TILDEN MINE
ANNUAL REPORT
YEAR - 1947

5. LABOR AND WAGES (Cont.)

b. Comparative Statement of Wages and Product

	1947	1946	Incr.	Decr.
Product	168,669	101,968	66,707	
Number of Days Operated	97	63	34	
Average Number of Men Working	24	29		5
Average Hourly Rate	1.418	1.274	.144	
Tons Per Man Per Hour	6.964	4.091	2.873	
Labor Cost per Ton	.204	.311		.107
Amount Paid for Labor	34,356.66	31,760.08	2,596.58	

c. Nationality of Employees

	American Born	Foreign Born	Total
English	8	3	11
Swedish	3		3
Finnish	7	1	8
Irish	3		3
French Canadian	5		5
	26	4	30

7. OPEN PIT OPERATIONS

a. Stripping

The stripping of the Summit Pit was completed in June with the loading of 2,172 yards of surface material, which had been washed and scraped to the South edge of the road, by means of the Marion Shovel into trucks for transportation to the dump. As has been mentioned earlier in this report, this stripping was for the purpose of cleaning off the ledge and making an approach so that this pit could be divided into an upper and lower bench. The detail of the expenses to this E & A CC 117, which was originally intended for stripping the East half of the upper bench in the West Pit and later carried over for work in the East and Summit Pits, is as follows:

E & A CC 117 - Tilden Mine - Stripping West, East, & Summit Pits

Detail	Amount	Expended in 1947	Expended To 12/31/47	Unexpended
192,000 yds. @ 12¢ per yd.	23,040.00	261.45	20,930.05	2,109.95
10% for Contingencies	2,304.00			2,304.00
Total	25,344.00	261.45	20,930.05	4,413.95

95,785 yards stripped & washed in West Pit @ .155 per yard.
18,524 yards stripped & washed in East Pit @ .174 per yard.
11,672 yards stripped & washed in Summit Pit @ .245 per yard.

Increase in the cost per yard for Summit Pit stripping was due to very irregular ledge and increase in wages and price of supplies in 1946 and 1947.

TILDEN MINE
ANNUAL REPORT
YEAR - 1947

7. OPEN PIT OPERATIONS (Cont.)

f. Drilling, Blasting & Explosives

1. Drilling

Churn drilling was not started during 1947 until about the middle of October when the broken ore in the West Pit had been nearly cleaned up. A section of the floor of the pit in the Northeast corner was found to be too high and 12 short holes were drilled, together with three holes four inches in diameter, which were put down by the Linde Air Products Company. These holes were blasted just previous to the regular bench blast; then drilling of the next series of holes was started and continued until the end of the season. Nine holes were completed, with an average of 19.87 feet per shift, leaving 21 holes remaining to complete the round. It will be necessary to also drill the upper bench of the East Pit next year if the production approaches 150,000 tons. The holes in the Summit Pit were drilled in 1946, and therefore no more drilling will be necessary there unless an unusual amount of low phos. ore is required.

Although a complete report on the experiments on fusion piercing by the Linde Air Products Company will be made by another department, it was thought advisable to make a brief note here of their results at the Tilden. On September 30th a $3\frac{1}{2}$" machine consisting of a 14' steel mast and a blow pipe mounted on a portable carriage was set up in the bottom of the West Pit. The blow pipe was made up of three pipes concentrically within one another, through which oxygen, kerosene, and water were fed from a controlled power unit. The flame, which had a temperature of approximately 4500° F., pierced the ground very rapidly, and the ore was removed in fine particles by the steam and jet velocity. The average rate of drilling was 15.9' per hour, including one hole drilled at a 45° angle. When loading these holes for blasting, it was found they averaged from four inches to eight inches in diameter and consequently were difficult to load properly, as too much powder pushed back into the larger openings. However, these holes were blasted along with other churn drill holes, and the result was satisfactory. From other experiments they have conducted, together with results obtained at this time, the Linde Company feels that a nine-inch hole could be drilled at the rate of 20' per hour, as compared with 20' per shift by the churn drills. However, equipment would have to be designed so that the hole would be of more even diameter, and the price of oxygen would have to be lowered considerably before it would be practical to drill holes by this method. There is no doubt that considerable research will be made in the near future, and with a decrease in the price of materials, it may be possible to drill economically by fusion piercing.

TILDEN MINE
ANNUAL REPORT
YEAR - 1947

7. OPEN PIT OPERATIONS

f. Drilling, Blasting & Explosives

1. Drilling Cont.)

Cost of operating 9-inch Churn Drills in 1947

Total Footage Drilled 945

Operating	Labor	Supplies	Total	Cost Per Foot
Drilling	$1,611.01	$ 108.00	$1,719.01	1.817
Sharpening Bits	380.74	208.74	589.48	.623
New Bits		977.38	977.38	1.034
Electric Power		74.71	74.71	.079
Wire Rope		62.76	62.76	.066
Truck & Tractor	170.06	15.30	185.36	.196
Total Operating	$2,161.81	$1,446.89	$3,608.70	3.815
Maintenance				
Drills	155.25	67.31	222.56	.235
Bit Dresser	10.38		10.38	.011
Total Maintenance	$ 165.63	$ 67.31	$ 232.94	.246
Grand Total	$2,327.44	$1,514.20	$3,841.64	4.061

Comparison of Footages and Costs

	1947			1946		
	Footage Drilled	Footage Per 8-hr. Shift	Cost Per Foot	Footage Drilled	Footage Per 8-hr. Shift	Cost Per Foot
West Pit, Lower Bench	945	16.29	4.061	2,234	21.45	2.492
East Pit, Upper Bench				534	19.71	2.697
	945	16.29	4.061	2,768	20.96	2.533

Footage Obtained from Bits

	1947		1946	
	Bits Used	Footage Per Bit	Bits Used	Footage Per Bit
West Pit, Lower Bench	88	10.73	207	10.79
East Pit, Upper Bench			48	10.98
Total	88	10.73	255	10.81

2. Blasting

The 15 short holes were blasted in the floor of the West Pit on October 10th with very good results. The ore was simply heaved up without any scattering, there were no large chunks visible, and the pile of broken ore was pushed well away from the bottom of the bench, so there was no extra burden against the

TILDEN MINE
ANNUAL REPORT
YEAR - 1947

7. OPEN PIT OPERATIONS

f. Drilling, Blasting & Explosives

2. Blasting (Cont.)

holes of the main blast. These 31 holes were blasted the next day, and again the results were very satisfactory, and loading to the end of the season has necessitated very little secondary blasting.

The cost per ton for primary blasting showed an increase of .022, due in the most part to the afore-mentioned blasting of the floor in the West Pit where the amount of powder in proportion to the burden was much greater than in blasting a face. The price of powder also increased 16% over last year.

Primary Blasting

Location	Date	No. of Holes	Footage Blasted	Estimated Tonnage	Pounds Explosives	Estimated Tons Ore Per Pound Explosive
West Pit, Lower Bench	10/11/47	31	1,915	72,951	36,800	1.98

STATEMENT OF EXPLOSIVES USED FOR YEAR 1947

Primary Blasting

Kind		Quantity	Price	Amount
Gelamite D 7½	lb.	23,150	.1400	$3,241.00
Hercomite Bag 7½	"	13,500	.1300	1,755.00
80% Gelatin		150	.1900	28.50
Total Powder		36,800	.1365	$5,024.50
Blasting Supplies				
Primacord Bickford Fuse, Regular	M ft.	2,000	32.00	64.00
Primacord Bickford Fuse, Wire Bound	"	3,000	40.50	121.50
Total Blasting Supplies				$ 185.50
Total All Explosives				$5,210.00

	1947	1946
Total Ore Blasted	72,951	135,932
Tons of Ore per Lb. of Powder	1.98	2.48
Cost per Ton for Powder	.0690	.0474
Cost per Ton for Blasting Supplies	.0025	.0020
Cost per Ton for All Explosives	.0715	.0494
Average Price per Lb. for Powder	.1365	.1178

TILDEN MINE
ANNUAL REPORT
YEAR - 1947

7. OPEN PIT OPERATIONS

f. Drilling, Blasting & Explosives

2. Blasting (Cont.)

Secondary Blasting

Kind		Quantity	Price	Amount
60% Gelatin	lb.	3,700	.1625	$601.25
Blasting Supplies				
Connecting Wire	"	10	.55	5.50
Crescent Fuse	M Ft.	9,050	7.43	67.24
#6 Blasting Caps	M	1,810	13.70	24.79
#7 Hot Wire Lighters	C	500	.676	3.38
Electric Blasting Caps	"	100	8.91	8.91
Total Blasting Supplies				$109.82
Total Secondary Explosives				$711.07

	1947	1946
Product	168,669	101,968
Pounds of Powder per Ton of Ore	.0455	.0750
Cost per Ton for Powder	.0356	.0086
Cost per Ton for Fuse, Caps, etc.	.0064	.0001
Cost per Ton for All Explosives	.0042	.0098
Average Price per Lb. for Powder	.1625	.1150
Total All Explosives Used at Pit	$5,921.07	$7,718.21

Comparison of Blasting Costs

	Primary Blasting	Secondary Blasting
	Cost per Ton Blasted	Cost per Ton Produced
1947	.0715	.0042
1946	.0494	.0098
1945	.0416	.0052
1944	.0423	.0074
1943	.0468	.0016

g. Loading Operations

There were only two shovels in operation at the Tilden during 1947, as both of the 80B's had been transferred to other properties. This caused a slight delay when changing from silica grade to low phos., as the 120B had to be moved from the West Pit to the East Pit where the Summit ore is stocked. At first it was necessary to move power lines so that the boom of the shovel would clear, but later these lines were placed in conduits where they crossed the road, and thus part of the delay was eliminated. There was very little

TILDEN MINE
ANNUAL REPORT
YEAR - 1947

7. OPEN PIT OPERATIONS

g. Loading Operations (Cont.)

delay due to shovel repairs, the most serious being on two occasions when the Marion Shovel was tied up for two days on account of electrical trouble. Loading started on July 7th in the stockpile and ceased on November 24th, at which date stocking was in progress.

All the transportation of the ore, both to the crusher and in stocking, was by means of the Euclid trucks, and here again there was very little delay due to break-downs of equipment. It is intended to transfer two more units from the Mesabi Range, which although they are not new, will be available for spares in case of having to tie up any of the present units.

The locality and tonnages for the various shovels during the 1947 season are noted below:

Unit	Tons	Locality
No. 52 Shovel	65,365	Stockpile
	93,446	Lower Bench of West Pit
	17,546	East Pit (Includes Summit ore stocked in East Pit)
No. 46 Shovel	57,677	East Pit
	1,005	Summit Pit (Low phos. ore stocked in East Pit)

TILDEN MINE
ANNUAL REPORT
YEAR - 1947

8. COST OF OPERATING

a. Comparative Mining Cost

	1947	1946
Production	168,669	101,968
Operating Cost	.520	.627
General Mine Expense	.095	.149
Stocking Ore	.016	.025
Cost of Production	.631	.801
Depreciation - Movable Equipment	.001	.000
Depreciation - Plant & Equipment	.070	.070
Depreciation - Motorized Equipment	.011	.083
Depletion - Original Cost	.003	.003
Amortization of Development	.003	.003
Amortization of Stripping	.020	.020
Taxes	.045	.066
Loading from Stockpile	.010	.012
Total Cost at Mine	.794	1.058
Average Daily Product	1,739	1,728
Tons Per Man Per Day	55.71	32.73
Number of Days Operated (1 8-hr. Shift)	97	59

TILDEN MINE
ANNUAL REPORT
YEAR - 1947

8. COST OF OPERATING (Cont.)

b. Detailed Cost Comparison

PIT OPERATING

	1947		1946	
Direct Ore	Amount	Per Ton	Amount	Per Ton
Drilling & Blasting	20,507.52	.122	14,883.06	.146
Power Shovels, Operating	9,451.80	.056	3,934.91	.039
Power Shovels, Maintenance	5,582.09	.033	5,922.43	.058
Euclid Trucks, Operating	5,409.89	.032	2,359.07	.023
Euclid Trucks, Maintenance	1,740.21	.010	1,733.82	.017
R.D. Tractor, Operating			648.90	.006
R.D. Tractor, Maintenance	80.88	.001	937.82	.009
Total Direct Ore	42,772.39	.254	30,420.01	.298
General Pit Expense				
Water Supply	49.29	.000	22.30	.000
Buildings			179.95	.002
Crushing & Screening	28,253.11	.168	17,407.24	.171
General Open Pit Expense	12,600.61	.075	12,161.65	.119
Open Pit Superintendence	3,916.89	.023	3,657.21	.036
Waste Pile Expense	65.93	.000	56.15	.001
Total General Pit Expense	44,885.83	.266	33,484.50	.329
TOTAL PIT OPERATION	87,658.22	.520	63,904.51	.627
Stocking Tilden Crushed Ore	2,739.03	.016	2,557.04	.025
GRAND TOTAL	90,397.25	.536	66,461.55	.652
General Mine Expense				
Mining Engineering	575.73	.003	909.39	.009
Mechanical & Electrical Engineering	149.45	.001	222.26	.002
Analysis & Grading	1,385.62	.008	821.04	.008
Safety Department	179.15	.001	169.00	.002
Special Expense	343.33	.002	380.86	.004
Ishpeming Office	1,145.78	.007	1,460.17	.014
Local & General Welfare	211.86	.001	245.48	.002
Mine Office	5,359.11	.032	4,977.45	.049
Insurance	1,417.54	.008	882.83	.009
Personal Injury	804.57	.005	780.40	.008
Social Security Taxes	1,270.56	.008	1,183.92	.011
Geological	101.36	.001	3.17	.000
Employees' Vacation Pay	3,058.82	.018	3,200.25	.031
Total General Mine Expense	16,002.88	.095	15,236.22	.149
COST OF PRODUCTION	106,400.13	.631	81,697.77	.801
Taxes	7,653.63	.045	6,697.83	.066
TOTAL	114,053.76	.676	88,395.60	.867

TILDEN MINE
ANNUAL REPORT
YEAR - 1947

8. COST OF OPERATING

b. Detailed Cost Comparison (Cont.)

Although the idle and winter expense is not shown as a separate caption, the amount is distributed to the various accounts under operating. The total idle and winter expense amounted to approximately $34,000 in 1947, as compared with $22,000 in 1946, and this increase was occasioned by not being able to do any repair work during the months of the strike in 1946, and also more repairs being necessary this year on account of more use of equipment, owing to larger production. The total cost per ton showed a substantial decrease for 1947, despite the raise in wages and increased prices of supplies, and this was due in the most part to the increased production. Where there was some unusual expense to the separate accounts, they are detailed as follows.

Cost of Production

	1947		1946	
Operating Pit	Cost Per Ton	%	Cost Per Ton	%
Labor	.302	47.8	.462	57.7
Supplies	.329	52.2	.339	42.3
Total	.631	100.0	.801	100.0

The decrease in the proportion of labor was due mostly to the purchase of costly repair parts for the crushing plant. Also it was possible to operate with a smaller crew in 1947, due to less extra work being necessary.

Days & Shifts Operating

	1947	1946
1 8-hour	97	59

Production

	1947	1946	Increase
Tons Produced	168,669	101,968	66,701
Tons Shipped from Pocket	109,359	45,738	63,621
Tons Shipped from Stockpile	65,365	49,699	15,666
Tons Stocked	59,310	56,230	3,080
Average Product per Shift	1,739	1,728	11
Tons per Man per Day	55.71	32.73	22.98

Detail of Accounts

Power Shovels, Operating

	1947	1946
Amount	9,451.80	3,934.91
Cost per Ton	.056	.039

Despite the increased production, the cost for operating shovels was higher in 1947, due to a new method of charging out the R.D. Tractor expense. This year all of the time spent by the tractor in moving ore at the shovel was charged to this account, instead of being set up under tractor expense.

TILDEN MINE
ANNUAL REPORT
YEAR - 1947

8. COST OF OPERATING

b. Detailed Cost Comparison

Detail of Accounts (Cont.)

R.D. Tractor, Operating & Maintenance

	1947	1946
Amount	80.88	1,586.72
Cost per Ton	.001	.015

The large decrease in 1947 was due to the 1947 charge being absorbed under operating shovels, as explained above.

Crushing & Screening

	1947	1946
Amount	28,253.11	17,407.24
Cost per Ton	.168	.171

The total amount spent under this account showed a large increase for 1947 on account of extensive repairs required to practically the entire crushing plant. The repair cost was practically $16,000, as compared with $7,000 in 1946.

Insurance

	1947	1946
Amount	1,417.54	882.83
Cost per Ton	.008	.009

A new hospitalization and insurance plan for the employees was started on September 1st, 1947, accounting for the increased charge to this account.

Idle & Winter Expense

	Labor	Supplies	Total
January	1,467.46	430.17	1,897.63
February	1,328.27	321.82	1,006.45
March	1,353.21	683.68	2,036.89
April	988.09	690.21	297.88
May	2,057.35	529.44	1,527.91
June	2,846.07	861.22	3,707.29
July		277.09	277.09
December	4,884.43	19,247.44	24,131.87
Total	14,924.88	19,403.95	34,328.83

	1947		1946	
	Amount	%	Amount	%
Labor	14,924.88	43.5	13,475.68	60.5
Supplies	19,403.95	56.5	8,803.44	39.5
Total	34,328.83	100.0	22,279.12	100.0

TILDEN MINE
ANNUAL REPORT
YEAR - 1947

8. COST OF OPERATING

b. Detailed Cost Comparison (Cont.)

Idle & Winter Expense (Cont.)

Although the above charges are now distributed to the various accounts and have been previously shown under Operating - Cost of Production, they are listed here for comparison purposes. There was a considerable increase in 1947, due to costly repairs to shovels and crushing plant, and also there were no men employed on repairs in 1946 until the strike was concluded near the last of May. The large increase in the proportion of supplies was due to charging out supplies that had been held on the supply inventory, and also the purchase of some expensive parts for the crushers.

10. TAXES

Tilden Township
Tilden Mine

	1947		1946	
	Valuation	Taxes	Valuation	Taxes
N ½ of Sec. 26, 47-27	195,000	4,104.67	200,000	3,736.06
Personal Supplies & Equip.	165,000	3,473.18	155,000	2,895.45
Collection Fees		75.78		66.32
Total	360,000	7,653.63	355,000	6,697.83

11. PERSONAL INJURY

There were no lost-time accidents at the Tilden Mine in 1947, and the Tilden Mine was presented with the "Banner Flag" for having the best severity rating of the Company's open pits for 1947. The severity rating was 0.000.

12. NEW CONSTRUCTION AND PROPOSED NEW CONSTRUCTION

There was no new construction during 1947, nor is there any contemplated for 1948.

13. EQUIPMENT AND PROPOSED NEW EQUIPMENT

There was no new equipment purchased during 1947, but it is expected that there will be two used 15-ton Euclid trucks purchased from the Company's properties on the Mesabi Range, to be used as spares in the event of break-downs, and also to make it possible to stockpile more rapidly.

ATHENS MINE
ANNUAL REPORT
YEAR 1947

1. GENERAL:

The Athens Mine operated on a schedule of six days per week on a full two-shift basis. In addition a portion of the 4th Level area was on a three-shift basis in order to increase production. Toward the end of the year the area above the 8th Level which is being mined by the block caving method was also put on a three-shift basis in order to attain greater efficiency. On weekends the midnight shift worked Sunday nights rather than Saturday nights.

The production for 1947 amounted to 508,100 tons, which was considerably more than last year due to the fact that the mine operated full time. In 1946 the mine was idle from February 8th to May 22nd due to the labor union strike. Shipments were also larger than last year, totaling 522,275 tons, an increase of 169,927 tons over 1946. Five levels were maintained for tramming during the year. The largest proportion of ore came from the 4th Level, being 37% of the total tonnage. The 6th and 7th Levels were next with about 20% each. The 9th and 10th Levels were third with approximately 11% each.

Development work was stepped up during the year in order to provide working places to replace those which are rapidly being depleted. In January there were four crews on development work and by the middle of the year this number had been increased to eight. By the end of the year there was a total of ten crews developing. Development for the block caving area above the 8th Level was completed and production was started late in August. The 9th Level development consisted of extending a new crosscut into the ore body north of the large diorite dike. An exploration raise was then put up from which diamond drilling will be done in order to determine the limits of the ore body on the 8th Level. The 5th and 6th Level development consisted mainly of raising, although some drifting was also done. On the 4th Level the Corbit Lot development was started and a crosscut was advanced south through the ore body and thence southwest to provide a ventilation connection to a 6th Level raise. It is planned that the major portion of the ore in the Corbit Lot be mined by block caving methods and the development for this was being stepped up toward the end of the year. It is expected that production from this area will be started by August or September of next year. At the shaft station on the 10th Level a trench was developed together with a raise from the skip pit to the 10th Level elevation. The raise, which extends to the end of the trench, will be used for skip pit cleaning. The trench will store this wet ore as well as ore from mining contracts inside.

