasonable attitude. A total of six formal grievances were submitted, five of which were dropped by the Union after going through various steps of the grievance procedure. A grievance in connection with the suspension of four employees was brought to arbitration and the arbiter ruled in favor of the Union.

There were 113 employees on the payroll at the close of the year compared with 112 a year ago. The turn-over was quite large - there were fifteen men laid off in May when the force was reduced, three quit and one was discharged. A total of ten men were hired and there were ten rehired resulting in a net increase of one.

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5. LABOR AND WAGES (Cont'd)

b. Statement of Wages and Product

	1950	1949
Product	205,619	150,022
Number of Shifts and Hours	2-8	2-8
Average Number of Men Working		
Surface	28¼	31
Underground	88½	85½
Total	116¾	116½
Average Wages Per Day		
Surface	11.63	11.51
Underground	13.84	13.44
Total	13.15	12.92
Average Per Month of 22 Days		
Surface	255.86	253.22
Underground	304.48	295.68
Total	289.30	284.24
Average Per Month of 24 Days		
Surface	279.12	276.24
Underground	332.16	322.56
Total	315.60	310.08
Product Per Man Per Day		
Surface	24.26	20.92
Underground	10.90	7.59
Total	7.52	5.57
Labor Cost Per Ton		
Surface	.481	.550
Underground	1.270	1.770
Total	1.751	2.320
Average Product Breaking and Tramming	47.31	31.02
Average Wages Contract Miners	16.45	15.22
Total Number of Days		
Surface	8,474¾	7,171
Underground	18,871	19,759½
Total	27,345¾	26,930½
Amount of Labor		
Surface	98,859.17	82,550.19
Underground	261,196.90	265,506.42
Total	360,056.07	348,056.61

Proportion of Surface to Underground Men

1950	1 to 3.13
1949	1 to 2.76
1948	1 to 2.48
1947	1 to 2.35
1946	1 to 2.01

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6. SURFACE

a. Buildings

A 22' x 22' wood frame addition was constructed to the east end of the office and warehouse building. Additional warehouse space which was badly needed was provided by the addition and also quarters for the electrician, mechanic foreman and surface foreman. New sills were also installed under the old office building and the interior painted. A septic tank was also installed for treating sewage from this building. The cement stucco on the exterior of the office building has deteriorated badly and in the coming year this will be replaced with an insulating sheathing to put the building into good condition.

The walls and ceiling in various rooms in the dryhouse were painted and tile was placed on the walls in the shower room. In the underground clothes room exhaust fans were installed in the east and west walls to improve the ventilation.

b. Stockpiles

Shipments from the stockpile were made from the pile northwest of the shaft, although the pile was not all loaded out at the close of the season. The trestle in this area was not dismantled and when the shipping season ended, several broken legs were replaced and some new bracing installed. The bull-dozer was employed spreading the pile during the stocking season and also cleaning up the scattered ore at the end of the season.

There were ten bents of trestle erected due north of the shaft and a small tonnage was stocked in this area when the area to the northwest of the shaft was filled to capacity.

c. Roads

The main road into the mine was graded and a blacktop surface applied to put it into good condition. After heavy rains and in the spring break-up period this road was in bad condition but upon surfacing and grading for proper drainage it was considerably improved.

Before the road into the surface plant was repaired, about 60' of concrete culvert pipe was installed replacing an old wood launder that crossed the road between the office and dryhouse.

7. UNDERGROUND

a. Shaft Sinking

There was no shaft sinking done in 1950.

b. Development

A large amount of stope development was driven and it was confined mostly to areas between the 4th and 6th Levels.

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7. UNDERGROUND (Cont'd)

b. Development (Cont'd)

Above the 4th Level some development was driven for a scram stope in a small pillar under old No. 2 Stope. In this same area some rock drifting was done to outline the extent of the large cave that occurred along the footwall side in No. 6 Stope. Some of the water draining through the cave was intercepted at this elevation. Lime was also introduced into the cave at this point with the hope of reducing the danger of fire breaking out in the black slates. At the south end of the 4th Level some rock drift was advanced to connect with the development for No. 11 Stope for ventilation.

When mining in No. 6 Stope was interrupted by caving on a large scale the balance of the ore in this area was developed for mining in two lifts reducing the stope height to approximately half the distance between the 4th and 6th Levels. Development was completed for No. 8 Stope near the center of the orebody for both the top and lower halves and at the north end a mill was advanced in a pillar to connect with the 4th Level for ventilation. Only a small amount of development was driven for No. 9 Stope, the major part of this work being completed in the previous year. After caving occurred in the stope, a pillar was left as a barrier and additional development was driven at the north end to enable mining to continue to the stope limits. At the south end of the deposit development was driven in the upper half for No. 11 Stope and work was still underway driving the intermediate subs at the close of the year.