On the morning of April 23rd, smoke was discovered in No. 5 Contract on the 760' Sub-level above 8th Level. It was found to be coming from the old timber gob at the coordinates 3450S - 1090W near the south footwall. This area is about 200 feet northwest and over 100 feet below the old fire area which was south of the cross dike. It is in the central part of block No. 3 where four contracts were mining at the time of discovery of smoke. The safety department was called immediately and an inspection was made with the use of safety lamps and carbon monoxide indicators. It was impossible to find any active fire although considerable smoke was coming out and tests revealed dangerous concentration of carbon monoxide. Upon consideration it was decided that this sub-level should be sealed off to prevent the oxygen from feeding the fire. A crew of trained men under the direction of Mr. A. J. Stromquist went into the area with oxygen breathing apparatus and constructed a temporary brattice in the slice from which the smoke was issuing. The mining equipment was then removed from this sub-level and the tops of the raises were sealed. In the last raise to be sealed, concrete was pumped up to the sub-level forming a tight covering over the raise. As a further precaution and in an attempt to smother the fire, a total of 25,000 cubic feet of carbon dioxide was released through a pipe which extended through the first brattice which was constructed on the sub-level. In addition bulkheads together with brattices were put up on the main level. Mining in this area will be continued at a lower elevation from 9th Level raises which were

ATHENS MINE
ANNUAL REPORT
YEAR 1947

1. GENERAL: (CONT.)

completed during the year. A pillar varying from 20 to 34 feet was left in the back as an insulation and seal from the fire area. It is fortunate that the indicated fire occurred near the south footwall and as mining progresses downward this area will be outside the limits of the workings.

On October 23rd hot charcoal which broke into open flame was drawn out of one of the finger raises in the east end of the block caving area above 8th Level. This is no doubt some charcoal which remains in the old gob from the previous fires which occurred in this area. Drawing operations were immediately stopped from the finger raises in this vicinity and some additional raises were opened to the west. To the end of the year no further trouble was encountered from this area.

2. PRODUCTION, SHIPMENTS & INVENTORIES:

a. Production by Grades:

Grade of Ore:	1947	1946	Increase
Athens Ore	383,606	275,547	108,059
Mitchell Lease Ore	122,239	91,814	30,425
Corbit Lease Ore	2,255	---	2,255
Total Ore	508,100	367,361	140,739
Rock	26,270	12,965	13,305
Total Hoist	534,370	380,326	154,044

b. Shipments:

Grade of Ore:	Pocket Tons	Stockpile Tons	Total 1947	Total 1946
Athens Ore	220,539	174,780	395,319	269,609
Mitchell Lease Ore	45,726	79,072	124,798	82,739
Corbit Lease Ore	2,158	---	2,158	---
Total 1947	268,423	253,852	522,275	352,348
Total 1946	235,960	116,388	352,348	
Increase	32,463	137,464	169,927	

c. Stockpile Inventories:

Grade of Ore:	Dec. 31, 1947	Dec. 31, 1946	Increase	Decrease
Athens Ore	43,623	55,336		11,713
Mitchell Lease Ore	15,107	17,666		2,559
Corbit Lease Ore	97	---	97	
Total	58,827	73,002		14,175

ATHENS MINE
ANNUAL REPORT
YEAR 1947

2. PRODUCTION, SHIPMENTS & INVENTORIES: (CONT.)

d. Division of Product by Levels:

	1947		1946	
	Tons	Percent	Tons	Percent
4th Level	190,859	37.6	148,332	40.4
6th Level	99,629	19.6	53,552	14.6
7th Level	579	0.1		
8th Level	104,099	20.5	112,470	30.6
9th Level	54,755	10.8	20,563	5.6
10th Level	58,179	11.4	32,444	8.8
Total	508,100	100.0	367,361	100.0

Note: In comparisons between 1947 and 1946 it should be remembered that the mine did not operate full time in 1946 due to the labor union strike which extended from February 8th to May 22nd, 1946.

e. Production by Months:

Month	Athens	Mitchell	Corbit	Total	Rock
January	38,512	12,038		50,550	605
February	26,956	19,556		46,512	1,430
March	29,183	16,874		46,057	2,595
April	30,485	13,876		44,361	3,580
May	26,310	7,673		33,983	2,985
June	30,452	8,578	576	39,606	2,880
July	24,628	10,751	1,192	36,571	810
August	24,717	7,636	330	32,683	2,520
September	42,062	4,450	60	46,572	2,065
October	54,543	445		54,988	2,550
November	25,489	8,484		33,973	2,700
December	30,292	11,371	97	41,760	1,550
Total 1947	383,629	121,732	2,255	507,616	26,270
Current Year's Stockpile Overrun	23	507		484	
Total 1947	383,606	121,239	2,255	508,100	26,270
Total 1946	275,547	91,814		367,361	12,965
Increase	108,059	30,425	2,255	140,739	13,305

f. Ore Statement:

	Athens	Mitchell	Corbit	Total 1947	Total 1946
On Hand Jan. 1, 1947	55,336	17,666		73,002	57,989
Output for Year	383,629	121,732	2,255	507,616	363,452
Current Year's Overrun	23	507		484	3,909
Total	438,942	139,905	2,255	581,102	425,350
Shipments	395,319	124,798	2,158	522,275	352,348
Balance on Hand	43,623	15,107	97	58,827	73,002
Increase in Output	111,991	29,918	2,255	144,164	
Increase in Ore on Hand			97		
Decrease in Ore on Hand	11,713	2,559		14,175	

ATHENS MINE
ANNUAL REPORT
YEAR 1947

2. PRODUCTION, SHIPMENTS & INVENTORIES: (CONT.)

g. Delays:

April 23rd

There was some delay to four contracts when smoke was discovered on the -760' Sub-level north of the cross dike. It was necessary to seal this area and start mining again at a lower elevation.

May 7th - 6 Hours - Loss of Product - 400 Tons

There was a broken runner near the bottom of the shaft causing a delay while repairs were made.

May 8th - 7 Hours - Loss of Product - 500 Tons

A breakdown occurred near No. 415 Raise on the 4th Level causing a delay of three shifts to eight contracts while repairs were made.

May 16th - 8 Hours - Loss of Product - 600 Tons

Several runners were broken just below the 8th level when the skip jumped out of the guides. Apparently a split runner caused the skip to jump. About 200 feet of rope was coiled on the skip and was kinked badly. Fortunately the rope had reached its ultimate life and had to be changed anyway.

May 20th - 6 Hours - Loss of Product - 400 Tons

The dividing wall between the skip road and cage road near the bottom of the shaft pushed in toward the cage compartment preventing the cage from being lowered to the skip pit level. It was necessary to stop hoisting in order to repair this wall.

May 21st, 22nd, 23rd - 43 Hours - Loss of Product - 3,400 Tons

Near the end of the afternoon shift the concrete wall at the bottom of the shaft broke, making it necessary to close the mine for two days in order to make repairs.

June 10th - 3 Hours - Loss of Product - 300 Tons

Electric power failure due to electrical storm.

June 26th - 16 Hours - Loss of Product - 1,400 Tons

Dividing wall between skip compartment and cage compartment near the bottom of shaft pushed in, preventing cage from being lowered to the bottom.

July 16th - 5 Hours - Loss of Product - 500 Tons

Broken runners in skip road.

August 4th - 5 Hours - Loss of Product - 400 Tons

Four broken runners in skip road.

August 12th - 3 Hours - Loss of Product - 300 Tons

Power failure due to electrical storm.

ATHENS MINE
ANNUAL REPORT
YEAR 1947

2. PRODUCTION, SHIPMENTS & INVENTORIES: (CONT.)

g. Delays: (Cont.)

September 16th, 17th - 9 Hours - Loss of Product - 900 Tons
Delay on account of ore hung up in skip pit.

October 14th - 5 Hours - Loss of Product - 600 Tons
Broken runners in skip co mpartment.

3. ANALYSIS:

a. Average Mine Analysis on Output:

	1947				1946			
Grade of Ore:	Tons	Iron	Phos	Sil	Tons	Iron	Phos	Sil
Athens Ore	385,884	58.89	.118	8.17	271,638	58.94	.124	8.35
Mitchell & Corbit	121,732	58.58	.121	8.83	91,814	59.19	.120	8.20

507 616

b. Average Analysis on Straight Cargoes:

There were no straight cargoe shipments during 1947.

c. High Sulphur Ore:

No high sulphur ore was encountered in the mine in 1947. The only known occurrence of high sulphur ore in the Athens Mine is near the Lucky Star Boundary. This block is now being d eveloped and mining will be started in 1948. There may be some increase in the sulphur content, particularly from the ore which comes from the upper part of this area.

4. ESTIMATE OF ORE RESERVES:

a. Developed Ore:

Assumption: 12.75 cubic feet equals one ton.
10% deducted for rock & loss in mining
Percent of Bessemer - None

	Athens Lots 1, 7, 10 & 12	Mitchell Lease Lots 8, 9 & 11	Corbit Lease Lot 13	Total Tons
4th Level & Above	138,897	115,526	505,505	759,928
4th to 6th Level	484,609	504,801	20,192	1,009,602
6th to 7th Level	43,039	71,694		114,733
7th to 8th Level	40,896			40,896
8th to 9th Level	191,114			191,114
9th to 10th Level	274,737			274,737
Below 10th Level	74,216			74,216
New Ore Body	584,615			584,615
Total Gross Tons as of 11/30/47	1,832,123	692,021	525,697	3,049,841
Less Dec. Production	30,292	11,371	97	41,760
Total Gross Tons as of 12/31/47	1,801,831	680,650	525,600	3,008,081
Less 10% for Rock & Loss in Mining	183,212	69,202	52,570	304,984
Net Tons 1947	1,618,619	611,448	473,030	2,703,097
Net Tons 1946	2,293,767	719,389	452,317	3,465,473
Increase			20,713	
Decrease	675,148	107,941		762,376

ATHENS MINE
ANNUAL REPORT
YEAR 1947

4. ESTIMATE OF ORE RESERVES: (CONT.)

a. Developed Ore: (Cont.)

The table on the preceding page shows a decrease of 762,376 tons. By subtracting the production of 508,100 tons we find that there is a loss in reserves of 254,276 tons. This is due largely to a reduction in areas in the old ore body which lowered the total reserves. Also there was some loss of ore due to the fire which occurred in April. It was necessary to leave a floor pillar of twenty to thirty-five feet in thickness as an insulation and seal for mining operations which are now being carried on below. There was some additional ore developed in the new ore body north of the large dike but not enough to offset the loss due to reduced ore areas in the old ore body.

b. Prospective Ore:

All ore in the mine is developed.

c. Estimated Analysis:

Ore Reserves:		Approximate Expected Natural Analysis								
	Tons	Iron	Phos.	Sil.	Mang	Alum	Lime	Mag	Sul	Loss	Moist.
Athens	2,703,097	51.50	.100	7.17	.350	2.75	.490	.760	.009	1.30	13.08
Ore In Stock:		**Average Natural Analysis**									
Athens	43,623	51.00	.101	7.59	.356	2.92	.312	.781	.009	1.40	13.25
Mitchell	15,107	51.26	.103	7.30	.356	2.67	.312	.781	.009	1.40	13.20
Corbit	97	51.00	.101	7.59	.356	2.92	.312	.781	.009	1.40	13.25

5. LABOR AND WAGES:

a. Comments:

The average earnings per month increased from $254.97 in 1946 to $270.84 in 1947. This was due entirely to the .12-1/2¢ per hour increase which was made effective May 9th, 1947.

ATHENS MINE
ANNUAL REPORT
YEAR 1947

5. LABOR AND WAGES: (CON'T)

b. Comparative Statement of Product, Men, Hours and Wages:

	1947			1946			Increase Or Decrease		
	Surface	Underground	Total	Surface	Underground	Total	Surface	Underground	Total
Production - Tons			508,100			367,361			140,739
Number of Days Operated			297			218			79
Number of Shifts and Hours			1-8 4 2-8 586			1-8 3 2-8 430			1-8 1 2-8 156
Average Daily Product			1,711			1,685			26
Average Number of Men Working	58	273	331	44	197	241	14	76	90
Tons Per Man Per Day:									
Total			5.04			4.82			.22
In Ore			20.15			21.87			1.72
Total Number of Man Days	19,491	81,365	100,856	15,637	60,558	76,195	3,854	20,807	24,661
Total Hours Worked	136,775	648,623	785,398	108,548	482,178	590,726	28,227	166,445	194,672
Total Wages Paid Above Employes	$173,334.21	$902,439.56	$1,075,773.77	$122,580.60	$614,781.63	$737,362.23	$50,753.61	$287,657.93	$338,411.54
Average Earnings Per Man Per Month	$249.04	$275.47	$270.84	$232.16	$260.06	$254.97	$16.88	$15.41	$15.87
Average Wages Per Man Per Day	$ 10.14	$ 11.13	$ 10.96	$ 9.03	$ 10.20	$ 9.99	$ 1.11	$ .93	$ .97
Average Contract Wages Per Day			$ 11.57			$ 11.02			$ .55
Total Operating Labor Per Cost Sheet	$200,312.68	$907,481.41	$1,107,794.09	$143,085.39	$619,208.63	$762,294.02	$57,227.29	$288,272.78	$345,500.07
Labor Cost Per Ton	$.394	$1.786	$2.180	$.389	$1.686	$2.075	$.005	$.100	$.105

ATHENS MINE
ANNUAL REPORT
YEAR 1947

6. SURFACE:

a-1. Buildings and Repairs:

A new storage shed was completed in October between the timber tunnel and the old storehouse. It is constructed entirely of steel with corrugated sheeting for the roof. This shed will b e used for storing electric hoists, fans and other equipment for underground use.

There were no major repairs to any of t he mine buildings. The window casings in the mine office, captain's office and the shops were sealed with a calking material to prevent t he wind from coming through.

a-2. Docks, Trestles & Pockets:

In January the surface crew moved the top tram sheaves on the south steel trestle in toward the shaft. In March the steel crew dismantled three spans of this trestle as this portion will eventually be involved in the surface cave. In July the wood trestle between the two steel trestles was dismantled and the electric shovel started loading from this pile.

In May and June several new plates were installed in the skip dump and loading pokcets, replacing those which were worn out.

A stoker coal bin for the engine house and office stokers was constructed under the old coal dock in September.

b. Stockpiles:

(1) Ore:

Athens ore was stocked under the east steel trestle and Mitchell ore under the south steel trestle. In addition Athens and Mitchell ore was stoc ked in separate piles under the wood trestle which extends southeast between t he two steel trestles. Stockpile loading was started in May and completed on October 2nd. At this time all ore in stock was shipped. The electric shovel was then moved up near the shaft house where repairs will be made during the winter.

(2) Rock:

The rock was stocked under the wood trestle to the southwest. As it accumulated under the bents it was pushed over the side of the rock pile wi th the bulldozer.

c, Cave to Surface:

The entire area wi thin previous cracks continued settling especially on the south side. Toward the west some new cracks appeared and it will be necessary t o move the electric line which extends from the Breitung Shaft to the Athens Mine engine house. This line is used for the pump which is down in the Breitung Shaft.

ATHENS MINE
ANNUAL REPORT
YEAR 1947

6. SURFACE: (CONT.)

d. Deep Wells:

No. 1 Deep Well continued operating throughout the year. A daily inspection of the pump was made to be sure that it was properly lubricated and in good running order. The volume of water pumped was much less than in previous years.

No. 2 Deep Well has not operated for the past three years as there is no water supply.

BREITUNG SHAFT:

Pumping was continued throughout the year from the Breitung Shaft. Late in t he year plans were made to install a clock in the Athens Mine engine house to determine exactly how much of each day the pump runs. In this way a tally can be made on the total amount of water which is being pumped from this shaft.

A shaft timbering crew from the Athens Mine spent two weeks during November repairing the upper part of the Breitung Shaft. Five new timber sets were installed replacing the old ones which had rotted and were caving into the shaft from the pressure of the surface material. A new covering over the shaft was constructed when this work was completed.

e. Water Purchased for Heating, Cooling, Etc.:

The number of gallons and cost of water purchased from the City of Negaunee during the last three years is as follows:

	1947		1946		1945	
	Gallons	Amount	Gallons	Amount	Gallons	Amount
1st Quarter	5,700,000	402.00	4,738,000	334.66	3,919,000	280.83
2nd Quarter	5,559,000	392.13	5,526,000	389.82	4,763,000	339.91
3rd Quarter	6,847,000	482.29	6,178,000	435.46	4,921,000	350.97
4th Quarter	7,545,000	531.15	6,425,000	452.75	5,503,000	391.71
Total	25,651,000	1,807.57	22,867,000	1,612.69	19,106,000	1,363.42
Produc t - Tons	508,100		367,361		438,427	
Cost Per Ton	.004		.004		.003	

f. Grounds and Fences:

The grounds around the mine buildings were maintained in good condition throughout the year. In December the poplar trees east of the mine office were topped to about one-half their height as they were becoming a hazard to the people living in the house next to the mine office.

Fen ces around the mine property and caves were maintained in good repair during 1947.

7. UNDERGROUND:

a. Shaft Sinking:

There was no shaft sinking in 1947.

ATHENS MINE
ANNUAL REPORT
YEAR 1947

7. UNDERGROUND: (CONT.)

b. Development, General Remarks:

The development program was increased considerably during the year. In January there were four crews on development and by the end of the year this was increased to ten crews. Two to three crews worked until September in the block caving development above the 8th Level. Late in the year these crews were transferred to the 4th Level where they started development of another block in the Corbit Lease.

Development and exploration was started in the new ore body north of the large diorite dike. This work will be continued by diamond drilling to determine the limits of the ore body before any mining will be started.

The 6th Level development was increased during the year in order to get raises up to the 4th Level where mining is approaching the 4th Level ele vation. Also, an additional area is being opened under the jasper capping at t he 4th Level and below.

b-1. Development in Ore:

-330' Sub-level:

A mining contract advanced 18 feet of single compartment ore raise while developing a stope area.

-365' Sub-level:

A double compartment transfer raise which is located east of No. 412 Raise was put up 21 feet in ore.

4th Level:

Total ore development footages on this level amounted to 155 feet, of which 115 feet was drifting and 40 feet raising. In developing the Corbit Lot a drift was extended through the ore body and into the south footwall. This accounted for the total ore drifting footages. No. 456 Raise, which started in the slate footwall, was extended to the -330' Sub-level where mining operations were started. No. 464 Raise was started in the Corbit Lot drift but later was discontinued as development plans were changed. The raise will be used as a traveling an d supply way to the transfer drift which is to be driven in this area.

5th Level:

Ore development at this elevation consisted of transfer drifts and raises for mining the ore along the north footwall limb. There was a total of 163 feet of ore drift and 145 feet of ore raise for the year. Raising in this area is slow due to very loose ground which requires the use of head boards in many instances.

6th Level:

Sixth Level ore development amounted to 210 feet which was entirely raising. Three new raises were started, two of which were completed. No. 661 Raise was put up in footwall material to the 5th Level elevation where a cut out was made and a transfer drift driven to the southwest. The total ore footage in this raise was very small as the contact between the ore and the footwall was near the 5th Level elevation. No. 653 Raise was started in the south footwall but soon encountered the ore approximately 40 feet up. By the end of the year the raise was cut out at the 5th Level elevation and was reversed in direction.

ATHENS MINE
ANNUAL REPORT
YEAR 1947

7. UNDERGROUND: (CONT.)

b-1. Development in Ore: (Cont.)

7th Level:

There was no development work done on the 7th Level during 1947.

-710' Sub-level:

Forty feet of ore drift was advanced in block 3 south of the dike when a mining crew advanced a transfer for stoping operations.

-745' Sub-level:

A total of 2,078 feet of drifts and raises were driven at this elevation. All of this development was done in the block caving area located in blocks 3 and 4 south of the cross dike. All of the raises were single compartment and cribbed. The drifts were also of small size with 7-foot legs and 4-1/2-foot caps.

-780' Sub-level:

There was a total of 714 feet of single compartment ore raise put up from the block cave transfer drifts at this elevation. These raises, which are located at 15-foot intervals along the length of the transfer drifts, were put up 30 feet to the grizzly sub elevation.

8th Level:

No. 11 Contract put up No. 867 Raise for a ventilation and supply connection to the grizzly sub of the block caving project.

9th Level:

The largest proportion of ore development on this level was done in connection with the new ore body north of the large diorite dike. A total of 319 feet of main level ore drift was driven and also one exploration raise was put up to the 8th Level elevation. No. 951 Raise, which is located in the ore body south of the large dike, was completed early in the year.

10th Level:

There was no ore development on the 10th Level during the year.

The following is a summary of the development footages in ore for 1947:

Location	Drifting	Raising	Total
-330' Sub-level		18	18
-365' Sub-level		21	21
4th Level	115	40	155
5th Level	163	145	308
6th Level	10	200	210
-710' Sub-level	40		40
-745' Sub-level	1336	742	2078
-780' Sub-level		682	682
8th Level		32	32
9th Level	319	217	536
Total 1947	1983	2097	4080
Total 1946	395	571	966
Increase	1588	1526	3114

ATHENS MINE
ANNUAL REPORT
YEAR 1947

7. UNDERGROUND: (CONT.)

b-2. Development in Rock:

4th Level:

Practically all of the rock development on this level was done in connection with the Corbit Lease development. The north footwall drift was extend ed to the south through the ore body and again into the rock of the south footwall slates. This drift was turned to the southwest at about the 3400S coordinate and was extended to No. 652 Raise for ventilation. The total rock drifting footage for the year amounted to 540 feet. There was also some rock raise development done during the year in connection with mining operations in lot 12 and also in t he Corbit Lease. The total rock raise footage amounted to 137 feet.

5th Level:

A small amount of rock raise development was done at this elevation late in the year. No. 650-B Raise was advanced 30 feet in the north footwall slate.

6th Level:

No. 650 Crosscut was extended a distance of 196 feet in the north footwall slate. This work was done in order to get raises up to the area being mined above the 4th Level in lots 11 and 12. Mining is approaching the 4th Level elevation and the new raises will be put up as soon as possible.

The total rock raise development at this level amounted to 139 feet. Five raises were started in rock during the year. No. 661 Raise was put up to the 5th Level elevation in footwall slate and then a cutout was made preparatory to driving a transfer drift to the southwest. No. 665 Raise was put up some distance in rock. No. 667 and No. 669 Raises were started while the drift development crew was in this area and will later be continued by a regular raise crew. No. 653 Raise wal also started in slate, but after a short distance encountered the ore.

7th Level:

There was no rock development at this elevation during the year.

-710' Sub-level:

A total of 125 feet of water drainage drift and transfer drift was put in at this elevation. A portion of a transfer drift southwest from No. 875 Raise was in slate. In addition, a small-sized rock drift was driven for water drainage in this same area.

-745' Sub-level:

There was 45 feet of rock drift advanced and 56 feet of rock paise put up while developing the block caving area south of the cross dike.

-780' Sub-level:

During the development of the transfer drifts and raises for the block caving area a total of 210 feet of drift was advanced and 241 feet of single compartment raises were put up. The top of each raise was approximately 30 feet above the floor of the transfer drift.

ATHENS MINE
ANNUAL REPORT
YEAR 1947

7. UNDERGROUND: (CONT.)

b-2. Rock Development: (Cont.)

8th Level:

There was no rock development at the level during 1947.

-800' Sub-level:

A tot al of 302 feet of rock drift was advanced on this sub-level during t he year. Approximately 200 feet of this total was driven southwest from No. 966 Raise. This drift was put in to provide ventilation for the block caving area when the main 8th Level drift was sealed off following the indicated fire on the 760' Sub-level. The remainder of the rock footage was advanced by mining contracts at No. 951 and No. 952 Raises when they drove ventilation and traveling connections north to the 8th Level drift.

9th Level:

Development of the new ore body north of the large diorite dike was started during the year. A total of 115 feet of rock drift was advanced before encountering the ore.

10th Level:

A total of 68 feet of rock raise was put up from the bottom of the shaft to the 10th Level elevation where it connected to the end of the trench. This trench was put in last year and the raise and trench will be used for cleaning and storing skip pit mud. A scraper hoist will be installed on top of the raise and the skip pit mud will be scraped up the raise and dumped into the trench. From the trench it can be scraped into the north storage pocket.

The following is a summary of the development footages in rock for 1947:

Location	Drifting	Raising	Total
4th Level	540	137	677
5th Level		30	30
6th Level	196	139	335
-710' Sub-level	125		125
-745' Sub-level	45	56	101
-780' Sub-level	210	241	451
-800' Sub-level	302		302
9th Level	115		115
10th Level		68	68
Total 1947	1533	671	2204
Total 1946	616	127	743
Increase	917	544	1461

c. Stoping:

(1) General:

The product for 1947 was obtained largely from the 4th, 6th and 8th levels with smaller amounts from the 9th and 10th Levels. The Corbit Lot development was started during the year which will help to keep the 4th Level in the higher production bracket in the future. Sixth level production increased somewhat as new raises were put up which developed new areas under the jasper capping below the 4th Level. The ore body north of the cross dike between the 8th and 9th Levels was discovered t o be considerably smaller than indications. Consequently the to tal production from this area will be less than anticipated.

ATHENS MINE
ANNUAL REPORT
YEAR 1947

7. UNDERGROUND: (CONT.)

c. Stoping: (Cont.)

(1) General: (Cont.)

Sub-level caving was continued in certain areas during the year. In addition a block of ore which had been left above 8th Level as a fire pillar was developed and mining started by the block caving system. By the end of the year the ore above the 8th Level was nearly all mined and until the ore body north of the large dike comes into production the 8th Level production will decrease rapidly.

The locations of the mining contracts at the end of 1947 and 1946 are shown below:

	1947	1946
	11 above 4th Level	9 above 4th Level
	9 above 6th Level	3 above 6th Level
	2 above 8th Level	9 above 8th Level
	4 above 9th Level	1 above 9th Level
	3 above 10th Level	4 above 10th Level
Total	29	26

The contracts were divided as follows:

	1947		1946
Mining -	6 top slicing	Mining -	9 top slicing
	- 13 sub caving		- 14 sub caving
Developing -	6 raising	Developing -	1 raising
	- 4 drifting		- 2 drifting
Total	29		26

Above the 4th Level elevation ore was mined in 1947 from the following sub-levels: -245', -260', -275', -290', -300', -315', -330', -340', -355', -365', -375' and 4th Level.

Between 4th and 6th Levels ore was mined on the -405', -430', -500' Sub-levels and the 6th Level.

Between 6th and 8th Levels ore was mined on the following sub-levels: -600', -615', -625', -635', -645', -660', -675', 7th Level, -710', -720', -735', -745', -760', -770', -780', and 8th Level.

Between 8th and 9th Levels ore was mined on the -800', -865', -875' Sub-levels and the 9th Level.

Between 9th and 10th Levels ore was mined on the -905', -920', -930', -940' and -955' Sub-levels.

Many of the sub-levels mentioned above were not actually occupied by mining contracts but ore was drawn from some of them by mining operations which were conducted on lower elevations.

ATHENS MINE
ANNUAL REPORT
YEAR 1947

7. UNDERGROUND: (CONT.)

c. Stoping: (Cont.)

(2) Detail of Stoping:

Blocks 5 and 6 above 4th Level:

The largest proportion of mining above 4th Level during the year was done in the Mitchell Lease Lot 11 and Athens Lot 12. One Contract continued working along the north footwall in Athens Lot No. 10. Radial sub-level caving was continued in the north half of Athens Lot 12 where considerable difficulty is experienced due to heavy ground. Considerable repair work is necessary to keep the raises open for mining. During the year a new raise was put up from the north footwall drift on the 4th Level near the Corbit Lot boundary in order to provide additional working places and also to speed up the mining in this area. At the beginning of the year mining was well under way on the -290' Sub-level and by the end of the year mining was being carried on at the -330' elevation. In December 5 contracts were working in this area; Nos. 3, 4 and 23 from No. 456 Raise and Nos. 12 and 32 from No. 412 Raise.

Adjacent to the south footwall in Athens Lot 12 mining was carried on by two contracts. No. 8 Contract mined the greatest portion of the ore in this area while No. 12 Contract mined in Lott 11 as well as Lot 12. The -355' Sub-level was opened early in the year and by November mining was completed in this area. The ore rem aining below this sub-level will be mined from 6th Level raises which are now being put up.

In the Mitchell Lease Lot 11, Contracts No. 14 and 22 continued working the area adjacent to the north footwall. Mining was being completed on the -330' Sub-level early in the year and by the end of the year mining was well under way on the -355' Sub-level. Progress in this area was slowed up considerably due to heavy ground conditions which required continued repairs in the raise as well as on the main level below. In addition, considerable water was encountered along the dike and north footwall which greatly affected the progress of mining. Contracts No. 31 and No. 12 continued mining in the area next to the south footwall. By the end of the year both contracts had completed mining on the -365' Sub-level and the crews were then transferred to other working areas. Some ore still remains below this sub-level but it will be recovered from 6th Level raises.

In the Athens Lot 10 Contract No. 1 continued sub-level caving and top slicing operations in the area along the north footwall. By the end of the year mining was near completion on the 365' Sub-level which is 30 feet above the 4th Level. Development is underway to bring raises up to the area from a 5th Level transfer and mining will be started from these raises early in 1948.

Between 4th and 6th Levels - Athens Lot 10 & Mitchell Lot 11:

Mining was started on the -405' Sub-level early in the year by three sub-level caving contracts. This ore area is about 300 feet long and the width extends from the south footwall to the jasper capping, a distance of about 175 feet. By the end of the year development of the next lower sub-level had started and one more contract had been added to this area. General mining conditions are quite favorable in this area, although some water is encountered along the south footwall which retards progress somewhat.

ATHENS MINE
ANNUAL REPORT
YEAR 1947

7. UNDERGROUND: (CONT.)

c. Stoping: (Cont.)

(2) Detail of Stoping: (Cont.)

Between 6th an d 8th Levels - Ore Area South of Cross Dike:

In the west end of Block 4 there was an old fire pillar 30 feet wide which had been left at the time of the first fire in 1941. During the year this narrow pillar was mined by sub-level stoping operations which were carried on at the 7th Level elevation.

A small amount of sub-level caving and stoping was done in the west half of Block 3, where sub-level caving operations were discontinued following the strike in 1946.

The development work was completed and mining started in the east half of Block 3, which had been left as a fire pillar since 1943. This area was developed as an experiment in the block caving system and by the end of the year drawing operations were near completion. It was not an ideal block but it did give a fair idea as to the merits of the system. The total height of the block was approximately 100 feet and it was cut with many old drifts which caused considerable trouble due to old timber which clogged in the finger raises. Caving was st arted early in September and by October the area was producing from 1,000 to 1,200 tons daily. About this time hot charcoal was drawn from some of the fingers and it was necessary to seal off several positions in order to be sure that no more hot coals would be drawn. This greatly reduced the area that was being drawn and it was necessary to undercut additional positions in order to keep up production. In general the results obtained were good in spite of some of the difficulties due to the nature of this particular block. If this system were applied to a new block with some additional height, much better production could be obtained.

Ore Area North of Cross Dike:

In the west half of Block 3 mining was completed on the -745' Sub-level early in the year by three contracts. The -760' Sub-level was then developed and after being about one-third completed, smoke was discovered coming out of the old gob in one of the slices adjacent to the south footwall. This sub-level was sealed off and mining was then continued on the -800' Sub-level below the 8th Level. The pillar of ore between the -760' and -800' Sub-levels was left as a seal and insulation between the fire area and the new sub-level.

In Block 4 No. 18 Contract completed mining on the -745' Sub-level at the end of the year was mining on the -760' Sub-level. Considerable water is encountered in this area which greatly affects the progress of mining.

In the east end of Block 3 No. 27 Contract completed mining on the -770' Sub-level which was started early in the year. Shortly after the fire occurred in the west end this contract moved down to the -800' Sub-level, leaving a pillar to seal the new sub-level from the fire area.

Between 8th an d 9th Levels - Block 3 North of Cross Dike:

The -800' Sub-level was developed by three contracts following the fire which occurred on the -760' Sub-level above. The ore area is somewhat smaller at this elevation than was originally anticipated. By the end of the year mining was near completion on this sub-level and the crews will then develop the next lower sub-level. Some caving was done in the west end of the block by No. 2 Contract. The remainder of the area is being top sliced.

ATHENS MINE
ANNUAL REPORT
YEAR 1947

7. UNDERGROUND: (CONT.)

c. Stoping: (Cont.)

(2) Detail of Stoping: (Cont.)

Between 9th and 10th Levels - Block No. 2:

Sub-level caving operations were continued in this area by four contracts namely, Nos. 6, 24, 26 and 40. During the year one contracts was transferred to another area. The -920' Sub-level was developed early in the year by Contracts 24, 26 and 40. The caving operations carried on at this elevation actually mined ore from sub-levels above the 9th Level elevation. By the end of the year mining was completed on the -940' Sub-level and development of the -955' Sub-level, which is the transfer level, had been started. Contract No. 6 continued sub-level caving operations in the extreme west end where they are working in advance of mining operations in order to drain the water which occurs in this area. At the end of the year this latter contract was repairing on the level preparatory to starting a new raise to replace the raise which had closed in due to heavy ground.

d. Timbering:

The total cost for timbering increased $142,485.76 over last year. The year 1946 was low due to the fact the mine did not work for three months due to the labor strike. The cost per ton increased .05-1/2 over last year. The cost for timbering is high due to the large amount of repair work necessary to maintain the main level as well as mining raises and sub-levels. Constant repair work was necessary on the 4th Level where the drifts cross the ore body. In addition it was necessary at times to discontinue mining in order that the miners could help on main level repairs. An increasing amount of steel H beams are being used to support the back and sides where pressures are not too great. As more of these are installed it should eventually reduce timbering costs as the steel is permanent, where ordinary timber sets must be replaced every year or two.

ATHENS MINE
ANNUAL REPORT
YEAR 1947

7. UNDERGROUND: (CONT.)

d. Timbering: (Cont.)

Statement of Timber Used:

	Lineal Feet	Avg. Price Per Foot	Amount 1947	Amount 1946
6" to 8" Cribbing	142,559	.0674	9,615.19	4,128.66
8" to 10" Stulls	21,574	.1095	2,363.87	1,605.06
10" to 12" "	90,125	.1632	14,716.26	9,775.73
12" to 14" "	30,191	.2322	7,012.44	5,299.56
14" to 16" "	8,384	.2605	2,184.31	938.06
Spec. Squared Timber - Block Mining	8,371	.6349	5,315.34	-----
Total 1947	301.204	.1368	41,207.41	21,747.07
Lagging - 7 ft.	1,230,797	.0150	18,517.62	13,484.67
Poles - 9½ ft.	764,564	.0240	18,347.04	18,429.62
Total 1947	1,995,361	.0185	36,864.66	31,914.29
Wire Netting	165		10.52	73.29

	1947	1946
PRODUCT FOR YEAR	508,100	367,361
Ft. Timber per Ton of Ore	.5928	.4705
Ft. Lagging per Ton of Ore	2.4223	2.5861
Ft. Poles per Ton of Ore	1.5047	2.1628
Ft. Lagging per Ft. of Timber	4.0862	5.4967
Cost per Ton for Timber	.0811	.0592
Cost per Ton for Lagging	.0365	.0367
Cost per Ton for Poles	.0361	.0502
Cost per Ton for Wire Netting	.0000	.0002
Cost per Ton for Timber, Lagging, Poles & Netting	.1537	.1463
Equivalent of Stull Timber to Board Measure	513,099	307,480
Ft. of Board Measure per Ton of Ore	1.0098	.8370
Lin. Ft. Netting per Ton of Ore	.0003	.0031
Sq. Ft. Netting per Ton of Ore	.0014	.0131

Total Cost of Timber, Lagging, Poles, Etc.:

Year	Amount	Cost Per Ton
1947	78,082.59	.1537
1946	53,734.65	.1463
1945	72,844.22	.1661
1944	77,935.27	.1850
1943	82,305.17	.1589
1942	82,410.65	.1209
1941	67,589.93	.1041
1940	59,589.66	.1155
1939	47,153.55	.1164
1938	36,920.27	.1340

ATHENS MINE
ANNUAL REPORT
YEAR 1947

7. UNDERGROUND: (CONT.)

e. Drifting and Raising:

The following table gives a comparison of total feet of drifting and rais ing in ore and rock for 1947 and 1946:

	Drifting		Raising		Grand Total
Year	Ore	Rock	Ore	Rock	1947-1946
1947	1,983	1,533	2,097	671	6,284
1946	395	616	571	127	1,709
Increase	1,588	917	1,526	544	4,575

The large increase in ore development footage was due mainly to the block caving development above 8th Level. There was also some rock development in this connection. However, aside from this there was a considerable increase in development footages. By the end of the year one-third of the total contracts were on development work.

f. Explosives, Drilling and Blasting:

The use of Hercomite 2-X powder was continued with its consumption amounting to somewhat over 80% of the total. Approximately 16% of Gelamite 1-X was used and the remainder was Gelamite #1. The use of Gelamite powder was continued in raise work as it is more cohesive and sticks together better than Hercomite powder. In the block caving area some 2-inch diameter sticks of powder were used. By using the larger size it was possible to save some drilling time in that fewer holes were required.

There was no appreciable change in drilling methods during the year with Ingersoll-Rand RB12 jackhammers being used. Two new J50 jackhammers were purchased however, and are present ly being used in rock drift work. These new machines replace the regular drifters where the rock is not too hard. They are being used with jacklegs and considerable time is saved in rigging up and getting ready to drill.

Fuse and cap blasting was continued almost exclusively in the regular mining contracts. A change from DuPont to Hercules electric delay was made during the year. The Hercules delays fit our underground blasting conditions much better than did the DuPont in that the regular 250 volt circuit can be used. With DuPont caps it is necessary to carry a separate blasting circuit of not more than 110 volts. Some Primacord was used during the year in blasting the undercut in the block caving area. This was done in order to insure positive detonation of all holes.

ATHENS MINE
ANNUAL REPORT
YEAR 1947

7. UNDERGROUND: (CONT.)

f. Explosives, Drilling and Blasting: (Cont.)

Statement of Explosives Used: (Ore Development & Stoping)

KIND	QUANTITY	AVERAGE PRICE	AMOUNT 1947	AMOUNT 1946
60% Am. Gelatin Powder				148.92
No. 1 Gelamite Powder	4,000	14.25	570.00	3,578.22
No. 2X Hercomite Powder	154,494	13.44	20,762.94	12,615.46
No. 1X Gelamite Powder	30,306	14.20	4,303.30	----
Total Powder 1947	188,800	13.58	25,636.24	
Total Powder 1946	133,109	12.28		16,342.60
Fuse - Feet	694,175	6.97	4,840.39	3,074.29
Caps	85,885	13.70	1,176.62	900.85
Electric Caps & Delays	1,702	16.07	273.54	119.11
Primacord Fuse - Feet	24,000	32.00	768.00	----
Shot Firing Cord - Feet	805	24.07	19.38	8.73
Connecting Wire - Lbs.	96	.75	72.30	34.10
Fuse Lighters	17,100	6.75	115.46	101.28
Tamping Bags	25,000	2.15	53.75	43.00
Tamptite Shells	5,000	6.53	32.64	---
Blasting Machine Unit	1	13.50	13.50	
Total Fuse, Caps, Etc.			7,365.58	4,281.36
TOTAL ALL EXPLOSIVES			33,001.82	20,636.96
PRODUCT			508,100	367,361
Pounds Powder per Ton of Ore			.3716	.3623
Tons Ore per Pound of Powder			2.6912	2.7599
Cost per Ton fo r Powder			.0504	.0445
Cost per Ton for Fuse, Caps, Etc.			.0145	.0116
Cost per Ton for All Explosives			.0649	.0561

Sinking, Rock Development, Etc.

KIND	QUANTITY	AVERAGE PRICE	AMOUNT 1947	AMOUNT 1946
60% Am. Gelatin Powder				238.08
No. 1 Gelamite Powder				98.90
No. 2X Hercomite Powder	1,506	13.50	203.31	444.04
No. 1X Gelamite Powder	13,444	14.20	1,908.60	----
Total Powder 1947	14,950	14.13	2,111.91	
Total Powder 1946	6,366	12.27		781.02
Fuse - Feet	61,825	7.13	440.72	137.12
Caps	7,790	13.70	106.72	44.55
Electric Caps & Delays	853	17.19	146.61	34.09
Shot Firing Cord	305	34.95	10.66	8.73
Total Fuse, Caps, Etc.			704.71	224.49
TOTAL ALL EXPLOSIVES			2,816.62	1,005.51
TOTAL COST EXPLOSIVES USED AT MINE			35,818.44	21,629.47
AVERAGE PRICE PER POUND FOR POWDER			.1362	.1228

ATHENS MINE
ANNUAL REPORT
YEAR 1947

7. UNDERGROUND: (CONT.)

g. Mining and Loading:

There were three systems of mining used during the year, viz., top slicing, sub-level caving and block caving. Top slicing had been used for many years but some of these areas are now being mined by the sub-level caving system of mining which was introduced in 1945. In 1947 the block caving system was tried in an area which had been left as a fire pillar. In general, the results obtained were very good considering the nature of the block which had previously been cut by old drifts which caused some difficulty when the old timber clogged in the finger raises. It was also found that hot charcoal was still present in this area and when this appeared in some of the finger raises it was necessary to stop drawing ore. By the end of the year mining was near completion in this block caving area and plans were being made to develop a second block above t he 4th Level.

Most of the ore loading was done through raises and chutes. In the block caving area above 8th Level loading was done by scraping directly into cars from top timber transfer drifts.

h. Ventilation:

In general, ventilation was good during 1947 with a total volume of 75,000 to 80,000 cubit feet per minute being delivered by the main fan. The fan is located on the 10th Level and the fresh air comes down through the cage road and the exhaust returns to surface through the skip compartments. The fresh air is forced from the 10th Level through the upper levels and finally returns to th e skip compartments on the 4th Level which is the top level. The main pr oblem with this type of ventilation system is to prevent the air from leaking t hrough air lock doors and getting back to the intake channel. Regular ventilation surveys were made during the year by the Safety Department engineers and as far as possible their recommendations have been complied with. Several auxiliary fans are used throughout the mine to force air into headings where the circulation is poor and temperatures are high.

i. Pumping:

The following table gives data on pumping at the Athens & Breitung Shafts:

Period	Avg. K.W. Per Day - Athens	K.W.Per Month Breitung Pump	Avg. Gal. Per Min. - Athens	Total Cost Both Mines from the Athens Cost Sheet
January	3,423	1,790	297	2,076.49
February	3,348	1,740	290	1,983.02
March	3,394	1,580	287	2,217.85
April	3,440	4,000	292	2,283.55
May	4,257	7,720	363	2,728.81
June	4,474	5,900	385	2,973.18
July	4,290	5,580	376	2,838.90
August	4,491	4,230	374	2,983.72
September	4,345	3,250	368	2,828.77
October	4,135	2,500	357	2,818.20
November	4,124	1,910	346	2,803.79
December	3,774	3,774	346	2,661.55

ATHENS MINE
ANNUAL REPORT
YEAR 1947

7. UNDERGROUND: (CONT.)

i. Pumping: (Cont.)