Development for No. 7 and No. 10 Shrinkage Stopes has comprised driving short drift connections to the stope in the pillars at each end for drill stations as mining progressed to higher elevations. The mill raises in the pillars at each end of the stope were also driven to the upper limit of mining and at the north end of No. 10 Stope the mill was continued to connect with the 4th Level for ventilation and travelling purposes.

On the 6th Level 285' of drift was advanced in slate to the southwest to complete the level extension from which some drilling was done. Drill station cut-outs were excavated at the south end and also midway on the northwest side of the drift. On the north side of the haulage drift on the west side of the orebody another drill station was excavated in slate from which two holes were drilled to explore the north end of the deposit below the level.

Before drifting can be started to the orebody on the 8th Level a new skippit, loading pockets and a storage trench will be constructed. At the close of the year the major part of the skippit construction was completed and a large amount of clean-up work was done on the 8th Level plat preliminary to excavating the pockets. A measuring pocket and storage trench system will be constructed on this level similarly as on the 4th and 6th Levels.

The following tables show the development footage:

	Drifting		Raising		
	Ore	Rock	Ore	Rock	Total
Small Size	3588'	306'	2051'	96'	6041'
Large Size	219'	585'	203'	12'	1019'
Total	3807'	891'	2254'	108'	7060'

Development Footage Under E & A cc-390

Small Rock Drift	38'
Small Rock Raise	60'

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7. UNDERGROUND (Cont'd)

c. Stoping

The production was obtained from stopes and ore development above the 6th Level. The main source of production was from three sub level stopes and a smaller tonnage was realized from two shrinkage stopes.

Mining was underway in No. 6 Stope at the north end of the orebody throughout the year and operations in this area were nearing completion late in December. Caving from the footwall side on a large scale filled the east end of the stope near the Bates boundary and shortly after a rapid rise in the temperature of the water draining through this area occurred making it necessary to take precautions against a fire breaking out in the black slates. Brattices were constructed in many of the connections to the stope as mining neared completion and eventually this area will be completely sealed from the rest of the workings.

Near the center of the orebody No. 8 Stope was developed for production, and mining in the upper half was nearly completed. The bottom half of this area was being brought into production at the close of the year. Mining was underway all year in the upper half of No. 9 Stope and operations were nearing completion as the north face approached the stope limits. The bottom half of this area will be developed for stoping despite the fact that the orebody is confined to very narrow limits and mostly lean ore and jasper has been encountered in the development.

Mining was continued in No. 7 Shrinkage Stope until the middle of the year when work was temporarily abandoned in favor of concentrating operations in the sub level stopes. Approximately 50% of the block of ore being mined in this area remains to be recovered. Mining was continued in No. 10 Shrinkage Stope at the south end of the level throughout the year and approximately 80% of the pillar has been mined. When mining reaches the upper limits of the stope approximately 70,000 tons of accumulated broken ore can be rapidly recovered. Various drilling patterns were experimented with during the year and also the amount of burden in each lift. This, together with the use of milli-second delays in blasting, has resulted in improving fragmentation and control of the shrinkage method of mining.

d. Timbering

Only a small amount of timber was used but the cost was slightly higher than last year due to price increases in timber. Several of the transfer drifts required timbering and repairs and it was confined mostly at the mill raises that lead to the stopes. Steel sets are also used at these points and have proved very satisfactory. Steel is also being employed to a larger extent in the construction of loading slides and indicates much longer life and less repairs than timber construction.

Very little timber support was required in the development headings. A short section of the 6th Level extension at the south end required timbering and in the stope development a small amount of timbering was done in sections where fractured ground was encountered.

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7. UNDERGROUND (Cont'd)

d. Timbering (Cont'd)

The following is the comparative timber statement:

Kind	Lineal Feet	Avg. Price Per Foot	Amount 1950	Amount 1949
6" to 8" Cribbing				124.50
8" to 10" Stull Timber	1741	.1500	261.15	32.60
10" to 12" Stull Timber	270	.2114	57.10	69.70
Total Timber	2011	.1582	318.25	226.80
Lagging	1195	.1255	150.01	34.85
Poles	3143	.2488	781.99	484.49
Total Lagging and Poles			932.00	519.34
Product			205,619	150,022
Cost Per Ton for Timber			.0015	.0015
Cost Per Ton for Lagging			.0007	.0002
Cost Per Ton for Poles			.0038	.0032
Cost Per Ton for Timber, Lagging and Poles			.0060	.0049
Cost of Timber, Lagging and Poles			1250.25	746.14

e. Explosives, Drilling and Blasting

There was less powder consumed than last year due to the smaller development program. The cost per ton was also lower despite substantial increases in the price of explosives supplies. The more favorable explosives cost is due to the relatively large tonnage recovered from the shrinkage stopes and which was mined in the previous year and allowed to accumulate. Gelex No. 1 powder has continued to be used in the development and sub level stoping methods and Gelex No. 2 and a special Gelatin is used in large size cartridges in the shrinkage method of mining.