The following table gives data on pumping at the Athens & Breitung Shafts:

Period	Avg.K.W. Per Day - Athens	K.W. Per Month Breitung Pump	Avg. Gal. Per Min. - Athens	Total Cost Both Mines from the Athens Cost Sheet
1938 Avg.	3,767	3,433	314	2,350.42
1939 "	3,991	4,391	331	2,291.90
1940 "	4,141	858	351	2,381.69
1941 "	4,008	1,883	354	2,351.56
1942 "	4,435	2,258	388	2,668.91
1943 "	4,351	3,358	372	2,701.08
1944 "	3,696	1,688	308	2,528.62
1945 "	3,951	2,853	332	2,356.83
1946 "	3,909	1,839	320	2,456.08
1947 "	3,958	3,665	340	2,599.82

The average cost in 1934 prior to pumping at the Breitung Shaft was $2,611.79.

The number of gallons pumped per minute at the Athens Mine in each month of the year for the past seven years is given in the following statement:

Month	1947	1946	1945	1944	1943	1942	1941
January	297	303	306	315	359	399	330
February	290	331	302	297	334	388	327
March	287	282	293	296	330	373	324
April	292	327	342	295	356	374	334
May	363	366	365	307	404	402	334
June	385	330	359	312	411	402	367
July	376	321	359	314	431	393	386
August	374	314	355	313	419	394	363
September	368	316	338	311	390	384	363
October	357	316	329	312	364	397	360
November	346	304	325	316	337	379	365
December	346	302	307	308	328	368	397
Average	340	320	332	308	372	388	354

8. COST OF OPERATING:

a. Comparative Cost of Production:

		1947		1946		Increase Or Decrease
	Production - Tons	508,100		367,361		140,739
	UNDERGROUND COST:	Amount	Per Ton	Amount	Per Ton	Per Ton
1	Exploring in Mine	3,410.13	.007	336.90	.001	.006
3	Development in Rock	37,601.21	.074	11,947.50	.032	.042
4	Development in Ore	41,528.86	.082	9,547.66	.026	.056
5	Stoping	326,715.42	.643	225,822.97	.615	.028
6	Timbering	441,178.48	.868	298,692.72	.813	.055
7	Tramming	140,751.83	.277	102,823.69	.280	.003
8	Ventilation	20,013.70	.039	13,054.68	.036	.003
9	Pumping	31,197.83	.061	20,967.38	.057	.004
10	Compressors & Air Pipes	60,767.77	.120	36,610.78	.100	.020
11	Back Filling	190.08				
12	Underground Superintendence	41,492.41	.082	32,144.69	.087	.005
13	Cave-in or Fire in Mine	582.83	.001			.001
14	Maint: Compressors & Power Drills	5,089.03	.010	2,532.74	.007	.003
15	Scraper & Mech. Loaders	55,182.48	.109	28,004.31	.076	.033
16	Electric Tram Equipment	29,576.85	.058	19,224.83	.052	.006
17	Pumping Machinery	6,662.76	.013	3,721.66	.010	.003
	Total Underground Cost	1,241,941.67	2.444	805,432.51	2.192	.252
	SURFACE COST:					
18	Hoisting	48,791.47	.096	32,544.53	.089	.007
19	Stocking Ore	13,672.90	.027	6,528.12	.018	.009
21	Dry House	13,021.15	.026	11,930.12	.032	.006
22	General Surface Expense	14,212.40	.028	9,334.81	.025	.003
23	Maint: Hoisting Equipment	21,796.61	.043	13,112.14	.036	.007
24	Shaft	14,128,67	.028	5,492.77	.015	.013
25	Top Tram Equipment	2,441.13	.005	915.10	.002	.003
26	Docks,Trestles & Pockets	3,858.93	.007	2,076,09	.006	.001
27	Mine Buildings	2,084.28	.004	6,682.58	.018	.014
	Total Surface Cost	134,007.54	.264	88,616.26	.241	.023
	GENERAL MINE EXPENSE:					
28	Geological	738.97	.001			.001
29	Mining Engineering	7,179.36	.014	4,559.74	.012	.002
30	Mechanical & Electrical Engineering	3,117.83	.006	1,513.53	.004	.002
31	Analysis & Grading	20,602.19	.041	11,652.51	.032	.009
32	Safety Department	3,871.16	.008	2,370.53	.007	.001
33	Telephones & Safety Devices	4,043.92	.008	2,614.71	.007	.001
34	Local & General Welfare	4,820.75	.009	3,044.96	.008	.001
35	Special Expense,Pensions,Allowances	7,800.55	.015	6,145.07	.017	.002
36	Ishpeming Office	26,323.98	.052	18,918.02	.052	
37	Mine Office	27,213.15	.054	18,023.56	.049	.005
38	Insurance	10,064.35	.020	3,957.66	.011	.009
39	Personal Injury	28,143.32	.055	22,822.68	.062	.007
40	Social Security Taxes	23,803.61	.047	15,492.55	.042	.005
41	Employes' Vacation Pay	42,630.48	.084	27,594.08	.075	.009
	Total General Mine Expense	210,353.62	.414	138,709.60	.378	.036
	COST OF PRODUCTION	1,586,302.83	3.122	1,032,758.37	2.811	.311
	Depletion - Original Cost	9,535.94	.019	7,264.14	.020	.001
	Increment	22,222.78	.044	14,472.60	.039	.005
	Depreciation - Plant & Equipt.	14,170.16	.028	10,286.11	.028	
	Development	12,956.55	.025	8,816.66	.024	.001
	Taxes - Ad Valorem	96,795.13	.191	73,646.97	.201	.010
	Loading & Shipping	37,430.66	.074	24,803.03	.068	.006
	Administrative Expense	25,405.00	.050	18,368.05	.050	
	Miscellaneous Income & Expense	3,221.41	.006	2,666.55	.007	.001
	TOTAL COST AT MINE	1,808,040.46	3.559	1,193,082.48	3.248	.311
	Budget - Estimated Cost Per Ton		3.443		3.260	.183

ATHENS MINE
ANNUAL REPORT
YEAR 1947

8. COST OF OPERATING: (CONT.)

b. Detailed Cost Comparison: (Cont.)

(7) Detail of Accounts: (Cont.)

1. Exploring in Mine:

In 1947 there were 525 feet drilled with Bortz bits while in 1946 there was no drilling done. The increase in cost for 1947 was $3,073.23 and cost per ton .006.

3. Development in Rock:

Total feet of drifting and raising in rock 2,184 feet in 1947 as compared with 743 feet in 1946. Increase in expense $25,653.71 and in cost per ton .042. Drifting in 1947, 1,581 feet; in 1946, 616 feet. Raising in 1947, 603 feet; in 1946, 127 feet.

4. Development in Ore:

The increase in expense was $31,981.20 and cost per ton .056. There were 1,410 feet more drifting and 1,656 feet more raising in 1947. A great deal of the dri fting and raising was done in developing the block cave.

5. Stoping:

There was an increase in expense of $100,892.45 and cost per ton .028.

6. Timbering:

The increase in expense was $142,485.76 and cost per ton .055. The cost for t imber, lagging and poles increased .0074 per ton. There were two new HU Utility single drum air hoists costing $570.00 each and one A5NN-OH double drum air hoist costing $714.60 purch ased in 1947 as compared with five second-hand HU Utility hoists bought from the Princeton Mine costing $200.00 each in 1946.

7. Tramming:

There was an increase of 140,739 tons in production. The expense to this account increased $37,928.14 an d cost per ton decreased .003.

8. Ventilation:

The expense to this account increased $6,959.02 and cost per ton .003. The charge fo r electric power was $850.65 more in 1947. Two new 5 H.P. Jeffrey Fans costing $390.24 each were bought in 1947.

9. Pumping:

Expense increased $10,230.45 and cost per ton .004.

Gallons of water pumped in 1947	178,537,561
Gallons of water pumped in 1946	168,139,933
Gallons inc rease	10,397,628
Average gallons per minute in 1947	340
Average gallons per minute in 1946	320
Gallons increase	20

The cost for electric power was $180.81 less than in 1946

ATHENS MINE
ANNUAL REPORT
YEAR 1947

8. COST OF OPERATING: (CONT.)

b. Detailed Cost Comparison: (Cont.)

(7) Detail of Accounts: (Cont.)

10. Compressors & Air Pipes:

Expenditures increased $24,156.99 and cost per ton increased .020.

Cubic feet air compressed in 1947	1,191,510,000
Cubic feet air compressed in 1946	817,695,000
Increase in cubic feet compressed	373,815,000
Cost of electric power in 1947	$37,232.28
Cost of electric power in 1946	23,960.35
Increase	13,271.93

During the year there was a change over to victaulic pipe fittings which increased the cost to air lines considerably.

11. Back Filling:

The expense to this account was 190.08 in 1947. None in 1946.

12. Underground Superintendence:

The increase in expense was $9,347.72 and cost per ton decreased .005.

13. Cave-in or Fire in Mine:

The expense to this account in 1947 was due to the fire which occurred in April, requiring helmet crews to seal the area and introduce carbon dioxide.

14. Compressors & Power Drills:

The increase in expense was $2,556.29 and cost per ton .003. There were two new RB12 jackhammer drills purchased in 1947 costing $224.00 each, two J50 jackhammer drills costing $260.00 each, six jacklegs costing $95.20 each, eight pickhammer machines at $130.00 each and four JB4 jackhammer drills at $99.00 each.

15. Scrapers & Mechanical Loaders:

The expense in 1947 increased $27,178.17 and cost per ton .033. There were two new 25 H.P. Ingersoll-Rand electric scraper hoists at $2,116.00 each and four 25 H.P. Sullivan electric scraper hoists at $2,427.00 each purchased in 1947. Also four Holcomb-Westeeco scrapers bought second-hand from the Princeton Mine at $100.00 each.

16. Electric Tram Equipment:

The increase in expense was $10,352.02 and cost per ton .006.

	Generators	Locomotives	Wiring	M.L. Track	M. L. Cars
1947	386.21	8,723.49	1,104.94	14,343.30	5,018.91
1946	1,088.14	5,147.12	645.08	8,202.50	4,141.99
Increase		3,576.37	459.86	6,140.80	876.92
Decrease	701.93				

ATHENS MINE
ANNUAL REPORT
YEAR 1947

8. COST OF OPERATING: (CONT.)

b. Detailed Cost Comparison: (Cont.)

(7) Detail of Accounts: (Cont.)

16 Electric Tram Equipment: (Cont.)

The increase in expense to locomotives was due to overhauling locomotive bought from Princeton Mine and more repairs to other locomotives. The expense to M. L. Track increased due to extending tracks to block cave area. The increase to wiring and M. L. Cars was due to more repairs.

17. Pumping Machinery:

Expenditures increased $2,941.10 and cost per ton .003. The increase in 1947 was mostly due to repairing the shaft at the Breitung Mine where the Athens Mine operates a pump to handle water which would otherwise drain into the Athens Mine.

SURFACE COSTS:

18. Hoisting:

	Ore	Rock	Total
Product - 1947	508,100	26,270	534,370
Product - 1946	367,361	12,965	380,326
Increase	140,739	13,305	154,044

There was an increase in expense of $16,246.94 and cost per ton .007. The electric power charge was $8,510.21 more than in 1946.

19. Stocking Ore:

Tons stocked in 1947	239,193
Tons stocked in 1946	127,492
Increase	111,701

The increase in expense was $7,144.78 and in cost per ton .009.

20. Dry House Expense:

There was an increase in expense of $1,091.03 while the cost per ton decreased .005.

22. General Surface Expense:

Expense to this account increased $4,877.59 and cost per ton .003.

23. Hoisting Equipment:

	Electric Hoists	Hoisting Ropes	Skips & Skip Roads	Sheaves
1947	3,106.23	9,563.45	8,998.55	123.98
1946	2,955.56	4,526.18	5,249.01	381.39
Increase	150.67	5,037.27	3,749.54	
Decrease				253.01

8. COST OF OPERATING: (CONT.)

b. Detailed Cost Comparison: (Cont.)

(7) Detail of Accounts: (Cont.)

23. Hoisting Equipment: (Cont.)

The increase in expense was $8,684.47 and cost per ton .007.

In 1947 three 1-3/8" skip ropes costing $7,746.70 and one 1-1/4" cage rope costing $1,816.75 were charged out as compared with two 1-3/8" skip ropes at $2,843.29 and one 1-1/4" cage rope for $1,682.89 in 1946. The increase in expense to skips and skip roads was due to more repairs and construction of new skip bails.

24. Shaft:

There was an increase in expense of $8,635.90 and cost per ton of .013.

	Steel Sets	Undg. Pockets
1947	2,857.70	11,270.97
1946	1,901.08	3,591.69
Increase	956.62	7,679.28

The increase in expense to steel sets due to more repairs. Increase in expenditures to underground pockets due to repairing skip pit at bottom of shaft and building new concrete trench for cleaning skip pit.

25. Top Tram Equipment:

There was an increase in expense of $1,526.03 and cost per ton of .003.

	Engines & Motors	Wire Rope	Sheaves Rollers, Etc.	Tracks & Cars
1947	170.71	448.31	953.43	868.68
1946	81.64	110.83	133.79	588.84
Increase	89.07	337.48	819.64	279.84

239,193 tons were stocked as compared with 127,492 tons in 1946.

26. Docks, Trestles & Pockets:

The increase in expenditures was $1,782.84 and cost per ton .001. The increase in expense was due to repairing shaft house pockets and rock trestles.

27. Mine Buildings:

Expenditures decreased $4,598.30 and cost per ton .014. The detail of expense is as follows:

Mine Office	16.64	Repairing windows and doors.
Warehouse	42.82	New door and repairs to windows.
Shops	80.19	Repairing windows and doors.
Shaft House	7.14	Repairing windows.
Engine House	49.35	Painting floors and repairing windows.
Dry House	173.80	Interior painting & repairs to water lines.
Coal Dock	333.15	Enclosing part of dock for stoker coal
Top Tram Building	5.03	Repairing windows.
Storage Building	1,376.16	Extending building to make room for more storage and alterations to house tractor.
Total	2,084.28	

ATHENS MINE
ANNUAL REPORT
YEAR 1947

8. COST OF OPERATING: (CONT.)

b. Detailed Cost Comparison: (Cont.)

(7) Detail of Accounts: (Cont.)

GENERAL MINE EXPENSE:

28. Geological:

The expense to this account was $738.97 and cost per ton .001. In previous years this expense was charged to exploring in mine.

29. Mining Engineering:

The increase in expense was $2,619.62 and cost per ton .002. This figure covers time and expense of mining engineers and helpers.

30. Mechanical & Electrical Engineering:

There was an increase in expense of $1,604.30 and cost per ton of .002. The charge to this account covers the time spent by mechanical and electrical departments on inspections and repairs.

31. Analysis & Grading:

	Sampling At Mine	Central Laboratory Expense	Shipping Dept. Expense	Trucking Samples, Etc.
1947	5,225.65	10,621.61	3,505.39	1,062.42
1946	2,966.22	5,569.40	2,512.08	604.81
Increase	2,259.43	5,052.21	993.31	457.61

Determinations 1947 - 55,795 - cost per determination .090549.
" 1946 - 35,114 - " " " .158609.

There was an increase in expenditures of $8,949.68 and cost per ton of .009.

32. Safety Department:

	First Aid & Safety Supplies	First Aid and Helmet Practice	Ish peming Office Charge
1947	739.39	301.31	2,830.46
1946	338.50	173.16	1,858.84
Increase	400.89	128.15	971.62

The expense to this account increased $1,500.63 and cost per ton .001.

33. Telephones & Safety Devices:

There was an increase in expense of $1,429.21 and cost per ton of .001.

	1947	1946	Increase	Decrease
Lights at Shafts & Levels	1,851.45	1,388.61	462.84	
Mine Telephones	378.80	239.78	139.02	
Safety Gates	665.04	744.03		79.29
Sign Boards & Signals	838.45	25.69	812.76	
Fire Equipment	310.18	216.30	93.88	
Total	4,043.92	2,614.71	1,429.21	

ATHENS MINE
ANNUAL REPORT
YEAR 1947

8. COST OF OPERATING: (CONT.)

b. Detailed Cost Comparison: (Cont.)

(7) Detail of Accounts: (Cont.)

34. Local and General Welfare:

The expense to this account increased $1,775.79 and cost per ton .001.

35. Special Expense, Pensions & Allowances:

	Legal	Examinations	Retirement	Wage Adjustment	Other Expense	Pensions & Allowances
1947	537.83	627.50	4382.48		1673.07	579.67
1946	1322.82	338.30	2888.99		1015.74	579.22
Increase		289.20	1493.49		657.33	.45
Decrease	784.99					

There was an increase in expenditures of $1,855.48 and a decrease of .002 per ton.

36. Ishpeming Office:

Ishpeming Office expense is prorated to the various mines on the basis of labor costs. There was an increase in expense of $7,405.96 while the cost per ton remained the same.

37. Mine Office:

	Salaries	Central Warehouse Expense	Miscellaneous
1947	19,457.24	6,718.95	1,036.96
1946	12,818.00	n3,936.75	1,268.81
Increase	6,639.24	2,782.20	
Decrease			231.85

38. Insurance:

	Property	Group	Catastrophe	Group Annuity
1947	1,670.27	6,714.84	379.90	1,299.34
1946	1,043.12	1,813.27	412.37	688.90
Increase	627.15	4,901.57		610.44
Decrease			32.47	

There was an increase in expense of $6,106.69 and cost per ton of .009.

39. Personal Injury:

	Compensation and Doctors	Compensation Department	Hospital Loss
1947	17,850.80	1,181.34	9,111.18
1946	17,459.07	715.69	4,647.92
Increase	391.72	465.65	4,463.26

The increase in expense to this account was $5,320.64 and cost per ton decreased .007.

ATHENS MINE
ANNUAL REPORT
YEAR 1947

8. COST OF OPERATING: (CONT.)

b. Detailed Cost Comparison: (Cont.)

(7) Detail of Accounts: (Cont.)

40. Social Security Taxes:

	Unemployment Insurance Tax	Old Age Benefit Tax
1947	13,491.09	10,312.52
1946	8,756.75	6,735.80
Increase	4,734.34	3,576.72

There was an increase in expenditures of $8,311.06 and cost per ton .005.

41. Employees' Vacation Pay:

The increase in expense was $15,036.40 and cost per ton .009.

9. EXPLORATIONS AND FUTURE EXPLORATIONS:

On the 9th Level a drift was advanced into the ore body north of the large diorite dike. Some diamond drilling was done from this drift in order to determine the limits of the ore body at the 9th Level. One diamond drill hole was also drilled on the 4th Level late in the year to determine the location of the footwall contact on the south limit of the ore in the Corbit Lot.

Following are the locations and courses of the diamond drill holes:

D. D. Hole #17 - 9th Level - S 3179 & 1150 W - Dip 0° - N 45° 45'W

D. D. Hole #18 - 9th Level - S 3180 & 1141 W - Dip 0° - N 0° 31'E

D. D. Hole #19 - 9th Level - S 3107 & 1315 W - Dip ∠3° - S 18° 45'W

D. D. Hole #21 - 9th Level - S 3069 & 1361 W - Dip ∠1° 10' - S 44° 35'W

D. D. Hole #22 - 9th Level - S 3059 & 1352 W - Dip ∠1° 30' - N 00° 49'W

D. D. Hole #23 - 4th Level - S 3450 & 87 E - Dip ∠51° - N 1° 02' W

A raise was put up from the new drift on the 9th Level and some diamond drilling will be done from it at the 8th Level elevation to determine the limits of the ore body. It is also planned to do additional drilling from levels above to determine the upward extension of this ore body north of the large diorite dike.