Electric blasting is being continued in all the work and the advantages this offers from a safety and ventilation standpoint warrants its continued use in preference to the conventional fuse blasting. Milli-second electric delay caps are used in blasting the heavy charges in the shrinkage stope method and favorable results were realized from the standpoint of fragmentation and less concussion.

Tungsten carbide insert bits are used in the mining and development and the relatively hard ground encountered in all the work justifies continued use of this bit. An improvement in fabricating the drill rod threads and the method of reconditioning the bits has resulted in lowering the bit cost per foot of hole.

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7. UNDERGROUND (Cont'd)

e. Explosives, Drilling and Blasting (Cont'd)

The following is the comparative explosives statement:

Ore Development and Stoping	Quantity	Average Price	Amount 1950	Amount 1949
No. 1 Gelex	84,800	.1562 Lb.	13246.32	16168.27
No. 2 Gelex	11,717	.1559 Lb.	1826.85	2920.27
Hi-Vel 5 x 5	2,000	.1700 Lb.	340.00	697.00
Duplex 40% Special Gel.	8,400	.1801 Lb.	1512.50	
Electric Caps - Regular Delays	31,116	19.757 C	6147.63	7901.48
Electric Caps - Milli-Second	5,175	24.482 C	1266.92	152.08
Connecting Wire - Lbs.	1,968	.801 Lb.	1576.00	1560.00
Fuse - Feet	7,850	8.687 M	68.19	90.47
No. 6 Blasting Caps	1,200	1.637 C	19.64	33.37
Hot Wire Lighters	650	.900 C	5.85	7.21
Squibbs	25	8.640 C	2.16	
Powder Bags	82	2.053 Ea.	168.37	157.35
Primacord	13,000	32.000 M	416.00	400.00
Total Expense			26596.43	30087.50
Production - Tons			205,619	150,022
Lbs. Powder Per Ton of Ore			.5200	.8586
Cost Per Ton for Powder			.0750	.1319
Cost Per Ton for All Explosives			.1293	.2005
Rock Development				
No. 1 Gelex	8,191	.1836 Lb.	1503.70	
No. 2 Gelex	143	.1525 Lb.	21.81	
Electric Caps - Regular Delays	4,356	19.273 C	839.54	
Connecting Wire - Lbs.	156	.800 Lb.	124.80	
Fuse - Feet	2,688	8.683 M	23.34	
No. 6 Blasting Caps	100	1.470 C	1.47	
Hot Wire Lighters	50	.900 C	.45	
Powder Bags	6	2.050 Ea.	12.30	
Total Expense			2527.41	
E & A Development				
No. 1 Gelex	1,500	.1625 Lb.	243.75	
Fuse - Feet	500	9.180 M	4.59	
No. 6 Blasting Caps	60	1.466 C	.88	
Powder Bags	1		2.05	
Total Expense			251.27	
Total Expense All Explosives			29375.11	30087.50

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7. UNDERGROUND (Cont'd)

f. Ventilation

Good ventilation has been maintained in the mine by the Aerodyne fan at the collar of the ventilation shaft. The fan is delivering a volume of approximately 18,000 C.F.M. which has been adequate to ventilate the various working places. Additional connections were driven for ventilation between the 6th and 4th Levels, one near the center of the orebody and two at the south end, and these have made it possible to control the volume of air required in the various areas. An auxiliary fan with a 14" metal pipe extending to the breast was used to ventilate the heading when driving the extension at the south end of the 6th Level and a similar system was being installed on the 8th Level late in the year to provide ventilation for the rock development. In this case the exhaust air will be discharged into the skip compartments of the shaft.

In freezing weather the direction of the ventilating current is reversed to exhaust up the hoisting shaft on weekends and reduce the formation of ice. This method supplements the oil-burning heater that is operated during freezing weather to preheat the intake air.

8. COST OF OPERATING

a. Comparative Mining Costs

	1950	1949
Product	205,619	150,022
Underground Costs	2.186	2.695
Surface Costs	.356	.440
General Mine Expense	.433	.534
Cost of Production	2.975	3.669
Depreciation and Depletion	.912	1.064
Taxes	.090	.099
Loading and Shipping	.127	.059
Total Cost at Mine	4.104	4.891
Budget Estimated Cost at Mine	4.037	4.614
Number of Operating Days	240¾	237
Average Daily Product	897	633
Number of Shifts and Hours	2-8	2-8