ATHENS MINE
ANNUAL REPORT
YEAR 1947

10. TAXES:

COMPARATIVE STATEMENT OF TAXES FOR THE YEARS 1947 AND 1946

DESCRIPTION	1947 VALUATION	1947 TAXES	1946 VALUATION	1946 TAXES
ATHENS MINE				
Including Stockpiles, Supplies &				
Equipt. as placed by Tax Commission	1,540,000	68,170.26	1,990,000	87,845.17
Personal Property	625,000	27,666.50	305,000	13,463.71
Collection Fees		958.37		1,013.09
Total Athens Mine	2,165,000	96,795.13	2,295,000	102,321.97
HARVEY ADDITION				
Prop. of Lot 1	950	42.05	950	41.94
" " " 2	190	8.41	190	8.39
" " " 2 Fontaine Pur-Lib 23-3	600	26.56		
" " " 2 Gayotte " " 24-609	950	42.05	950	41.94
" " "5&6 .33A - Cedarblade	760	33.64	760	33.55
" " " 6 .36 Acres	855	37.85	855	37.74
" " " 7 Lehman - Lib 20-82	475	21.03	475	20.97
" " " 7 Liber 20-81	475	21.03	475	20.97
" " " 7 " 30-213	665	29.44	665	29.36
" " " 8 Blair-Liber 19-72	House Dismantled		475	20.97
STERLING ADDITION				
Lot 1, W 13' Lot 2, & W 6½' Lot 3	190	8.41	190	8.39
Lot 7 - Vassanen	1,330	58.87	1,330	58.71
Lots 8 & 9 - Bjornberg	1,140	50.47	1,140	50.32
Lot 10 - Delarye	855	37.85	855	37.74
Lot 11 - 2 Houses	1,140	50.46	1,140	50.32
Lots 12 & 13	2,185	96.72	2,185	96.45
Lot 14 - Wick	1,045	46.26	1,045	46.13
Lot 15 - Johnson	1,425	63.08	1,425	62.90
Lots 16 & 17 - Roma	1,520	67.28	1,520	67.10
Lot 18 CCICo.	1,140	50.46	1,140	50.32
Lot 19 - Turpinen	855	37.85	855	37.74
Lot 20 - Savola	475	21.03	475	20.97
Lot 22 - Pachette	475	21.03	475	20.97
Lots 23 & 24 - CCICo.	1,425	63.08	1,425	62.90
Lot 25 - Forsland	855	37.85	855	37.74
Lot 26 - CCICo.	855	37.85	855	37.74
Lot 27 - Maki8	855	37.85	855	37.74
Lot 28 - CCICo.	1,330	58.87	1,330	58.71
Lot 29 - Mattsen	1,710	75.70	1,710	75.49
Lot 30 - Rund	1,330	58.87	1,330	58.71
Lots 31 to 38 Inc. - CCICo.	4,370	193.45	4,370	192.91
Lot 72 - Lehman	100	4.43	100	4.41
Lots 73, 74 & 75	290	12.84	290	12.80
Collection Fees		14.52		14.43
Total Rented Buildings	32,815	1,467.14	32,690	1,457.47
Total Athens Iron Mining Company	2,197,815	98,262.27	2,327,690	103,779.44

DISPOSITION OF CHARGES	Oprtg. Mine	Rented Bdgs.	Oprtg. Mine	Rented Bdgs.
Total as Above	96,795.13	1,467.14	102,321.97	1,457.47
Charged 11 Months	88,900.00	1,331.00	93,000.00	1,243.00
Balance December Month	7,895.13	136.14	9,321.97	214.47

ATHENS MINE
ANNUAL REPORT
YEAR 1947

11. ACCIDENTS AND PERSONAL INJURY:

The following table gives the number and time lost from compensable accidents for the past seven years.

	1947	1946	1945	1944	1943	1942	1941
Fatal	0	0	0	0	0	0	0
Time Lost - Over 4 Mos.	3	1	0	2	4	2	1
- 1 to 4 Mos.	6	2	7	7	4	9	7
- Less than 1 Mo.	16	8	7	12	18	5	10
Total Compensable Accidents	25	11	14	21	26	16	18
Number of cases paid compensation for accidents prior to Jan. 1st each year	2	1	4	4	4	4	4
Number of cases paid difference in wages (Inc. in above total)	2	0	2	2	1	2	2

Nature and Classification of Compensable Accidents:

Date	Remarks	Days Lost
1/ 6/47	Compound Comminuted fracture, upper left arm and both bones, left forearm	180
1/13/47	Sprained left ankle.	23
1/14/47	Bruised left hand and foot	8
12/11/46	Muscle rupture, right arm	192
3/24/47	Contusion of right thigh	32
4/ 2/47	Dislocation of left elbow	24
5/9/47	Bruised right foot and ankle	13
5/14/47	General contusions, shoulders and back	145
5/19/47	Fractured patella, right knee	29
5/14/47	Ulceration of right knee	8
6/21/47	Sprained right knee	15
8/23/47	Bruised back, right thigh and leg	25
8/23/47	Strained back	8
9/16/47	Fractured skull	Home
9/26/47	Infection upper eyelid	19
10/ 5/47	Contusion, right ankle	60
10/13/47	Fracture, right great toe	24
11/ 5/47	Fracture right ankle	Home
11/ 7/47	Bruised right arm and right leg	13
11/ 5/47	Fracture, 9th rib, left side	12
11/ 5/47	Bruised left leg	22
11/19/47	Bruised both thighs and pelvis	Home
12/ 4/47	Bruised right foot	9
12/13/47	Fractured bone, left foot	16
12/ 2/47	Infection, right knee	11

There was a total of 25 compensable accidents during 1947 as compared with 11 the previous year. Based on severity the Athens Mine had a position rating of sixth in a total of eleven underground properties.

ATHENS MINE
ANNUAL REPORT
YEAR 1947

12. NEW CONSTRUCTION AND PROPOSED NEW CONSTRUCTION:

Anew storage shed was constructed between the timber tunnel and the old storage shed. This was made entirely of metal and will be used to store equipment for underground use.

13. EQUIPMENT AND PROPOSED EQUIPMENT:

a. Tractor:

A second-hand Cletrac tractor and trail builder were purchased from the Princeton Mine during the year. It is used mainly for pushing rock and also for cleaning up on the stockpile area when shovel loading is in progress. Also, in the winter it is used for snow plowing.

b. Power Shovel:

The Athens Mine purchased an electric shovel from the Tilden Mine. This was used during the year for loading of all stockpile ore.

c. Scraper Hoists:

Following is a list of scraper hoist equipment at the mine:

		1947		1946	
		Total Cost of		Total Cost of	
Company	Machines	Machines Repaired	Each Mach. Repaired	Machines Repaired	Each Mach. Repaired
Sul. 15 H.P. Elec.	17	8	247.80	10	239.72
" 20 " "	3	1	320.47	2	234.84
" 25 " "	5	2	273.24	1	71.47
I.-R 15 " "	6	1	426.63	4	232.39
" 20 " "	7	6	201.35	3	399.44
" 25 " "	8	3	427.45	1	195.59
Total	46	21	274.58	21	250.56

In 1947 two new Ingersoll-Rand 25 H. P. and four new Sullivan electric hoists were purchased.

d. Drill Machines:

Purchased in 1947 and 1946 are listed below:

1947	1946
2 RB12 I.-R. Jackhammers	2 RB12 I.-R. Auger Drill Machines
2 J50 " "	4 Pickhammer Machines
4 JB4 " "	Purchased from Princeton Mine
8 Pickhammer Machines	
6 Jacklegs	

e. Motor Haulage Cars:

There were no new cars purchased during 1947.

ATHENS MINE
ANNUAL REPORT
YEAR 1947

13. EQUIPMENT AND PROPOSED EQUIPMENT:

f. Timber Hoists:

There were two new HU Utility single-drum air hoists and one new A5NN-OH double-drum air hoist purchased during 1947.

14. MAINTENANCE AND REPAIRS:

a. Steel Trestles:

Three spans of the southeast steel trestle were dismantled during the year. This is the portion of the trestle which would eventually be involved in the surface cave and it was felt that it would be much better to take it down before the ground settlement actually occurred. Stockpiling is still continued under the two spans near the shaft.

b. Comparison of Costs - 1947 with 1946:

Maintenance and repairs listed under underground costs:

	Amount	Cost Per Ton
1947	96,511.12	.190
1946	53,483.54	.145
Increase	43,027.58	.045

Maintenance and repairs listed by the four accounts as shown on the cost sheet:

	1947	1946	Increase
Comp. & Power Drills	5,089.03	2,532.74	2,556.29
Scraper Equipment	55,182.48	28,004.31	27,178.17
Elec. Tram Equipment	29,576.85	19,224.83	10,352.02
Pumping Machinery	6,662.76	3,721.66	2,941.10
Total	96,511.12	53,483.54	43,027.58

Purchased 1947:

Power Drills - 2 RB12 Ingersoll-Rand Jackhammers
- 2 J50 Ingersoll-Rand Jackhammers
- 4 JB4 Ingersoll-Rand Jackhammers
- 8 Pickhammer Machines
- 6 JL3 Ingersoll-Rand Jacklegs

Scraper Hoists - 2 Ingersoll-Rand 25 H.P. Electric Hoists
- 4 Sullivan 25 H.P. Electric Hoists

Maintenance and repairs listed under surface costs:

	Amount	Cost Per Ton
1947	44,309.62	.087
1946	28,278.68	.077
Increase	16,030.94	.010

ATHENS MINE
ANNUAL REPORT
YEAR 1947

14. MAINTENANCE AND REPAIRS: (CONT.)

b. Comparison of Costs - 1947 with 1946: (Cont.)

Maintenance and repairs listed in the five accounts as shown on the cost sheet:

	1947	1946	Increase	Decrease
Hoisting Equipment	21,796.61	13,112.14	8,684.47	
Shaft	14,128.67	5,492.77	8,635.90	
Top Tram Equipment	2,441.13	915.10	1,526.03	
Docks, Trestles & Pockets	3,858.93	2,076.09	1,782.84	
Mine Buildings	2,084.28	6,682.58		4,598.30
Total	44,309.62	28,278.68	16,030.94	

15. POWER:

Detail of electric current purchased compared with 1946:

	1947 - 12 Mos. Oprtg.		1946 - 12 Mos. Oprtg.	
	Cost	Per Ton	Cost	Per Ton
Stoping	3,519.39	.007	2,148.79	.006
Ventilation	12,491.30	.025	11,640.65	.032
Pumping	20,976.96	.041	21,157.77	.058
Hoisting	29,592.90	.058	21,082.69	.057
Stocking Ore	923.99	.002	532.29	.001
Dry House	673.95	.001	682.32	.002
Lights at Levels	846.43	.002	647.44	.002
Compressors	37,232.28	.073	23,960.35	.065
Electric Haulage	3,228.57	.006	2,062.79	.006
Shops	385.67	.001	317.63	.001
Heating	16.69		17.73	
Office	53.23		47.65	
Storage Battery Locomotive	32.00		192.04	
Electric Shovel	771.68	.002	432.26	.001
Surface Lighting	505.96	.001	432.26	.001
Total	111,251.00	.219	84,922.40	.231

Main Line Meter - K.W.	8,325,989	6,082,000
Separate Meter Readings	7,994,036	5,891,498
Line Loss - K.W.	331,953	190,502
Product - Tons	508,100	367,361
K.W. Per Ton (Inc. Line Loss)	16.3865	16.556
Cost Per K.W. (Avg. for Year)	.01391675	.013962907
15 Min. Demand (Avg. for Year)	1,538	1,308
Load Factor (Avg. for Year)	61.75%	54.75%

17. CONDITION OF PREMISES:

The grounds around the mine were kept in good condition throughout the year.

b. Athens Mine Houses:

The following statement gives the total cost of repairs and the average cost per house for 1947 and 1946:

Year	No. Houses	Amount Repairs	Average Cost Per House	Rental Income	Taxes and Insurance	Net Income
1947	31	1,083.38	34.95	6,032.32	1,880.15	3,062.04
1946	31	612.45	19.76	5,962.52	1,969.00	3,381.07

ATHENS MINE
ANNUAL REPORT
YEAR 1947

18. NATIONALITY OF EMPLOYEES:

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

As to Parentage:	1947	Percent	1946	Percent
Finnish	137	40.3	140	41.5
Italian	66	19.4	56	16.6
English	57	16.7	58	17.2
French (Canadian)	37	10.9	37	11.0
Swedish	23	6.7	22	6.5
French (Parisian)	1	0.3	1	0.3
Danish	1	0.3		
German	3	0.9	4	1.2
Austrian	4	1.2	6	1.8
Norwegian	5	1.5	6	m1.8
Irish	3	0.9	3	0.9
Greek	1	0.3	1	0.3
Polish	1	0.3	2	0.6
Scotch	1	0.3	1	0.3
Total	340	100.0	337	100.0

As to Birth:

	American Born		Foreign Born	
	1947	1946	1947	1946
Finnish	101	102	36	38
English	48	46	9	12
Italian	35	26	31	30
French (Canadian)	37	35		2
Swedish	20	17	3	5
French (Parisian)	1	1		
Scotch	1			
German	3	4		
Austrian	4	5		1
Norwegian	5	6		
Irish	3	3		
Greek			1	1
Danish	1			
Polish	1	2		
Bohemian		1		
Total	260	248	80	89

CRS/jl - 6
3/25/48

CAMBRIA-JACKSON MINE
ANNUAL REPORT
YEAR 1947

1. GENERAL:

The Cambria-Jackson Mine operated on a twelve-shift per week schedule during the entire year and a crew of about ten men were employed on the midnight shift to take down supplies, hoist the rock produced by one gang developing and also any accumulation of ore in pockets and chutes as time permitted.

The Cambria-Jackson Mine had a very successful and prosperous year. It developed a considerable amount of standard ore, absorbed 34,884 tons of high-sulphur ore in its standard grade, developed a large tonnage of high-sulphur ore and produced 86.8% more ore than last year at a cost of 24.2 cents per ton less than in 1946. The costs are remarkable when it is taken into consideration that there was during 1947 a great increase in prices of all materials and also a considerable increase in wages and the purchase of much new equipment.

Next year should be a banner year for the Cambria-Jackson Mine as all major improvements have been completed with the exception of repairing the shaft. The mine is now in tip-top condition with very good equipment and should show an increase in production at a lower cost in 1948.

2. PRODUCTION SHIPMENTS & INVENTORIES:

a. Production by Grades:

	1947	1946	Increase	Decrease
Cambria Lease Ore	692	4,378		3,686
Jackson Strip Ore	555,974	294,813	261,161	
Rock	6,356	9,704		3,348
Total Hoist	563,022	308,895	254,127	

The above figures include a stockpile overrun of 14,994 tons, of which 12,433 tons were credited to 1947 production and 2,561 tons to 1946.

b. Shipments:

	Pocket Tons	Stockpile Tons	Total Tons	Total Tons Last Year
Cambria Lease		5,070	5,070	
Jackson Strip	357,341	252,596	609,937	231,551
Total 1947	357,341	257,666	615,007	231,551
Total 1946	168,283	63,268	231,551	
Increase	189,058	194,398	383,456	

Shipments increased 165.60% in 1947 and were 60,902 tons more than the product for the year.

c. Stockpile Inventories:

	Dec. 31, 1947	Dec. 31, 1946	Decrease
Cambria Lease		4,378	4,378
Jackson Strip	52,895	106,858	53,963
Total	52,895	111,236	58,341

d. Division of Product by Levels:

	1947	Percentage	1946	Percentage
6th Level	111,025	20.04	85,616	28.86
7th Level	443,080	79.96	211,044	71.14
Total	554,105	100.00	296,660	100.00

CAMBRIA-JACKSON MINE
ANNUAL REPORT
YEAR 1947

2. PRODUCTION SHIPMENTS & INVENTORIES: (CONT.)

e. Production by Months:

Month	Cambria Lease	Jackson Strip	Total Ore	Rock
January	395	40,877	41,272	320
February		41,877	41,877	44
March		42,785	42,785	1,584
April		47,008	47,008	192
May		42,669	42,669	100
June		47,624	47,624	476
July		45,965	45,965	236
August		44,951	44,951	856
September		46,996	46,996	388
October		54,930	54,930	592
November		41,456	41,456	628
December		44,139	44,139	940
	395	541,277	541,672	6,356
Overruns	297	12,136	12,433	
Total 1947	692	553,413	554,105	6,356
Total 1946	4,378	292,282	296,660	9,704
Increase		261,131	257,445	
Decrease	3,686			3,348

f. Ore Statement:

	Cambria Lease	Jackson Strip	Total 1947	Total 1946
On Hand Jan.1,1947	4,378	106,858	111,236	43,596
Output for Year	395	541,277	541,672	294,177
Transfers	5,070	5,070		
Overruns	297	14,697	14,994	5,014
Total		667,902	667,902	342,787
Shipments		615,007	615,007	231,551
Bal.on Hand Dec.31,1947		52,895	52,895	111,236
Increase in Output	5,403	252,898	247,495	21,337
Increase in Ore on Hand				67,640
Decrease in Ore on Hand	4,378	53,963	58,341	

1947 - Six 2-8 hr. Shifts 1-1-47 to 12-31-47

1946 - Five 2-8 hr. Shifts and 1 1-8 hr. Shift 1-1-46 to 6-24-46
Six 2-8 hr. Shifts 6-24-46 to 12-31-46

1945 - Five 2-8 hr. Shifts 1-1-45 to 1-22-45
Five 2-8 hr. Shifts and 1 1-8 hr. Shift 1-22-45 to 12-31-45

1944 - Five 2-8 hr. Shifts and 1 1-8 hr. Shift 1-1-44 to 7-1-44
Five 2-8 hr. Shifts 7-1-44 to 12-31-44

1943 - Five 3-8 hr. Shifts and 1 2-8 hr. Shift 1-1-43 to 6-12-43
Five 3-8 Hr. Shifts and 1 1-8 hr. Shift 6-12-43 to 7-6-43
Five 2-8 hr. Shifts and 1 1-8 hr. Shift 7-6-43 to 12-31-43

CAMBRIA-JACKSON MINE
ANNUAL REPORT
YEAR 1947

2. PRODUCTION SHIPMENTS & INVENTORIES: (CONT.)

g. Delays:

1-13-47, 4½ hours delay - Loss of Product - 200 Tons
Broken skip runners.

1-24-47, 4½ hours delay - Loss of Product - 300 Tons
Broken skip runner.

2-6-47, 2 hours delay - Loss of Product - 200 Tons
Broken skip runner.

8-25-47, 3/4 hour delay - No loss in product
Coil on skip hoist.

8-26-47, 1-1/3 hours delay - No loss in product
Underground shaft pocket broken.

9-18-47, 2 hours delay - Loss of Product - 200 Tons
Wire burned off at substation.

10-8-47, 1 hour delay - Loss of Product - 150 Tons
Repair safety catches on cage.

10-22-47, 1 hour delay - Loss of Product - 100 Tons
Fluctuating power.

11-4-47, 1 hour delay - Loss of Product - 75 Tons
Repair cage.

The total loss of product from the 9 delays listed above amounted to 1,225 tons, as compared with 9 delays and a loss of 2,050 tons in 1946.

h. Delays Due to Lack of Current:

The only trouble experienced during 1947 was a wide fluctuation of voltage on a couple of occasions due to line failure.

3. ANALYSIS:

a. Average Mine Analysis on Output:

Grade	Tons	Iron	Phos.	Silica	Sulphur
Cambria-Jackson	554,105	58.48	.088	9.57	.031

b. Average Mine Analysis on Straight Cargoes:

All ore shipped was mixed with other grades.

CAMBRIA-JACKSON MINE
ANNUAL REPORT
YEAR 1947

4. ESTIMATE OF ORE RESERVES:

a. Developed Ore:

Assumption: 12.00 cubic feet equals one ton
10% deduction for loss in mining and rock

Percentage of Bessemer: None.

	Standard Ore				Sulphurous Ore	
	Negaunee		Ishpeming		Negaunee	Ishpeming
Area	Cambria Lease	Jackson Strip	Jackson Strip	Total	Jackson Strip	
Above 5th Lev. - Dep. #1	24,394			24,394		
Bet.5th&6th Lev.-Dep. #1	41,146					
Bet.5th&6th Lev.-Dep. #2	2,667	159,596				
Tot.Bet.5th&6th Levels	43,813	159,596		203,409		
Bet.6th&7th Lev.-Dep. #2	3,188	1,310,952			427,631	
Bet.6th&7th Lev.-Dep. #3	1,417	9,677	69,204			
Bet.6th&7th Lev.-Dep. #4						105,417
Tot.Bet.6th&7th Levels	4,605	1,320,629	69,204	1,394,438	427,631	105,417
Below 7th Level - Dep. #2		14,688			146,771	
Below 7th Level - Dep. #3		1,979	7,500			
Below 7th Level - Dep. #4						199,062
Tot.Below 7th Level		16,667	7,500	24,167	146,771	199,062
Gross as of Nov.30,1947	72,812	1,496,892	76,704	1,646,408	574,402	304,479
Less Dec.1947 Production		28,226	10,003	38,229		5,910
Gross as of Dec.31,1947	72,812	1,468,666	66,701	1,608,179	574,402	298,569
Less 10% for Mng.&Rock	7,281	149,689	7,670	164,640	57,440	30,448
Net Tot.as of Dec.31,1947	65,531	1,318,977	59,031	1,443,539	516,962	268,121

b. Total Developed Ore:

	Cambria Lease	Jackson Strip	Total
1947 Estimate	65,531	1,378,008	1,443,539
1946 Estimate	66,225	1,601,653	1,667,878
Decrease	694	223,645	224,339

The ore estimate of the Cambria-Jackson Mine, composed of the Cambria Lease and the Jackson Strip, is divided between the City of Negaunee and the City of Ishpeming. To obtain the amount of ore developed in 1947, the estimated decrease in reserves of 224,339 tons is deducted from the 1947 production (554,105 tons), which shows that 329,766 tons of standard ore were developed in 1947. This ore was developed by mining, which showed the ore areas to be larger than estimated last year.

In addition to the 329,766 tons of standard ore developed, an estimated 90,657 tons of high-sulphur ore were developed West of the main North-South fault.

c. Expected Average Natural Analysis:

Grade	Trade Name	Tons	Iron	Phos.	Sil.	Mang.	Alum.	Lime	Mag.	Sul.	Loss	Moist.
Non-Bess.	Camb.-Jack.	1,443,539	51.32	.087	8.31	.17	2.46	.55	.18	.035	3.00	12.50
Non-Bess.	Camb.-Jack.Spec.	785,083	52.50	.105	6.56	.11	2.44	.61	.44	.263	1.69	12.50
		2,228,622										

d. Ore in Stock: Average Natural Analysis:

Grade	Trade Name	Tons	Iron	Phos.	Sil.	Mang.	Alum.	Lime	Mag.	Sul.	Loss	Moist.
Non-Bess.	Camb.-Jack.	52,895	50.927	.078	8.928	.175	2.508	.403	.167	.041	2.121	12.30

CAMBRIA-JACKSON MINE
ANNUAL REPORT
YEAR 1947

5. LABOR AND WAGES:

a. Comments:

There were 229 men on the payroll on December 31st, 1947 as compared with 220 on December 31st, 1946, showing an increase of 9 men. The following is a compilation of accessions and separations:

Accessions:	
Transferred from Lloyd Mine	16
Transferred from Princeton Mine	6
Transferred from Negaunee Mine	3
Transferred from Mather "B" mine	1
Returned Veteran	1
Straight Hires	27
Total	54
Separations:	
Retired	8
Transferred to Other Mines	5
Discharged	9
Quit	17
Ill Health	5
Fatally Injured	1
Total	45

b. Comparative Statement of Wages and Product:

	1947	1946	Increase	Decrease
Product:	554,105	296,660	257,445	
No. Shifts and Hours 1-8	3	11		8
2-8	297	207	90	
Average No. Men Working:				
Surface	52	55		3
Underground	166½	148½	18	-
Total	218½	203½	15	
Average Wages per Day:				
Surface	10.25	9.25	1.00	
Underground	12.19	10.63	1.56	
Total	11.73	10.25	1.48	
Average Wages per Month:				
Surface	255.14	237.70	17.44	
Underground	303.70	272.72	30.98	
Total	292.15	263.25	28.90	
Product per Man per Day:				
Surface	35.67	25.74	9.93	
Underground	11.13	9.50	1.63	
Total	8.48	6.94	1.54	
Labor Cost per Ton:				
Surface	.287	.375		.088
Underground	1.095	1.160		.065
Total	1.382	1.535		.153
Average Product Mining:				
Stoping	29.26	26.93	2.33	
Development in Ore	9.56	10.17		.61
Total	28.69	25.33	3.36	

CAMBRIA-JACKSON MINE
ANNUAL REPORT
YEAR 1947

5. LABOR AND WAGES: (CONT.)

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

	1947	1946	Increase	Decrease
Avg. Wages Contract Labor:	13.47	11.42	1.95	
Total Number of Days:				
Surface	15,536	12,014½	3,521½	
Underground	49,786	32,393-3/4	17,392¼	
Total	65,322	44,408¼	20,913-3/4	
Amount for Labor:				
Surface	159,209.97	111,124.24	48,085.73	
Underground	606,799.42	344,238.85	262,560.57	
Total	766,009.39	455,363.09	310,646.30	
Avg. Wages per Mo. as per Labor Statement - Less Capt. and Clerks:				
Surface	257.42	239.85	17.57	
Underground	303.29	272.25	31.04	
Total	292.97	263.92	29.05	

Proportion of Surface to Underground Men:

1947 - 1 to 3.20
Six 2-8 hour Shifts 1-1-47 to 12-31-47

1946 - 1 to 2.70
Five 2-8 hour Shifts and 1 1-8 hour Shift 1-1-46 to 6-24-46
Six 2-8 hour Shifts 6-24-46 to 12-31-46

1945 - 1 to 2.52
Five 2-8 hour Shifts 7-1-44 to 1-22-45
Five 2-8 hour Shifts and 1 1-8 hour Shift 1-22-45 to 12-31-45

1944 - 1 to 2.52
Five 2-8 hour Shifts and 1 1-8 hour Shift 7-6-43 to 7-1-44
Five 2-8 hour Shifts 7-1-44 to 12-31-44

Note:	1947	1946
Proportion of Vacation Pay for Surface	5,838.40	6,040.55
Proportion of Vacation Pay for Underground	21,501.56	16,014.30
Total	27,339.96	22,054.85

Statement of wages and product for 1946 calculated for actual operating period, or approximately 8½ months.

6. SURFACE:

a. Buildings:

Engine House:
At the end of the year the floors and machinery were being cleaned and repainted. New rubber matting has been purchased to lay on all walkways.

Dryhouse:
The interior of the dry was repainted during the year.

Office:
No work was done on the office building during the year except that the floor of the storeroom was repainted.

6. SURFACE: (CONT.)

a. Buildings: (Cont.)

Shops:

The new shop building, constructed under authorization No. CC-174, was completed and accepted on May 27th, and under this same E.&A. all the machinery from the old shops together with a new drill sharpener and threading machine was installed with individual controls for each unit. A concrete launder with steel plate cover was constructed from the Dry building to the new shops and air, water and steam lines were laid in same, and a sewer line was put in from the shop to the sewerage sump located in the Dry building.

This building with its full complement of machinery is a very valuable asset for the economical operation of the property and compares favorably with the best in the district.

Air Hoist and Vacuum Pump Building:

This is a new, concrete block building, 8 feet by 12 feet in size, located just South of the shaft and houses a small air hoist and a vacuum pump. The air hoist is utilized to hoist timber and supplies to be loaded into the cage, and the vacuum pump is a part of the heating system for the top landing of the shafthouse. All charged for the construction of this building were absorbed in the mining costs.

Storage Sheds:

Two storage buildings, the old barn which was located just East and the shed North of the new shops, were sold and removed.

At the present time the old shop building is being used for storage. It has been proposed to sell and remove this building, which is in very bad condition and more or less of a fire hazard, next spring or summer when a new Quonset building will be erected just South of the new shops.

b. Ore and Rock Trestles and Stocking Grounds:

Dur to the fact that a shortage of stocking area was experienced this spring the stocking grounds both North and South of the pocket track were extended further East. The cut of about 3,000 cubic yards of earth for the South stocking ground balanced with the fill for the North grounds. The additional area was covered with about 8 to 10 inches of rock. The South area was graded with a dip to the South and East so that the water from spring thaws and rains would flow East along the South edge to the East end of the grounds where a 24-inch galvanized culvert was installed across the stocking grounds to a point near U. S. Highway 41, where a culvert under the highway carries the drainage into Teal Lake. The expense of this project was absorbed in the cost of mining.

c. Railroad Tracks:

Track work at the mine during 1947 consisted of maintenance of the main line and pocket track, regrading of the pocket track across the cave West of the shaft where a settlement occurred during last winter, and the laying of tracks for the loading out of the stockpiles.

d. Fences and Caves:

The erection of the fence last year inclosing the entire mining area eliminated all fence work this year. The caving areas increased in size and showed some more settling during the year.

6. SURFACE: (CONT.)

e. Grounds:

The grounds in front of the office and dry building, which were graded and prepared last year, were seeded in the spring and produced a beautiful lawn. Shrubbery and flowers were planted along the front of the office, between the office and dry and on the East side of the dry. The shrubbery and flowers grew exceptionally well and looked beautiful.

After the removal of the aforementioned old storage sheds the grounds around the new shop building were graded and surfaced with rock. The use of rock for grading around the plant depleted the rockpile which was located Northwest of the office and this area was smoothed up and graded and greatly improved the appearance of the grounds.

7. UNDERGROUND:

a. Shaft Sinking:

There was no shaft sinking in 1947.

b. Development:

The following table gives a comparison of total feet of drifting and raising in ore and rock in 1947 and 1946:

	Drifting		Raising		Grand
Year	Ore	Rock	Ore	Rock	Total
1947	553'	722'	367'	None	1,642'
1946	896'	992'	269'	538'	2,695'
Increase			98'		
Decrease	343'	270'		538'	1,053'

Development of the ore between the main North-South fault and the West end of the property on the Seventh Level and the drifting South of the shaft on the Sixth Level to develop the ore located by diamond drilling on the Fifth Level accounted for practically all the drifting and raising tabulated for 1947.

b-1. Rock Development:

The following table gives the total footage of rock drifting and raising for 1947 and 1946:

	Drifting	Raising	Total 1947	Total 1946
6th Level	382'	None	382'	85'
7th Level and Above	340'	None	340'	894'
Total 1947	722'	None	722'	979'
Total 1946	710'	269'	979'	
Increase	12'			
Decrease		269'	257'	

The advancing of a crosscut Northwesterly from a point 80 feet East of the West boundary line on the 7th Level into the footwall slate and the drifting South of the shaft on the 6th Level to develop the ore located by diamond drilling on the 5th Level accounted for most of the rock drifting in 1947. The above-mentioned crosscut on the 7th Level encountered 167 feet of rock and rock drift on the 6th Level was advanced 382 feet. The balance of rock drifting, 173 feet, represents footage required for ventilation and traveling roads on various subs throughout the mine.

7. UNDERGROUND: (CONT.)

b-2. Ore Development:

The following is a summary of ore development in 1947 as compared with 1946:

	Drifting	Raising	Total 1947	Total 1946
6th Level	114'	72'	186'	605'
7th Level	439'	295'	734'	925'
Total 1947	553'	367'	920'	1,530'
Total 1946	992'	538'	1,530'	
Decrease	439'	171'	610'	

Included in above statement are 317 feet of ore drift in the extension of the main drift to the Mather Mine boundary and the advance of a crosscut to the Northwest from a point 80 feet East of the boundary line, 46 feet of ore in No. 761 Raise, 47 feet in No. 736 Raise, 36 feet in No. 765 Raise and 45 feet in No. 767 Raise.

c. Stoping:

(1) General:

At the end of 1947 there were 17 gangs sub-level caving or developing for sub-level caving, one sub-level stoping, one developing for sub-level stoping, one top-slicing and one drifting in rock, a total of 21 gangs, the same number as at the end of 1946. It will be noted that at the present time there is only one gang top-slicing and one sub-level stoping, whereas at the end of 1946 there were five gangs top-slicing and none sub-level stoping. During a portion of the year there were three gangs sub-level stoping. This change in system of mining was the main factor in increasing production, which in turn reduced costs.

The taking down of timber and supplies on the midnight shift by a crew of ten men was continued throughout 1947. This crew also trammed and hoisted considerable ore during spare time which helped production considerably.

The location and number of mining contracts at the end of 1947 as compared with 1946, are as follows:

Location of Contracts	December 31st, 1947	December 31st, 1946
Sixth Level and Above		
220' Sub-Level		1
200' Sub-Level		1
180' Sub-Level	1	
140' Sub-Level	2	2
Sixth Level	1	
Seventh Level and Above		
90' Sub-Level	1	2
70' Sub-Level	1	
60' Sub-Level	2	
50' Sub-Level		3
35' Sub-Level		2
25' Sub-Level	2	2
00' Sub-Level	3	5
-25' Sub-Level	4	
-50' Sub-Level	1	
-50' Sub-Level - West	1	
-60' Sub-Level - West	2	
Seventh Level		3
Total	21	21

7. UNDERGROUND: (CONT.)

c. Stoping: (Cont.)

(1) General: (Cont.)

Occupation of contracts was as follows:

	Dec. 31st, 1947	Dec. 31st, 1946
Sub-Level Caving or Developing for Sub-Level Caving	17	9
Sub-Level Stoping	1	
Developing for Sub-Level Stoping	1	2
Top-Slicing	1	5
Drifting	1	1
Raising		2
Repairing		2
Total	21	21

(2) Detail of Stoping:

240' Sub - South Riser Orebody:
Work on this sub was started in October, 1945 and completed in September, 1947. Mining in 1947 consisted of completing the sub-level stoping of the ore West of the main North-South dike.

220' Sub - South Riser Orebody:
The 220' Sub was started in August, 1946 and completed in September, 1947. Four gangs worked on this sub. All ore East of the main North-South dike was mined by sub-level caving and that West by sub-level stoping. The ore area on this sub was somewhat larger than on the sub above having extended further South, East of the North-South dike and further West on the West side.

200' Sub - South Riser Orebody:
Mining on this sub was started in August, 1946 and completed in October, 1947. Four gangs worked here during the year, three sub-level caving and one sub-level stoping. As on the sub above all ore East of the North-South dike was sub-level caved and West, sub-level stoped. At times the product from this territory was not so good due to the numerous dikes and the intrusion of seams of lean ore and jasper.

180' Sub - South Riser Orebody:
All ore at this elevation has been mined with the exception of that portion South of the main East-West dike and East of the North-South, where one gang is sub-level caving at the present time. The ore West of the North-South dike was mined by sub-level stoping and the remainder by sub-level caving.

160' Sub - South Riser Orebody:
As on subs above the ore West of the North-South dike was mined by sub-level stoping and the East is being sub-level caved. One gang is mining on this elevation at the present time.

140' Sub - South Riser Orebody:
As on subs above all ore West of the North-South dike has been mined during the year. This is the sub on which the transfer drift that was being advanced at the end of last year was completed and from which all ore from above the North half of the ore West of the North-South dike was developed and sub-level caved. Due to the irregularities of the hanging and the intrusion of jasper it is almost impossible to describe this orebody. The intrusion of jasper at this elevation along the dike cut the ore into two parts, but at a lower elevation they again unite. The Southern half through an irregularity in the hanging connected to the chimney of ore located midway between the South Riser Orebody and the Main Deposit which was mined years ago.

7. UNDERGROUND: (CONT.)

c. Stoping: (Cont.)

(2) Detail of Stoping: (Cont.)

140' Sub - South Riser Orebody: (Cont.)
The ore North of the main South dike and East of the North-South dike is being mined by one gang and is nearing completion. The ore South of the South dike has been increasing in area on its downward extension so this area is two subs behind in mining. As this territory became too large for the one gang another was added which started mining in November just under the hanging in the Southwest corner of the area. When this gang advanced a drift to the West end of the ore and started retreating it was found that the ore extended about 50 feet above the sub under an irregular hanging. This being mined by a combination of sub-level caving and sub-level stoping.

120' Sub - South Riser Orebody:
This is the elevation of the transfer sub from which the South half of the ore West of the North-South dike was developed and mined. The floor of the sub was sub-level stoped from developments above the transfer drift on the 50-foot sub which is about 70 feet below.

Sixth Level:
In July, drifting was started to advance a main haulage drift Southerly from the shaft to develop ore located on the Cambria Lease just above and below the Fifth Level. At the end of the year this drift had been advanced 382 feet, all in footwall slate. This leaves about 170 feet more of drifting to complete the drift as proposed. As a raise will have to be put up from the 6th Level to the 5th Level, which is about 325 feet, and much drifting and raising done to develop this ore for sub-level stoping there will probably be no production from there until about a year from now.

Sixth Level - South Riser Orebody:
Mining on the 6th Level consisted of the sub-level stoping of an area 155 feet in length, averaging about 40 feet in width, which was developed from a transfer drift on the 50-foot sub.

90' Sub-Level:
South Riser Orebody:
An area approximately 140 feet by 60 feet was mined from sub-level stope developments above a transfer drift on the 50' Sub. The ore along the dike which could not be reached with development from the above-mentioned transfer is being developed and mined from another transfer drift on the 50-foot sub which was advanced parallel with and 30 feet distant from the North-South dike.

West Deposit:
Mining of the 90' Sub in the West Deposit was started in August of 1945 and completed in February of 1947. Two gangs worked on this sub ever since it started with the exception of the last two months. The percentage of extraction here was very high as several pillars were recovered which were left from the mining of the Sixth Level by the Republic Steel Corporation.

70' Sub-Level:
South Riser Orebody:
An area 125 feet by 40 feet was sub-level stoped on the 70-foot sub from developments above the North-South transfer drift on the 50-foot sub and mining was started along the North-South dike from developments above the transfer drift that parallels the dike on the 50-foot sub.

7. UNDERGROUND: (CONT.)

c. Stoping: (Cont.)

(2) Detail of Stoping: (Cont.)

70' Sub-Level: (Cont.)

Main Deposit:

Pillars that were left near the West side of the main North-South dike were caved from sub-level caving operations on the 50' Sub-Level.

West Deposit:

An area of about 110 feet by 75 feet on the West end of the West Deposit at the 70-foot elevation was mined by sub-level caving operations on the 60-foot sub.

60' Sub-Level:

Main Deposit:

The East end of the Main Deposit West of the North-South dike was mined from sub-level caving operations on the 50'-Sub.

South Riser Orebody:

An area about 105 feet by 35 feet was mined by a sub-level cave retreat in the North-South transfer drift on the 50-foot Sub.

Southwest Deposit:

Two small areas of ore were mined at the elevation of the 60-foot sub. These were chimneys or domes in the hanging and were mined from subs below.

West Deposit:

Two gangs are sub-level caving this area. The area of this sub will be very much smaller than on the sub above as the ore lies on a very flat foot and is cut off by a vertical dike. Mining on this sub will be completed in a couple of months.

50' Sub-Level:

Main Deposit:

Mining of the East end of the main deposit West of the North-South dike by sub-level caving was completed during the year. This area was a part of the block of ore which was left as a support for the upper ore in the South Riser which extended out over this area.

South Riser Orebody:

At the elevation of this sub (50'-Sub) the Main Deposit and the South Riser Orebody join along the West side of the North-South dike. The old transfer drift South of No. 713 Raise, which was advanced several years ago in jasper and from which a chimney of ore was developed and sub-level stoped, was extended South in the South Riser to the North East-West dike. From this transfer drift a sub-level stope was developed and mined up to the Sixth Level. After completing the stope the transfer drift was sub-level caved back to the jasper. To recover the ore lying along the North-South dike, which could not be reached from this development, a second transfer drift was advanced Southwesterly from No. 709 Raise parallel with the dike. At the end of the year developments for the sub-level stoping of this ore were far enough advanced so that mining was started in the latter part of December.

Southwest Deposit:

A small chimney of ore extending from the 25'-Sub up to the 70'-Sub near the Southeast corner of the deposit was stoped from the 25'-Sub.

7. UNDERGROUND: (CONT.)

c. Stoping: (Cont.)

(2) Detail of Stoping: (Cont.)

35' Sub-Level:

Main Deposit:

Mining in this area was started in June, 1946 and at the end of 1947 was mined to a line 40 feet West of the 9600' North-South coordinate line. This is the only area in the mine where the top-slicing system of mining is being used. The reason for top-slicing this territory is that the foot is so flat that if greater vertical intervals than that practiced in top-slicing were used it would be impossible to recover the ore on the far reaches of the footwall.

Southwest Deposit:

The only work for the year at this elevation was a sub-level caving retreat in the most Easterly drift and the mining of the chimney of ore mentioned on the sub above.

West Deposit:

A transfer drift was advanced Westerly from No. 747 Raise to the large North-South fault line as a development fro the sub-level caving of the 60' Sub. This drift for more than half its distance was in the very crotch of the footwall and a vertical dike which is the South limit of the orebody, and the dike and footwall are very close to either side of the drift for the balance of the distance. Therefore, this drift must be considered as the bottom of the West Deposit.

Deposit - South of West Deposit:

A small, isolated deposit is being developed and sub-level stoped just South of the West Deposit. More will be said about this deposit in report of work on the -60' sub-level from which this stope is being developed.

25' Sub-Level:

Main Deposit:

Mining by top-slicing was started in August underneath the area top-sliced on the sub above. At the end of the year there were two gangs top-slicing in this territory. In February, a transfer drift for the sub-level caving above was advanced North to the footwall from No. 709 Raise and later mills were put up to the 50' Sub.

Southwest Deposit:

Mining of the 25' Sub was completed during the year by six gangs of miners. The area of the Southwest deposit has been increasing on its downward extension. The area on the 25' Sub is about twice the size as it was on the top, or 70' Sub. Its increase has been to the South, East and West with a slight decrease along the North, or foot side.

Deposit - South of West Deposit:

See -60' Sub for report.

10' Sub-Level:

All ore shown mined at this elevation is the upward extension of the mining done on the 00' Sub.

00' Sub-Level:

East Riser - Main Deposit:

Mining in this area was started in November of last year and was completed in April. Mining in this territory was then abandoned due to the necessity of protecting the pillar or block that supports the main haulage drift on the Sixth Level that services the mining of the South Riser Orebody. It was feared that if this mining was carried down lower it might draw a portion of the block.

7. UNDERGROUND: (CONT.)

c. Stoping: (Cont.)

(2) Detail of Stoping: (Cont.)

00' Sub-Level: (Cont.)

Southwest Deposit:

Mining of this area on the 00' Sub has been just about completed. All that remains to be mined is three small pillars which is now being extracted by two gangs, and this should be completed in about two months. This sub is much larger at this elevation than on the 25' Sub. It might also be stated that at this elevation the deposit connects with the main deposit. From present evidence the Southwest Deposit, Main Deposit, East Riser and South Riser are all connected, the South Riser and the Main Deposit on the 50' Sub, the East Riser and Main Deposit on the 25' Sub, the North side of the Southwest Deposit and the Main Deposit on the 00' Sub and the South side of the Southwest Deposit with the South Riser Orebody on the -25' Sub.

Deposit - South of West Deposit:

See -60' Sub for report.

-25' Sub-Level (East):

Southwest Deposit:

Mining on the -25' Sub in this territory was started in February and at the end of the year was being sub-level caved by five gangs. It is at this elevation that the South side of this deposit connects with the South Riser Orebody, the main South drift which was all in ore having just passed under the jasper that separated the two deposits above. The area of ore in this deposit on the -25' Sub is much larger than on the sub above extending further to the East and the West, but is narrowed some by the foot on the North side. Approximately 25% of the area had been mined at the end of the year.

Deposit - South of West Deposit:

See -60' Sub for report.

-25' Sub-Level (West):

Deposit - West of North-South Fault:

The only work done on this sub was the cutting out in No. 751 Raise and drifting North to determine the width of the ore at this point. This drift proved the ore to be 35 feet wide from foot to hanging and the back of the drift the top of the orebody at this point.

-50' Sub-Level (East):

Areas shown at this elevation are portions of the deposit South of the West Deposit which will be reported on the -60' Sub.