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8. COST OF OPERATING (Cont'd)

b. Detailed Cost Comparison

		1950		1949	
	Underground Costs	Amount	Per Ton	Amount	Per Ton
1.	Exploring in Mine	1,160.17	.006	1,427.30	.009
3.	Development in Rock	14,004.35	.068	1,332.50	.009
4.	Development in Ore	67,979.87	.331	91,930.02	.613
5.	Stoping	124,791.40	.607	105,809.32	.705
6.	Timbering	11,509.29	.056	14,880.24	.099
7.	Tramming	43,524.67	.212	45,471.45	.303
8.	Ventilation	2,334.83	.011	4,556.41	.031
9.	Pumping	49,327.36	.240	39,936.80	.266
10.	Compressors and Air Pipes	17,873.23	.087	19,694.25	.131
12.	Underground Superintendence	22,805.49	.111	18,588.82	.124
14.	Compressors and Power Drills	1,510.10	.007	7,310.72	.049
15.	Scrapers and Mechanical Loaders	28,861.18	.140	30,027.54	.200
16.	Electric Tram Equipment	13,957.44	.068	11,510.68	.077
17.	Pumping Machinery	49,757.63	.242	11,867.78	.079
	Total Underground Costs	449,397.01	2.186	404,343.83	2.695
	Surface Costs				
18.	Hoisting	22,092.83	.107	19,631.44	.131
19.	Stocking Ore	11,141.01	.054	12,052.38	.080
20.	Screening-Crushing at Mine	7,788.78	.038	10,515.37	.070
21.	Dry House	7,102.51	.035	7,006.92	.047
22.	General Surface Expense	11,050.89	.054	9,062.38	.060
23.	Hoisting Equipment	5,231.48	.025	3,187.02	.021
24.	Shaft	1,937.56	.009	2,556.54	.017
25.	Top Tram Equipment	991.27	.005	976.45	.007
26.	Docks, Trestles and Pockets	101.48	.001	680.11	.004
27.	Mine Buildings	5,900.28	.028	370.10	.003
	Total Surface Costs	73,338.09	.356	66,038.72	.440
	General Mine Expense				
28.	Geological	1,659.46	.008	1,136.35	.008
29.	Insurance	9,566.29	.046	7,813.34	.052
30.	Mining Engineering	8,068.65	.039	9,059.76	.060
31.	Mech. and Elec. Engineering	1,304.55	.006	901.76	.006
32.	Analysis and Grading	7,608.89	.038	5,008.34	.033
33.	Personal Injury	1,871.01	.009	5,963.64	.040
34.	Safety Department	1,628.62	.008	1,696.00	.011
35.	Telephones and Safety Devices	1,237.68	.006	1,360.08	.009
36.	Local and General Welfare	1,683.68	.008	1,623.50	.011
37.	Special Exp., Pensions and Allow.	3,936.11	.019	4,438.95	.030
38.	Ishpeming Office	9,063.43	.044	7,233.70	.048
39.	Social Security Tax	8,946.98	.043	7,678.94	.052
40.	Mine Office	17,022.32	.083	14,634.66	.098
41.	Employees Vacation Pay	13,620.00	.067	11,465.40	.076
42.	Additional Wage Adjustment	1,738.27	.009		
	Total General Mine Expense	88,955.94	.433	80,014.42	.534
	Cost of Production	611,691.04	2.975	550,396.97	3.669

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8. COST OF OPERATING (Cont'd)

b. Detailed Cost Comparison (Cont'd)

		1950		1949	
		Amount	Per Ton	Amount	Per Ton
43.	General Supplies	31,258.99	.152	19,974.81	.133
44.	Iron and Steel	13,244.14	.064	10,966.14	.073
45.	Oil and Grease	3,158.59	.015	3,540.77	.024
46.	Machinery Supplies	39,285.81	.191	26,493.21	.177
47.	Explosives	31,278.58	.152	30,098.60	.201
48.	Lumber and Timber	3,764.99	.018	5,294.02	.035
49.	Fuel	6,711.74	.033	5,019,05	.033
50.	Electric Power	53,554.79	.261	42,727.79	.285
51.	Sundries	13,213.20	.064	7,552.04	.050
	Total Supplies	195,470.83	.950	151,666.43	1.011

The following are explanations of operating costs that show significant variations compared with last year:

3. Development in Rock

The large increase in this expenditure is due to driving the 6th Level extension at the south end and also the ventilation connection at the south end of the 4th Level.

4. Development in Ore

The large decrease in this expenditure is due to less stope development. The major part of the development above the 6th Level was driven in the previous year.

5. Stoping

The increase in this expense is due to a larger mining program and the purchase of some new equipment. The cost per ton was lower due to the larger production.

7. Tramming

There was a decrease in this expense due to more favorable tramming conditions and improved efficiency.

9. Pumping

The increase in this expense is due to a large volume of mine water becoming very acidic causing severe corrosion to pumps and pipe lines despite the large amount of lime that was introduced into the water as a neutralizing agent. Due to the increase in the acidity of the water it became necessary to purchase corrosion proof pumps and rubber lined pipe to make the pumping plant dependable for removal of water from the mine. An average of 730 G.P.M. was being pumped at the close of the year and 55% of this volume is very acidic and is being pumped by the corrosion proof system that was installed on the 4th Level. There was practically no change in the total volume of water in the mine compared with the previous year.

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8. COST OF OPERATING (Cont'd)

b. Detailed Cost Comparison (Cont'd)

12. Underground Superintendence

The increase in the total expense is due to adding another supervisor to the force as a trammer boss. The salaries of the supervisors were increased effective August 15th when the operating schedule was increased to 48 hours per week and again on December 1st when the general increase in salaries was made. A Christmas bonus of $100.00 was also paid each salaried supervisor.

16. Maintenance Tramming Equipment

The larger expense is due to more repairs on the tram cars and locomotives.

17. Pumping Machinery

A large increase in this expense is due to purchasing three centrifugal pumps of stainless steel construction and also a large quantity of rubber lined pipe for handling acid water. Extensive repairs were also required on the Aldrich and Prescott pumps when the working parts of these units were damaged by corrosion.

22. General Surface Expense

The increase in this expense is due to grading and surfacing the roads around the surface plant and installing a concrete culvert.

27. Mine Buildings

The increase in this expense is due to erecting an addition to the east end of the office building and also general repairs to the building.

28. - 40. Inclusive

The expense in most direct charges was higher due to the increase in wages, salaries and supply costs but the cost per ton was lower in nearly every account due to the larger production.

9. EXPLORATION AND FUTURE EXPLORATION

A drilling program was underway all year from the 6th Level exploring the extent of ore below this level. Eight steeply dipping holes were drilled cross-cutting the orebody near the 8th Level elevation at various points for approximately 600' along the strike. The drilling proved a continuation of the narrow orebody in depth to the 8th Level and at the south end it narrows rapidly and pinches out. Although the tonnage is relatively small, sufficient reserves are indicated to warrant development of the 8th Level.

Two horizontal holes were drilled from the south end of the level but no concentration was proven in this area. Drilling was being continued in one of the holes at the end of the year with the hope that a westerly extension of the iron formation can be located.

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9. EXPLORATION AND FUTURE EXPLORATION (Cont'd)

Upon completion of the drilling program on the 6th Level it is planned to drill several holes from the 4th Level where a possible westerly extension of the iron formation in Section 24 will be explored with several deep holes. The following are logs of drilling completed in 1950:

D. D. H. No. 44
6th Level - Due East - Dip -50°

0' - 10'	Gray Slate and Graywacke
10' - 190'	Cherty Carb. Iron Form. and Graphitic Slate
190' - 275'	Cherty Iron Form. and Graphitic Slate
275' - 280'	Hematitic Iron Form.
280' - 285'	Lean Ore
285' - 290'	Cherty Iron Form.
290' - 295'	Lean Ore
295' - 330'	Ore
330' - 335'	Lean Ore
335' - 381'	Ore
381' - 403'	Graphitic Slate

D. D. H. No. 45
6th Level - S 61° E - Dip -45°

0' - 7'	Graywacke
7' - 199'	Iron Form. and Graphitic Slate
199' - 305'	Cherty Argilite and Graphitic Slate
305' - 310'	Lean Ore
310' - 340'	Ore
340' - 352'	Iron Formation
352' - 363'	Lean Ore
363' - 368'	Iron Formation
368' - 393'	Lean Ore
393' - 412'	Iron Formation
412' - 444'	Graphitic Slate

D. D. H. No. 46
6th Level - N 86° E - Dip -49°

0' - 125'	Graphitic Slate and Cherty Carb.
125' - 335'	Ore
335' - 375'	Iron Form.
375' - 407'	Graphitic Slate

D. D. H. No. 47
6th Level - S 16° E - Dip -48°

0' - 210'	Graphitic Slate
210' - 215'	2nd Class Sul. Ore
215' - 220'	High Sul. Ore
220' - 245'	Ore
245' - 249'	High Sul. Ore
249' - 340'	Graphitic Slate

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9. EXPLORATION AND FUTURE EXPLORATION (Cont'd)

D. D. H. No. 48
6th Level - S 7° W - Dip -73°

0' - 120'	Hematitic Cherty Carb. Argilite
120' - 145'	Hematitic Cherty Iron Form.
145' - 150'	No Core
150' - 182'	Dark Gray Slate
182' - 317'	Gray Slate and Graywacke
317' - 333'	Dark Gray Slate (Not Completed)

D. D. H. No. 49
6th Level Due South Dip 0°

0' - 5'	Ore
5' - 10'	High Sul. Ore
10' - 15'	Lean Ore
15' - 28'	Ore
28' - 80'	Gray Slate
80' - 220'	Cherty Gray Slate
220' - 265'	Iron Form.
265' - 376'	Carb. Iron Form. and Graphitic Slate