-50' Sub-Level (West):

Deposit West of North-South Fault:

This is a long, narrow orebody extending from a point approximately 350 feet West of the large North-South Fault West to the West boundary line into the Mather Mine. The length of the ore on the Cambria-Jackson property at this elevation is 725 feet. The average width of the ore throughout the entire length averaged about 30 to 35 feet and the height 15 to 20 feet above the floor of the sub. This entire area with the exception of a small portion near the West end where the ore extends a little higher was mined during the year. At the end of the year there was one gang sub-level caving that which remains.

-60' Sub-Level (East):

Deposit - South of West Deposit:

This is a long, narrow stringer of ore located by underground drill hole No. 163 drilled parallel with and 100 feet East of the large North-South fault from a point in the Seventh Level main footwall drift. The South haulage drift on the Seventh Level was extended into this ore last year. This year two raises were put up from the Seventh Level to the -66-foot elevation where a transfer drift was ad-

7. UNDERGROUND: (CONT.)

c. Stoping: (Cont.)

(2) Detail of Stoping: (Cont.)

-60' Sub-Level (East): (Cont.)

Deposit - South of West Deposit: (Cont.)

vanced East and West for a total distance of 340 feet. Developing for sub-level stoping was started at both ends of the transfer at the same time. Actual stoping in the East end got under way in May and the West end in June. Stoping in the East end lasted less than a month as the stope encountered jasper all the way around. The West end which butted into the North-South fault was developed on the -50, -25, 00, /25 and /35-foot sub-levels and stopes opened on all. The top of the ore was reached at an elevation /50 feet or about 10 feet above the so-called 35-foot sub. The stope opening on the top or 35-foot sub measures 35 feet North and South and 50 feet East and West. The opening on the 25-foot sub, the only sub of the stope on which both foot and hanging was encountered, measured 110 feet North and South or foot to hanging and 65 feet East and West. Openings on the zero, -25 and -50-foot subs measured 70 feet by 55 feet, 50 feet by 55 feet and 35 feet by 45 feet, respectively. Roughly speaking, this ore extends 115 feet above the floor of the transfer at the fault line or West end and has been mined about 55 feet to the East.

-60' Sub-Level (West):

Deposit - West of North-South Fault:

At the end of the year there were two gangs sub-level caving under the sub mined above. There are indications that the width of the ore on this sub will be somewhat greater than it was on the sub above.

d. Timbering:

Much less timber was used in 1947 than in 1946 due to changing the system of mining in several places from top-slicing to sub-level caving and sub-level stoping. At the present time there is only one gang top-slicing, whereas at the end of 1946 there were five and there was no sub-level stoping in 1946; in 1947 there were three gangs a portion of the year. Sub-level caving requires only about 25% of that used in top-slicing and very little timber is used in sub-level stoping.

As a great deal of steel is being used on the main levels instead of timber I think future statements should include the amount of steel used.

Statement of Timber Used:

	Lineal Feet		Average Price per Foot		Amount	Amount
	1947	1946	1947	1946	1947	1946
8" Stulls	22,981	21,491	.1012	.0997	2,326.15	2,141.82
10" Stulls	40,906	42,489	.1679	.1500	6,868.69	6,372.16
12" Stulls	12,516	12,080	.2204	.2101	2,758.59	2,538.39
14" & Over	2,001		.2692		538.68	
Total	78,404	76,060	.1593	.1453	12,492.11	11,052.37
Hardwood Cribbing	19,567	2,583	.0356	.0338	697.40	87.20
6" Cribbing	20,935	25,297	.0598	.0599	1,252.63	1,516.48
Lagging - 7'	609,076	599,541	.0151	.0140	9,207.08	8,405.61
Poles - 9½'	311,203	473,125	.0245	.0227	7,622.01	10,720.66
Poles - 16'	4,848		.0371		179.81	
Total	965,629	1,100,546	.0196	.0188	18,958.93	20,729.95
Grand Total					31,451.04	31,782.32

CAMBRIA-JACKSON MINE
ANNUAL REPORT
YEAR 1947

7. UNDERGROUND: (CONT.)

d. Timbering: (Cont.)

Statement of Timber Used: (Cont.)

	1947	1946
Product	554,105	296,660
Feet of Timber per Ton of Ore	.141	.256
Feet of Cribbing per Ton of Ore	.073	.094
Feet of Lagging per Ton of Ore	1.099	2.021
Cost per Ton for Timber	.0226	.0373
Cost per Ton for Cribbing	.0035	.0054
Cost per Ton for Lagging	.0166	.0283
Cost per Ton for Poles	.0141	.0361
Total Cost per Ton	.0568	.1071

e. Drifting and Raising:

The following table gives a comparison of total feet of drifting and raising in ore and rock in 1947 and 1946:

	Drifting		Raising		
Year	Ore	Rock	Ore	Rock	Grand Total
1947	553'	722'	367'	None	1,642'
1946	896'	992'	269'	538'	2,695'
Increase			98'		
Decrease	343'	270'		538'	1,053'

Development of the ore between the main North-South fault and the West end of the property on the Seventh Level and the drifting South of the shaft on the Sixth Level to develop the ore located by diamond drilling on the Fifth Level accounted for practically all the drifting and raising tabulated for 1947.

f. Explosives, Drilling and Blasting:

Year	Cost per Lb. for Powder	Lbs. Powder per Ton of Ore	Cost per Ton for Powder	Cost per Ton Fuse & Caps	Cost per Ton Total
1947	.1344	.4506	.0606	.0105	.0711
1946	.1232	.4197	.0517	.0099	.0616

Statement of Explosives Used: (Ore Development and Stoping)

	Quantity	Average Price	Amount 1947	Amount 1946
Gelamite #1 - Lbs.	950	14.25	135.38	3,183.21
Hercomite #2X - Lbs.	237,190	13.437	31,872.15	12,153.42
Total Powder	238,140	13.441	32,007.53	15,336.63
Tamptite Shells	350	7.55	2.64	
Tamping Bags	5,000	5.00	25.00	12.50
Fuse - Feet	597,318	6.988	4,173.87	2,080.97
Caps - #6	81,286	13.717	1,115.04	720.18
Fuse Lighters - Hot Wire	30,000	6.718	201.55	118.16
Total Fuse, Etc.			5,518.10	2,931.81
Total All Explosives Stoping, Etc.			37,525.63	18,268.44

7. UNDERGROUND: (CONT.)

f. Explosives, Drilling and Blasting: (Cont.)

Statement of Explosives Used: (Cont.)

	1947	1946
Product	554,105	296,660
Pounds of Powder per Ton of Ore	.4506	.4197
Cost per Ton for Powder	.0606	.0517
Cost per Ton for Fuse, Caps, Etc.	.0105	.0099
Cost per Ton for All Explosives	.0711	.0616

Statement of Explosives Used: (Sinking, Rock Development, Etc.)

	Quantity	Average Price	Amount 1947	Amount 1946
Gelamite #1 - Lbs.	2,000	14.25	285.00	31.05
Hercomite #2X - Lbs.	8,010	13.431	1,075.85	1,151.56
60% Gelatin - Lbs.				381.25
Total Powder	10,010	13.595	1,360.85	1,563.86
Fuse - Feet	27,239	7.255	197.61	164.67
Caps - #6	3,647	13.707	49.99	52.63
Fuse Lighters - Hot Wire	[illegible]			16.88
Primacord - Feet	1,000	32.00	32.00	
Tamptite Shells	700	7.55	5.28	
Total Fuse, Etc.			284.88	234.18
Total All Explosives Rock Development, Etc.			1,645.73	1,798.04
Total All Explosives Used in Mine			39,171.36	20,066.48
Average Price per Pound for Powder			.1344	.1232
Explosives Charged to Idle Expense (March) *Included above.				2.45*
Explosives Charged to Ventilation (March)			238.10	
Total as per Cost Sheet			39,409.46	

Increase in cost per ton is principally due to the rise in prices of all explosives. There was also a slight increase in the amount of powder used per ton of ore.

g. Mining and Loading:

The mine has operated the entire year of 1947 on a schedule of two shifts per day, six days a week with 21 gangs of contract miners, one of which spent almost all of its time on rock development work. This is the same number of contracts that were employed at the end of last year. At the end of 1947 all mining was by the sub-level caving system with the exception of two gangs, one of which is top-slicing and the other sub-level stoping. The conversion from top-slicing to sub-level caving has greatly increased production and decreased costs but the grade of ore has been somewhat lowered by contamination which must be expected in this system of mining, especially if a good recovery is desired.

CAMBRIA-JACKSON MINE
ANNUAL REPORT
YEAR 1947

7. UNDERGROUND: (CONT.)

h. Ventilation:

Good ventilation has been maintained throughout the year. Much drifting, raising and repairing was done during the year to make and keep open airways throughout the mine.

i. Pumping:

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

Month	1947	1946	1945	1944	1943	1942	1941	1940
January	281	285	317	333	369	413	374	332
February	294	293	284	285	340	387	342	326
March	279	309	315	328	335	375	340	309
April	319	396	456	344	433	430	392	330
May	538	362	460	425	619	477	435	555
June	471	314	453	389	620	465	424	540
July	460	308	439	378	583	421	407	513
August	376	289	374	347	411	379	390	481
September	359	272	341	410	395	362	382	461
October	343	255	315	408	402	391	386	431
November	323	250	299	423	340	394	419	400
December	323	276	292	397	340	386	459	374
Avg. Gals. per Minute	364	301	363	372	432	407	396	421

Figures previous to June, 1943 were taken from Republic Steel Corporation records.

8. COST OF OPERATING:

a. Comparative Mining Costs:

	1947	1946	Increase	Decrease
Product	554,105	296,660	257,445	
Underground Costs	1.495	1.693		.198
Surface Costs	.200	.243		.043
General Mine Expense	.296	.304		.008
Cost of Production	1.991	2.240		.249
Taxes	.126	.131		.005
Depletion and Depreciation	.089	.092		.003
Loading and Shipping	.053	.038	.015	
Total Cost	2.259	2.501		.242
No. of Days Operated	300	218	82	
Total No. of Shifts Operated	597	425	172	
Average Daily Product	1,847	1,361	486	

Cost of Production:

	1947	Percent	1946	Percent	Increase	Decrease
Labor	1.482	65.6	1.647	65.9		.165
Supplies	.777	34.4	.854	34.1		.077
Total	2.259	100.0	2.501	100.0		.242

CAMBRIA-JACKSON MINE
ANNUAL REPORT
YEAR 1947

8. COST OF OPERATING: (CONT.)

b. Detailed Cost Comparison:

(1) Days and Shifts:

Year	Days Mine Worked	Shifts & Hours	Men Employed	Total Shifts
1947	300	597 - 8 Hr.	218½	65,322
1946	218	425 - 8 Hr.	203½	44,408¼
Increase	82	172	15	20,913-3/4

(2) Wages:

Through the new Agreement or Contract with the union all wage earners received a 12½ cents per hour increase in wages effective May 9th, 1947. All salaried men also received increases in the same proportion.

(3) Comparison of Production:

Production - 1947	554,105 Tons
Production - 1946	296,660 Tons
Increase	257,445 Tons

(4) Comparison of Number of Men and Wages:

Year	No. of Men	No. of Days	Amount	Rate per Day
1947	218½	65,322	766,009.39	11.73
1946	203½	44,408¼	455,363.09	10.25
Increase	15	20,913-3/4	310,646.30	1.48

(5) Tons per Man per Day:

	1947	1946	Increase
Surface	35.67	25.74	9.93
Underground	11.13	9.50	1.63
Total	8.48	6.94	1.54

(6) Cost of Production:

1947	1,103,446.01	Cost per Ton	1.991
1946	664,579.50	Cost per Ton	2.240
Increase	438,866.51		
Decrease			.249

	Labor	Percent	Supplies	Percent
1947	802,964.23	72.8	300,481.78	27.2
1946	481,290.48	72.4	183,289.02	27.6
Increase	321,673.75	.4	117,192.76	
Decrease				.4

CAMBRIA-JACKSON MINE
ANNUAL REPORT
YEAR 1947

8. COST OF OPERATING: (CONT.)
b. Detailed Cost Comparison: (Cont.)
(7) Detail of Accounts:

	1947		1946	
Days per Week	6		6	
Shifts and Hours	1-8 3 2-8 297		1-8 11 2-8 207	
Production, Tons	554,105		296,660	
Average Daily Production, Tons	1,847		1,361	
Number of Days Worked	300		218	
UNDERGROUND COSTS:	Amt.	Per Ton	Amt.	Per Ton
1. Exploring in Mine	1,546.54	.003	5,263.11	.018
2. Sinking Shaft				
3. Development in Rock	14,940.24	.027	20,478.46	.069
4. Development in Ore	10,674.21	.019	17,340.52	.058
5. Stoping	331,362.55	.598	161,250.17	.544
6. Timbering	189,961.49	.343	139,496.96	.470
7. Tramming	134,134,99	.242	68,588.33	.231
8. Ventilation	6,988.17	.012	4,809.57	.016
9. Pumping	30,032.90	.054	18,003.41	.061
10. Compressors and Air Pipes	30,475.96	.055	18,943.72	.064
11. Back Filling				
12. Underground Superintendence	22,718.59	.041	13,742.59	.046
13. Cave-in, or Fire in Mine	29.97		493.33	.002
14. Maint.:Compressors and Power Drills	2,596.27	.005	3,289.33	.011
15. Scrapers & Mechanical Loaders	25,936.45	.047	16,304.57	.055
16. Tramming Equipment	23,761.25	.043	12,806.45	.043
17. Pumping Machinery	3,205.32	.006	1,531.45	.005
Total Underground Costs	828,364.90	1.495	502,341.97	1.693
SURFACE COSTS:				
18. Hoisting	32,758.74	.059	19,593.89	.066
19. Stocking Ore	19,910.23	.036	10,920.86	.037
20. Screening - Crushing at Mine				
21. Dry House	9,448.38	.017	5,957.24	.020
22. General Surface Expense	15,919.60	.029	18,212.02	.061
23. Maint.:Hoisting Equipment	17,636.82	.032	10,486.19	.035
24. Shaft	4,558.53	.008	1,197.21	.004
25. Top Tram Equipment	7,660.45	.014	2,916.33	.010
26. Docks, Trestles & Pockets	66.20		442.96	.002
27. Mine Buildings	3,011.49	.005	2,220.14	.008
Total Surface Costs	110,970.44	.200	71,946.84	.243
GENERAL MINE EXPENSES:				
28. Geological	876.61	.001		
29. Mining Engineering	4,686.45	.008	3,977.99	.013
30. Mechanical & Electrical Engineering	3,789.89	.007	1,598.17	.005
31. Analysis and Grading	16,405.84	.030	8,218.09	.028
32. Safety Department	2,291.42	.004	1,359.55	.005
33. Telephones and Safety Devices	4,822.21	.009	2,700.21	.009
34. Local and General Welfare	3,332.31	.006	1,979.26	.007
35. Spec. Exp., Pensions & Allowances	5,264.94	.010	3,370.66	.011
36. Ishpeming Office	18,499.86	.033	12,504.21	.042
37. Mine Office	27,089.11	.049	16,468.08	.056
38. Insurance	8,338.59	.015	3,033.44	.010
39. Personal Injury	22,116.98	.040	6,908.19	.023
40. Social Security Taxes	18,920.70	.034	9,855.18	.033
41. Employees' Vacation Pay	27,339.96	.049	17,609.85	.060
Supply Inventory Adjustment	335.80	.001	707.81	.002
Total General Mine Expenses	164,110.67	.296	90,290.69	.304
COST OF PRODUCTION	1,103,446.01	1.991	664,579.50	2.240

CAMBRIA-JACKSON MINE
ANNUAL REPORT
YEAR 1947

8. COST OF OPERATING: (CONT.)
b. Detailed Cost Comparison: (Cont.)
(7) Detail of Accounts: (Cont.)

UNDERGROUND COSTS:

1. Exploring in Mine:
Bortz drilling during June, July and August.
2. Sinking Shaft:
3. Development in Rock:
722 feet of rock drifting.
4. Development in Ore:
553 feet of ore drifting; 367 feet of ore raising.
5. Stoping:
Increase due to 12½¢ an hour increase in wages effective May 9; also increase in price of powder, fuse and caps.
6. Timbering:
There was less timber used in 1947 than for the 8½ months' operating period in 1946.
7. Tramming:
Increase is due in part to more ½" plate used for chute lining.
8. Ventilation:
During the year 2 5-H.P. Fans 215.00, were charged out.
9. Pumping:

	Total Gallons Pumped	Gallons per Minute
Year 1947	190,950,934	364
Year 1946 (Operating Period)	108,148,315	276

The decrease in cost per ton due to larger production.
10. Compressors and Air Pipes:
6,317.76 more was charged to this account for electric power but this was offset by the larger production.
11. Back Filling:
There was no back filling in 1947.
12. Underground Superintendence:
The small decrease in cost per ton is due to larger production.
13. Cave-In, or Fire in Mine:
There was little cost to this account in 1947.
14. Compressors and Power Drills:
3 J-50 Jackhamers 780.00, 1 Pickhamer 131.03, 10 RB-12 Jackhamers(2nd Hand) 337.50, Worthington compressor parts 299.78 were charged out.
15. Scrapers and Mechanical Loaders:
No new equipment was charged to this account during the year.
16. Tramming Equipment:
7 2nd hand 65-cu.ft. tram cars 1700.00 and 440 ft. of 5000-volt haulage cable 684.62 installed and charged out.
17. Pumping Machinery:
Large repairs include 1 set pump bearings 290.00, 1 herringbone gear 560.86 and other pump parts 337.72.

SURFACE COSTS:

18. Hoisting:
Small decrease due to larger production.
19. Stocking Ore:
Extraordinary charges include culvert pipe for stocking grounds 457.60 and grading by Lindberg & Sons 1,050.00.
21. Dry House:
109 tons more coal consumed in heating plant.
22. General Surface Expense:
Less men employed on surface. Less charges for surface improvements than in previous year.
23. Hoisting Equipment:
3 hoisting ropes 4,338.64 and repairs to skiproads 1,267.91 during vacation week.
24. Shaft:
Repairs to shaft pocket.

CAMBRIA-JACKSON MINE
ANNUAL REPORT
YEAR 1947

8. COST OF OPERATING: (CONT.)
b. Detailed Cost Comparison: (Cont.)
(7) Detail of Accounts: (Cont.)
GENERAL MINE EXPENSES: (CONT.)

36. Ishpeming Office:

1947	18,499.86	Cost per Ton	.033
1946	12,504.21	Cost per Ton	.042

37. Mine Office:

The detail of charges to this account were as follows:

	Salaries Supt. & Clerks	Central Warehouse	Miscellaneous	Total
1947	19,806.00	5,531.39	1,751.72	27,089.11
1946	12,565.62	3,188.24	714.22	16,468.08
Increase	7,240.38	2,343.15	1,037.50	10,620.03

38. Insurance:

This account is made up as follows:

	Property Insurance	Group Health & Life	Group Annuity	Catastrophe Insurance	Total
1947	1,407.52	4,797.18	1,521.77	612.12	8,338.59
1946	878.28	1,222.57	561.92	370.67	3,033.44
Increase	529.24	3,574.61	959.85	241.45	5,305.15

39. Personal Injury:

The detail of charges to this account were as follows:

	Compensation & Doctors	Compensation Department
1947	21,296.04	820.94
1946	6,442.58	465.61
Increase	14,853.46	355.33

40. Social Security Taxes:
The detailed charges to this account were as follows:

	Unemployment Tax	Old Age Benefit Tax
1947	11,166.85	7,753.85
1946	5,570.22	4,284.96
Increase	5,596.63	3,468.89

41. Employees' Vacation Pay:

1947	27,339.96	Cost per Ton	.049
1946	17,609.85	Cost per Ton	.060

Supply Inventory Adjustment:

1947	335.80	Cost per Ton	.001
1946	707.81	Cost per Ton	.002

It will be noted that the above statement on the cost of operating in 1947 is compiled for the full year's operation whereas the 1946 figures cover only the actual operating time, which was 8½ months. Therefore, the total amount of money expended in each account for each of the two years does not produce a ready comparison, as does the cost per ton.

8. COST OF OPERATING: (CONT.)

b. Detailed Cost Comparison: (Cont.)

(7) Detail of Accounts: (Cont.)

SURFACE COSTS: (CONT.)

25. Top Tram Equipment:

Charges include 2 controllers 395.18, 1 set armature coils 431.12, 2 brake coils 161.70, 2 bronze worm wheels 236.00, 2 steel worms 131.00, 5,600 pounds 40-lb. rail 159.82 and 3,000 feet trolley wire 628.64.

26. Docks, Trestles and Pockets:

There was little cost to this account in 1947.

27. Mine Buildings:

Charges include cost of erecting shed of concrete block construction to house timber hoist for shaft and return vacuum pump for shafthouse heating 784.43; also cost of moving and repairing steel shed and tool house near new shops.

28. Geological: GENERAL MINE EXPENSES:

A new account. Charges originate from Cleveland office.

29. Mining Engineering:

Slight decrease due to larger production.

30. Mechanical and Electrical Engineering:

More expense to this account.