D. D. H. No. 50
6th Level - S 55° E - Dip -60°

0' - 139'	Mixed Graphitic Slate and Iron Form.
139' - 150'	Ore
150' - 310'	Graphitic Slate
310' - 330'	Mixed Graphitic Slate and Iron Form.
330' - 362'	Mixed Graphitic Slate and Gray Slate
362' - 399'	Graphitic Slate

D. D. H. No. 51
6th Level Dip 90°

0' - 44'	Iron Form. and Gray Slate
44' - 64'	Iron Form. and Graphitic Slate
64' - 185'	Gray Slate
185' - 194'	Iron Form.
194' - 230'	Iron Form. and Gray Slate
230' - 390'	Iron Form.
390' - 455'	Ferr. Slate
455' - 462'	Gray Slate
462' - 486'	Cherty Iron Form.
486' - 517'	Ferr. Slate
517' - 537'	Ferr. Slate

D. D. H. No. 52
6th Level Dip 63.35° S 56°51' E

0' - 18'	Gray Graphitic Slate
18' - 105'	Ferr. Gray Slate
105' - 165'	Ferr. Dark Gray Slate
165' - 185'	Iron Form.
185' - 190'	2nd Class Ore
190' - 382'	Ore
382' - 414'	Gray to Graphitic Slate

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9. EXPLORATION AND FUTURE EXPLORATION (Cont'd)

D. D. H. No. 53
6th Level Dip -43° N 52° 37' E

0' - 357'	Cherty Gray Slate Partly Ferr.
357' - 365'	Hematitic Cherty Arg. Iron Form.
365' - 370'	Lean Soft Ore
370' - 377'	Hematitic Cherty Arg. Iron Form.
377' - 380'	2nd Class Soft Ore
380' - 401'	Ore
401' - 466'	Hematitic Cherty Arg. Iron Form.
466' - 492'	Dark Gray Pyritic Carb. Arg.

10. TAXES

There was an increase in taxes due to the larger personal property valuation and the substantial increase in the tax rates in the various sub-divisions. The following is a comparison of the taxes in the past two years in Iron County:

Description	1950		1949	
Iron County	Valuation	Taxes	Valuation	Taxes
Iron River Township				
Spies Mine				
NE¼ of NW¼ of Sec. 24, 43-35, 40A)				
SE¼ of NW¼ of Sec. 24, 43-35, 40A)				
Virgil Mine Lease No. 51				
SW¼ of NW¼ of Sec. 24, 43-35, 40A)	25,000	550.00	40,000	800.00
Per. Prop., Stkple., Supp. & Equip.	325,000	7150.00	300,000	6000.00
Total Spies Mine	350,000	7700.00	340,000	6800.00
Spies Dwellings and Mineral Lands	1,950	42.90	1,250	25.00
Total Iron River Township	351,950	7742.90	341,250	6825.00
Tax Rate		2.20		2.00
Village of Mineral Hills				
Spies Mine				
NE¼ of NW¼ of Sec. 24, 43-35, 40A)				
SE¼ of NW¼ of Sec. 24, 43-35, 40A)				
Virgil Mine Lease No. 51				
SW¼ of NW¼ of Sec. 24, 43-35, 40A)	25,000	161.53	40,000	239.60
Per. Prop., Stkple., Supp. & Equip.	325,000	2099.84	300,000	1797.00
Total Spies Mine	350,000	2261.37	340,000	2036.60
Spies Dwellings	1,250	8.08	1,250	7.48
Total Village of Mineral Hills	351,250	2269.45	341,250	2044.08
Tax Rate		.64610723		.5989986
City of Iron River				
Spies-Johnson (East Deposit)				
SE¼ of NW¼ of Sec. 24, 43-35, 40A	115,000	4255.00	115,000	4025.00
NE¼ of SE¼ of Sec. 24, 43-35, 40A	115,000	4255.00	115,000	4025.00
Mineral Lands				
NE¼ of NW¼ of Sec. 24, 43-35, 40A	2,000	74.00	2,000	70.00
NW¼ of NE¼ of Sec. 24, 43-35, 40A	1,600	59.20	1,600	56.00
NW¼ of NW¼ of Sec. 24, 43-35, 40A*				
NW¼ of SE¼ of Sec. 24, 43-35, 40A	1,600	59.20	1,600	56.00
NE¼ of SW¼ of Sec. 24, 43-35, 25A	1,400	51.80	1,400	49.00
Mineral Lands	13,150	486.59	1,005	35.45
Collection Fees		92.53		83.16
Total City of Iron River	249,750	9333.32	237,605	8399.61

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10. TAXES (Cont'd)

Description	1950 Taxes	1949 Taxes
Iron County (Cont'd)		
City of Iron River (Cont'd)		
Paid in August 1950	5044.77	4799.62
Paid in January 1951	4288.55	3599.99
Total	9333.32	8399.61
Tax Rate	3.70	3.50

*The James Mining Co. paid the taxes on the NW¼ of NW¼ of Sec. 24, 43-35.

11. ACCIDENTS AND PERSONAL INJURY

The accident frequency rate was slightly higher than last year but the severity rate was much lower. There were five compensable accidents compared with three in the previous year but fortunately none were very serious in nature. There was a total of 37,884 man days worked and 126 days were lost on account of all injuries compared with 379 in the previous year.

	Frequency Rate	Severity Rate
1950	26.46	.565
1949	22.38	1.696

Frequency Rate - Number of accidents per 1,000,000 man hours.
Severity Rate - Number of days lost per 1,000 man hours.

The following is a detailed description of the compensable accidents:

Accident No. 175, March 14, 1950, Sebastian Taetsch, Blacksmith. Taetsch was carrying a piece of 60# rail and when he stooped to set it on the floor, he received a kink in the back - strained back - time lost 10 days.

Accident No. 176, March 8, 1950, William Walker, Miner. Walker was carrying a short piece of plank as he was climbing a ladder and the plank struck a pole causing him to lose his balance and fall to the sollar about 15' below, injuring his left heel - chipped bone left foot - time lost 15 days.

Accident No. 177, October 6, 1950, Wilbert Puskula, Miner. Puskula and his partner were dumping a loaded car into the shaft pocket using an air hoist. The tugger pulled loose from the base plate causing a sprag pole to loosen and fall striking him on the thumb - compound fracture left thumb - time lost 43 days.

Accident No. 178, December 4, 1950, Sam Trevarton, Surface Laborer. Trevarton was unloading coal from the truck into the steamshovel and when he stepped off the truck onto the tire he slipped and fell to the ground - strained left shoulder - time lost 24 days.

Accident No. 179, November 22, 1950, Louis Nardi, Miner. The Eimco loader was being moved past a chute and as Nardi was standing on the side swinging the dipper clear his foot slipped and was squeezed under the wheel of the shovel - crushed right foot, no fracture - time lost 8 days.

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12. NEW CONSTRUCTION AND PROPOSED NEW CONSTRUCTION

a. Surface

A settling pond was excavated adjacent to the old rock piles southwest of the shaft for the purpose of settling solids out of the mine water before it enters Iron River. A pond about 150' x 30' x 5' in depth was excavated and surrounded with an earth fill. Numerous tests of the discharge water from the pond shows a very low solid content. It is planned to lease a small parcel of adjoining property so a settling pond of much larger capacity can be constructed.

A new stoker coal bin was constructed at the south end of the coal dock replacing the old one that was badly rotted.

b. Underground

A 500 G.P.M. centrifugal pump of stainless steel construction was installed on the 4th Level plat for pumping water that is very acidic. About 600' of rubber lined 6" discharge pipe was installed from the 4th Level to surface to provide a corrosion proof pumping unit for handling the acid water. This unit is operated by automatic controls and at the close of the year about 55% of the mine water was being pumped from this station.

When caving in a stope above the 6th Level extended to the old workings above the 4th Level a large amount of acid water draining through this area reached the 6th Level. It became necessary to divert this water back to the 4th Level so a centrifugal pump with a corrosion proof line was installed near the workings on the 6th Level for this purpose. This unit is also operated by automatic controls.

Due to the increase in the acidity of the mine water and the likely possibility of the condition becoming worse a 500 G.P.M. centrifugal pump will be installed on the 6th Level. A discharge line for the pump will be installed to connect with the present corrosion proof line extending from the 4th Level to surface. This project including the new equipment will be under E & A cc-423.

13. EQUIPMENT AND PROPOSED EQUIPMENT

A large amount of new equipment and accessories was purchased for pumping the acidic water. New parts were also installed on the reciprocating pumps replacing parts that were damaged by corrosion. Only a small amount of new equipment was required for the stoping operations.

Some new equipment is on order for the 8th Level development program and it includes a Model 40 Eimco Loader and a Hydro-Gib Jumbo equipped with long feed drill machines. Also on order are two centrifugal pumps, a 500 G.P.M. and a 200 G.P.M. of stainless steel construction for installation on the 6th Level.

13. EQUIPMENT AND PROPOSED EQUIPMENT (Cont'd)

The following is a list of the larger items of equipment added to the inventory:

Item	Number	Cost
PB-6 Chunk Breakers	2	560.00
J-50 Drill Machine	1	330.00
JL-3 Special Jack Legs	2	300.00
AW-80 Air Hoist	1	325.00
Lime Feeder	1	1,117.81
Scraper - 48"	1	234.58
Fans (Dryhouse)	2	137.92
Concrete Drain Pipe - 30"	60'	286.80
Heresiting Pump Parts and Pipe		1,284.03
50 h.p. Motor	1	507.78
Working Barrel (Aldrich)	1	820.00
Two Working Barrels and Five Chambers (Aldrich)		3,611.00
Water Bodies (Prescott)	2	3,722.00
Eimco Wire Braid Hose 2"	645'	1,064.42
Fire Hose 2½"	200'	270.00
Stainless Steel Valves 4"	3	484.72
Rubber Lined Pipe and Fittings 4"	440'	3,186.72
Rubber Lined Pipe 6"	630'	3,137.40
Carlon Pipe 4"	500'	620.00
Extra Heavy Black Pipe 8"	503'	2,184.83
New Equipment Charged to E & A cc-330		
Byron Jackson Pump	1	2,777.23
150 h.p. Motor	1	1,510.08
Pump Starter	1	547.80
Rubber Lined Pipe and Fittings 6"	200'	1,799.50
Stainless Steel Gate Valve 6"	1	441.14
Stainless Steel Valve 6"	1	220.87
Stainless Steel Swing Check Valve 6"	1	330.00

14. MAINTENANCE AND REPAIRS

a. Mine

Maintenance and repairs to pumps and pumping equipment was high due to the extremely corrosive condition of the mine water. Neutralization of the water could not be affected as in the past with the addition of large amounts of lime and as a result the working parts on the reciprocating pump were severely corroded. Two new water bodies were installed on the Prescott pump and two new working barrels and five valve chambers were installed on the Aldrich pump. The pumps also were fitted with stainless steel valves. Corrosion also necessitated replacement of the 8" discharge line from the 2nd Level to surface with double extra heavy pipe. On surface, the old steel pipe from the headframe to the discharge ditch was replaced with concrete pipe.

A 500 G.P.M. corrosion resistant stainless steel pump was installed on the 4th Level with a rubber lined discharge to surface. This unit is handling 55% of the mine water and is entirely automatic and in time will result in a considerable reduction in pumping expense.

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14. MAINTENANCE AND REPAIRS (Cont'd)

a. Mine (Cont'd)

A 200 G.P.M. stainless steel pump with 4" rubber lined pipe is on order to pump highly acid water from the 6th to the 4th Level. At present this water is being handled by a pump rented from another mining company. A plastic lined steel pipe was employed in this installation but did not withstand the corrosive action of the water and has been temporarily replaced with high pressure hose.

A 4" corrosion resistant plastic pipe was installed as a drain line from 6th to 4th Levels and similar pipe is on order for a drain line from 8th to 6th Levels.

Upon installation of the 500 G.P.M. stainless steel pump on the 6th Level and a rubber lined discharge pipe the entire pumping system will be automatic and corrosion resistant and should show a marked decrease in maintenance and repairs.

Maintenance and repairs in the shaft have been about normal requiring only occasional replacement of worn runners and lath. Before the 8th Level development program was started, repairs were made in a section of the shaft from 8th Level to the bottom. This work was charged to E & A cc-390. Minor repairs to grizzlies and steam piping were made in the headframe.

Repairs to tramming equipment was confined chiefly to the tram cars. All the cars are being thoroughly overhauled and the work is being accomplished as rapidly as the operation will permit. An additional six ton locomotive purchased from the Negaunee Mine was put into service during the year. Repairs to power drills and scraper hoists have continued to be relatively low.

b. Location

There was very little maintenance expense on the Captain's and Mine Clerk's houses in the location. One of the houses has been vacant since the middle of the year when a change in the Captains was made at this property. The following table shows the maintenance cost on rented houses:

	1950	1949
Maintenance Expense	8.34	151.22

15. ELECTRIC POWER

There was less power consumed due to the mine operating on a schedule of four days per week until late in May. There were no delays due to the lack of electric power although there were several short interruptions that were of no serious consequence.

Year	Average Maximum Demand	Rate Per K. W. H.	Total K. W. H.	Cost Per Ton
1950	816	.0144	3,742,000	.262
1949	729	.0127	3,995,600	.285

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16. WATER SUPPLY

There were no extensions or changes made in the water mains and the supply has been continued to be obtained from the Homer Mine.

17. CONDITION OF PREMISES

The only improvement on the premises consisted of grading and hard-surfacing the roads around the surface plant.

18. NATIONALITY OF EMPLOYEES

	American Born	Foreign Born	Total	Percent
English	15	7	22	19.5
Finnish	11	7	18	15.9
Polish	11	5	16	14.2
Italian	10	4	14	12.4
French	12		12	10.7
Swedish	8	1	9	7.9
German	4	2	6	5.3
Lithuanian	3		3	2.6
Scotch	3		3	2.6
Irish	3		3	2.6
Danish	2		2	1.8
Austrian		2	2	1.8
Croatian	1		1	.9
Belgian	1		1	.9
West Indian	1		1	.9
Total	85	28	113	100.0