31. Analysis and Grading:

The cost to this account is made up as follows:

	Sampling at Mine	Central Laboratory	Shipping Dept. Expense	Trucking Samples, Etc.
1947	1,105.69	11,804.57	2,565.85	929.73
1946	436.94	5,647.77	1,620.73	512.65
Increase	668.75	6,156.80	945.12	417.08

32. Safety Department:

This account is made up as follows:

	Central Office Expense	First Aid & Helmet Practice
1947	1,962.24	329.18
1946	1,204.98	154.57
Increase	757.26	174.61

33. Telephones and Safety Devices:

The detail of charges to this account were as follows:

	1947	1946	Increase	Decrease
Lights for Shafts and Levels	2,896.90	1,978.86	918.04	
Mine Telephones	56.36	69.60		13.24
Safety Appliances	1,690.27	650.07	1,040.20	
Fire Equipment	178.68	1.68	177.00	
Total	4,822.21	2,700.21	2,122.00	

34. Local and General Welfare:

The cost to this account is made up as follows:

	1947	1946	Increase
General Welfare	2,654.39	1,568.62	1,085.77
District Welfare	677.92	410.64	267.28

35. Special Expenses, Pensions & Allowances:

	1947	1946	Increase	Decrease
Pensions	400.68	379.20	21.48	
Legal	135.31	258.35		123.04
Retirements	3,266.74	1,879.20	1,387.54	
Examinations	623.90	208.59	415.31	
Employment Office	31.08		31.08	
Other	807.23	645.32	161.91	
Total	5,264.94	3,370.66	1,894.28	

9. EXPLORATIONS AND FUTURE EXPLORATIONS:

One diamond drill unit using bortz bits was operated from June 6th to August 9th and drilled five holes totaling 446 feet, two on the -50' Sub-Level, two on the 7th Level and one on the 6th Level.

Holes No. 176 and No. 177, drilled South from the -50' Sub in the territory West of the main North-South fault, were put in to determine the outline of the orebody at that elevation. This sub is about 48 feet above the 7th Level.

Holes No. 178 and No. 179, drilled South from the 7th Level in the same territory as were No. 176 and No. 177, were put in to determine the outline at the elevation of the 7th Level.

Hole No. 180 was drilled on a course of South 22 degrees East from the breast of the extreme South haulage drift on the 6th Level to locate the ore and hanging wall contact.

Logs of Holes Drilled:

D.D. Hole No.	Location	Dip	Elev.	Course	Footage	Material		
						Iron	Phos.	Sul.
176	-50' Sub	/1°	-47.7'	South				
Date Started - 6-24-47					0' to 15'	57.40	.057	.360
Date Stopped - 7-8-47					15' to 27'	54.24	.058	.432
					27' to 114'	Soft Ore Jasper		
177	-50' Sub	/½°	-41.4'	S3°E	0' to 6'	60.30	.155	2.423
Date Started - 7-11-47					6' to 11'	Soft Ore Jasper		
Date Stopped - 7-16-47					11' to 23'	Dike		
					23' to 31'	54.90	.203	.592
					31' to 67'	Soft Ore Jasper		
178	7th Lev.	0°	-86.4'	S1°E	0' to 7'	63.80	.069	.025
Date Started - 7-18-47					7' to 92'	Soft Ore Jasper		
Date Stopped - 7-26-47					92' to 101'	Dike		
					101' to 102'	Soft Ore Jasper		
179	7th Lev.	0°	-87.7'	S1°23'E	0' to 41'	62.14	.080	.145
Date Started - 7-28-47					41' to 88'	Soft Ore Jasper		
Date Stopped - 8-4-47					88' to 96'	Dike		
					96' to 106'	Soft Ore Jasper		
180	6th Lev.	0°	/112'	S22°E	0' to 24'	First Class Ore		
Date Started - 8-6-47					24' to 37'	Lean Ore		
Date Stopped - 8-9-47					37' to 57'	Soft Ore Jasper		

A record of the cost of drilling is given in the following table:

Drilling Cost:	Labor	959.88
	Supplies & Misc.	221.59
	Bortz	165.04
	Total	1,346.51
Overhead Expense:	Analysis	62.84
	Geological Dept.	129.39
	Auto Mileage	7.80
	Total	200.03
Grand Total		1,546.54

Feet Drilled	Cost per Foot	Total Cost
446	3.47	1,546.54

CAMBRIA-JACKSON MINE
ANNUAL REPORT
YEAR 1947

10. TAXES:

	1947		1946	
	Valuation	Taxes	Valuation	Taxes
Cambria Realty:				
S½ of SE¼ of Sec. 35, 48-27)				
Lots 7 & 8 of Sec. 35, 48-27)				
Lots 5,6 & 7 of Sec.36,48-27)				
- 222.09 Acres)	125,000	5,533.30	125,000	5,517.91
Jackson Strip:				
N 660' of N½ of NW¼ of Sec.1,)				
47-27 - 40 Acres)	650,000	28,773.16	805,000	35,535.36
Personal Property:				
Stockpile,Supplies & Equipment	730,000	32,314.47	240,000	10,594.39
Total by Mich.State Tax.Com.	1,505,000	66,620.93	1,170,000	51,647.66
Lillie Mine Loc.,1 House-Lot 5	100	4.43	100	4.41
Total	1,505,100	66,625.36	1,170,100	51,652.07
Collection Fees		666.25		516.52
Total Taxes, Negaunee		67,291.61		52,168.59
Division of Payments:				
Cambria-Jackson Taxes, Ishpeming*	75,000	2,685.50	30,000	1,077.39
Cambria-Jackson Taxes, Negaunee	1,505,100	67,291.61	1,170,100	52,168.59
TOTAL	1,580,100	69,977.11	1,200,100	53,245.98

*Cambria-Jackson Mine - Ishpeming:
N 660' of NE¼ of NE¼ of Sec. 2,)
47-27 - 20 Acres)

Tax Rate per $100 of Valuation:

	1947	1946
City of Negaunee	4.42664	4.41433
City of Ishpeming	3,58067	3.59130
Total Taxes, City of Negaunee:	526,260.15	523,650.90
Cambria-Jackson Percent of Taxes:		
City of Negaunee	12.79	9.96

11. ACCIDENTS AND PERSONAL INJURY:

Following is a list of the number of accidents classified as to time lost:

	1947	1946
Fatal	1	0
Time Lost - Over 4 Months	1	0
Time Lost - 1 to 4 Months	6	5
Time Lost - Less than 1 Month	7	4
Total Compensable Accidents	15	9

On December 31, 1947 payments were being made on two accidents which occurred prior to January 1, 1947.

Accident No.	Date of Accident	Name	Injury	Days Lost
43	1-11-47	Isaac Leppala	Fracture of left leg	200
44	1-17-47	Clifford Barabe	Fractured bone,left foot	27
45	1-21-47	John Savola	Thrombo-phlebitis,left leg	28
46	2-25-47	William Korpi	Fracture of right ring finger	30
47	3-15-47	Elmer Ritari	Contusion, left ankle	14
48	4-18-47	Eugene Jetty	Strained back	?
49	5-6-47	Edward Terres	Infection, right leg	18
50	6-2-47	Sulo Grayes	Severed tendon,left index finger	32
51	6-8-47	August E.Tyynismaa	Fatal	
52	6-18-47	Gordon Jewell	Laceration, back of left hand	9
53	6-21-47	Eino Wainio	Perforating wound, right eye	78
54	6-21-47	Edlore LaFave	Laceration, right ankle	13
55	8-11-47	William Jokela	Sprained left ankle	42
56	8-25-47	Arne Saari	Lac. of face & back of ear	18
57	10-18-47	Rich.Yelland,Jr.	Fracture of right leg	74
58	12-27-47	Marino Marta	Fractured bone, left hand	Home

CAMBRIA-JACKSON MINE
ANNUAL REPORT
YEAR 1947

12. NEW CONSTRUCTION AND PROPOSED NEW CONSTRUCTION:

a. Shop Building:

This building was erected under the issuance of E. & A. CC-174 by MacDonald and Kaake, Incorporated of Marquette, Michigan which submitted the lowest bid which in the final analysis was, with escalator clauses, nothing more or less than a cost-plus contract. The cost of construction was much more than estimated due to being erected in mid-winter and to the increase in prices of all material after the estimate was made.

The building was completed and accepted on May 27th, after which the machinery from the old shop building was moved and installed with individual drives for each machine. Steam, water and air lines were run in a concrete launder with a steel plate cover from the dry building to the shops, a distance of about 200 feet, and a sewer line laid from shop to sewerage sump in the dry building. The electric power cable from the dry to the shop was laid inside of a four-inch pipe about 18 inches below the surface of the ground. This made a very fine looking building and it is well equipped to meet all requirements.

b. Air Hoist and Vacuum Pump Building:

This is a new concrete-block building with a concrete floor and a pitched 2/3-inch per foot concrete roof and is located just South of the shaft. This 8 by 12-foot building houses a small air hoist used to load timber and supplies into the cage and a small pump for the return line of the heating system on the top-landing of the shafthouse. There was no E. & A. for this building, but it was erected by mine labor and charged to production costs.

13. EQUIPMENT AND PROPOSED EQUIPMENT:

a. Pump:

E. & A. No. CC-161 authorized for the purchase and installation of a 5" x 8" used Prescott pump complete with motor and control, preparing shaft for installation of a new discharge line from the 7th to 4th levels and installing the line has been closed with a fairly large unexpended balance. Work on this project in 1947 consisted of replacing worn parts, erecting the pump, connecting electric controls and laying a concrete floor in the entire pumproom.

b. Diesel Shovel:

Under E. & A. No. 167 a No. 54-B Diesel shovel was purchased, delivered, erected and put in operation on September 15th. The old No. 59 steam shovel which was included in the purchase of the property from the Republic Steel Corporation was sold for scrap and has been removed from the property.

c. Bolt-Threading Machine:

A new bolt-threading machine with a range of up to 2 inches was purchased under E. & A. No. CC-174 for the new shop. This authorization was overexpended 588.02 due to the rise in price between the time of estimate and delivery.

d. Drill Sharpener and Accessories:

A new Ingersoll-Rand drill sharpener with dies, etc. was purchased and installed in the new shop through E. & A. No. CC-174. The authorization was overexpended by 489.86 due to the rise in price between the time of estimate and delivery.

e. Scraper Hoists:

The following is a list of scraper hoists at the mine and costs of repairs:

Company	Total Machines	1947 Total Machines Repaired	1947 Avg. Cost of Ea.Mach. Repaired	1946 Total Machines Repaired	1946 Avg. Cost of Ea.Mach. Repaired
Ing.-Rand 15 H.P.Elec.	17	3	120.82	2	190.17
Ing.-Rand 20 H.P.Elec.	2				
Ing.-Rand 25 H.P.Elec.	2				
Ing.-Rand Air Hoists	2				
Sullivan 15 H.P.Elec.	9			2	305.62
Sullivan 25 H.P.Elec.	6				
Total	38	3	362.46	4	991.57

CAMBRIA-JACKSON MINE
ANNUAL REPORT
YEAR 1947

13. EQUIPMENT AND PROPOSED EQUIPMENT:

e. Scraper Hoists: (Cont.)

The above statement shows an increase of 2 Ingersoll-Rand 15 H.P. Electrics, 3 Sullivan 15 H.P. Electrics and 2 Ingersoll-Rand 25 H.P. Electrics. One 15 H.P. Ingersoll-Rand and two 15 H.P. Sullivans were used units transferred from the Lloyd Mine, one 15 H.P. Sullivan a used unit transferred from the Princeton Mine and two new 25 H.P. Ingersoll-Rands purchased through E. & A. No. CC-176 which was overexpended 607.20 due to a rise in the price.

f. Underground Tram Cars:

During the year 7 used 65 cubic-foot rocker dump cars were purchased from the Lloyd Mine. These cars which were built for 30" gauge track were rebuilt to fit the 24" gauge track in use at the Cambria-Jackson Mine. At the present time there are 23 65-cu.ft. rocker dump cars in use at the mine.

g. Skips and Cages:

There are two combination skips and cages in use at the mine and one spare. At the present time the spare is at the General Shops for an overhauling.

All three cages are so constructed that they can be converted to double-deckers by bolting on the floor for the upper deck. One is used with a double-deck all the time; in the other the floor for the upper deck must be left out to make clearance for timber and poles which are upended in the cage for transportation to the underground.

h. Haulage Tracks:

The following is a comparison of costs of materials for haulage tracks for 1947 and 1946:

	1947	1946
40-Lb. Rail	1,048.22	570.53
Ties and Tie Plates	448.58	339.69
Total	1,496.80	910.22

i. Mine Trucks:

A new Chevrolet 1½-ton truck was purchased under E. & A. No. CC-162.

14. MAINTENANCE AND REPAIRS:

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

	1947		1946	
	Amt.	Cost per Ton	Amt.	Cost per Ton
Compressors & Power Drills	2,596.27	.005	3,289.33	.011
Scraper Equipment	25,936.45	.047	16,304.57	.055
Electric Tram Equipment	23,761.25	.043	12,806.45	.043
Pumping Machinery	3,205.32	.006	1,531.45	.005
Total	55,499.29	.101	33,931.80	.114

The following is a list of purchases and repair costs for 1947 as compared with 1946:

	1947	1946
4 Jacklegs	440.00	
Parts for Drill Sharpener	230.20	
15,216 Lbs. 1/2" x 6" Plate	519.84	
125 Yds. Rubber Matting	236.80	
3 Pickhamers	236.20	
3 J-50 Jackhamers	784.59	
1 250-Volt Circuit Breaker	276.00	
440 Ft. 5,000-Volt Cable	684.62	
1 Welding Unit	146.00	

CAMBRIA-JACKSON MINE
ANNUAL REPORT
YEAR 1947

14. MAINTENANCE AND REPAIRS: (CONT.)

	1947	1946
1 Herringbone Gear	560.86	
1 Set Main Bearings	290.00	
752 Ft. 8" Tirex Cable	242.00	
190 Ft. 24" Culvert	457.70	
Grading of Stocking Grounds by A.Lindberg & Sons	1,050.00	
Policemen's Uniforms	259.95	
1 Monroe Calculator	432.00	
1 Underwood Typewriter	141.19	
1 Coffing Hoist	32.67	
Lighting System, Cab & Hydraulic Lift for Tractor	888.04	
Overhauling of Tractor by Brebner-Sinz Co.	1,920.45	
61,765 Ft. Scraper Rope	7,321.55	
7 65-cu.ft. Tram Cars (Used, from Lloyd Mine)	1,700.00	
2 15-H.P. Scraper Hoists(" , " " ")	839.00	
2 RB-12 Jackhamers (" , " " ")	100.00	
2 15-H.P. Scraper Hoists(" , " " ")	846.00	
10 RB-12 Jackhamers (" , " Princeton Mine)	437.50	
2 Blower Fans (" , " " ")	215.00	
1 15-H.P. Scraper Hoist(" , " " ")	340.00	
Compressor Parts	528.95	
Total Purchases	22,157.11	15,398.44
Repairs to Compressors & Power Drills	530.26	
Repairs to Scraper Hoists	17,431.90	
Repairs to Locomotives	6,506.96	
Repairs to Trolley Wire	2,404.36	
Repairs to Tracks	7,605.39	
Repairs to Cars	3,902.38	
Repairs to Pumping Machinery	3,205.32	
Total Repairs	41,586.57	21,594.30
3 New Hoisting Ropes	4,338.64	
Repairs to Electric Hoists	1,906.65	
Repairs to Skips, Cages, Etc.	10,477.45	
Repairs to Sheaves & Pulley Stands	406.45	
Repairs to Shaft	4,558.53	
Repairs to Larry Cars & Tracks	5,834.80	
Trestle Trolley Line	1,825.65	
Repairs to Pockets, Chutes, Etc.	66.20	
Repairs to Mine Buildings	3,011.49	
Total	32,425.86	17,214.68

CAMBRIA-JACKSON MINE
ANNUAL REPORT
YEAR 1947

15. POWER:

Following is a detail of electric current purchased in 1947 and 1946, distribution of charges to various accounts, and other data:

	1947		1946	
	Cost	Per Ton	Cost	Per Ton
Stoping	1,291.62	.002	1,036.04	.004
Tramming	242.22	.001	142.81	.001
Ventilation	3,176.71	.006	2,093.29	.007
Pumping	13,383.00	.024	12,367.24	.042
Compressors	18,399.77	.033	12,082.01	.041
Hoisting	17,407.44	.031	11,347.05	.038
Stocking Ore	1,081.94	.002	662.93	.002
Dry House	333.79	.001	253.67	.001
General Surface	408.38	.001	421.54	.001
Telephones & Safety Devices	1,588.35	.003	1,492.50	.005
Mine Office	86.25	.000	61.66	.000
Electric Haulage	11,555.81	.021	6,580.94	.022
Shops	205.55	.000	164.21	.001
Heating	61.47	.000	82.44	.000
Tractor & Truck	37.62	.000	24.05	.000
Loading at Pocket	22.00	.000		
Total	69,281.92	.125	48,812.48	.165
Power charged to Mather "B"*	1,408.44			
*Included above.				
Main Line Meter - K. W.	4,987,200		3,393,600	
Separate Meter Readings	4,985,610		3,388,484	
Line Loss - K. W.	1,590		5,116	
Product - Tons	554,105		296,660	
K.W. per Ton (Inc. Line Loss)	9.00		11.44	
Cost per K. W. (Average)	.0139		.0144	
15 Min.Demand-K.W.(Average)	1,057		811	
Average Load Factor	54%		46%	

17. CONDITION

OF GROUNDS:

Comment has been made elsewhere of the many improvements made on surface. There has been a great improvement in the general appearance of the surface plant, but there is still some to be made. The project of painting the engine house and shafthouse which was to have been done in 1947 did not materialize but should be done in 1948. Other work contemplated for 1948 is the building of a new concrete-block oil house, a new storehouse to house the supplies now stored in the old shop building which will be sold and removed from the property, and build a garage to house the tractor and a new crane.

CAMBRIA-JACKSON MINE
ANNUAL REPORT
YEAR 1947

18. NATIONALITY OF EMPLOYEES:

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

As to Parentage:	1947	Percent	1946	Percent
Finnish	84	36.7	80	36.4
English	40	17.5	37	16.8
Italian	38	16.6	33	15.0
Swedish	29	12.7	28	12.7
French (France)	12	5.2	11	5.0
French (Canadian)	7	3.0	9	4.1
Danish	5	2.2	6	2.7
German	5	2.2	4	1.8
Irish	3	1.3	4	1.8
Norwegian	3	1.3	4	1.8
Austrian	3	1.3	3	1.4
Lithuanian			1	.5
Total	229	100.0	220	100.0

	American Born		Foreign Born	
As to Birth:	1947	1946	1947	1946
Finnish	57	51	27	29
English	33	29	7	8
Swedish	27	25	2	3
Italian	19	12	19	21
French (France)	12	11		
French (Canadian)	7	9		
Danish	5	6		
German	5	4		
Irish	3	4		
Norwegian	2	2	1	2
Austrian	1	1	2	2
Lithuanian		1		
Total	171	155	58	65
Percent	74.7%	70.5%	25.3%	29.5%

MAAS MINE
ANNUAL REPORT
YEAR 1947

1. GENERAL

The Maas Mine operated on two 8-hour shifts, six days per week fron January 1st to December 31st. There was also a small tramming and hoisting crew on the third shift to remove the excess ore which was produced on the two previous shifts. A full crew was available at all times, as the change in mining system from top slicing to sub caving increased the tons per man per day sufficiently to keep up production although less working places were possible and despite the number of miners who quit during the year.

The total production for the year of 722,401 tons showed an increase of approximately 250,000 tons over last year, and this was due to the mine being idle from February 8th to May 21st of 1946 on account of the strike. An increase of one-half ton per man per day made possible a decrease in cost despite the raise in wages and supplies.

The shipments naturally increased for the same reason and also due to the fact that there were 100,000 tons left in stock at the end of the 1946 shipping season, as compared with only 25,000 tons in 1947. Cleaning up of most of the grades and royalties also developed 20,000 tons of overrun, largely credited to 1947 production. 25% of the ore was too wet to ship directly from the pocket and had to be stocked and allowed to drain sufficiently before it was dry enough to be transported.

There was very little main level development required during the year, allowing more time for mining and handling of ore. The new system of mining, namely sub level caving, introduced last year, was carried out muchmore extensively during 1947, and by the end of the year only 30% of the contracts were employed on top slicing. In addition there were three sub level stopes in operation. Timbering in connection with the maintenance of the main level drifts and raises occupied the total time of about 60 men, while the contracts also averaged nearly 20% of their time on sub level repairs. One or two crews were mining continuously on the North footwall above the 4th Level in an endeavor to drain the water from adjacent areas at higher elevations and although there is now a large flow of water being drained here, the results above have not been altogether satisfactory. Toward the last of the year a trench was started at the shaft on 6th Level where a larger proportion of the ore is too wet to dump in the main pockets, and it is expected that the use of this trench for storage and drainage of the wet ore will speed up production in releasing the motor trains more rapidly and also in being able to hoist full skips at all times. A raise will be put up from the skip pit and then this accumulated spillage will also be hoisted and dumped directly into the trench, thus eliminating the use of the cage hoist for this work and relieving two out of three men now employed one shift per day.

The safety record of the Maas Mine, which had been fairly good all year with no very serious accidents, received a major set-back in October, when two fatal accidents occurred within two weeks of each other. Heretofore the Maas Mine had operated 14 years with only two fatal accidents, one in 1941 and one in 1945.

MAAS MINE
ANNUAL REPORT
YEAR 1947

2. PRODUCTION, SHIPMENTS & INVENTORIES

a. Production by Grades

	1947	1946
Maas	393,913	236,004
Maas Special	179,325	109,431
Race Course	48,892	62,301
Race Course Special	100,271	68,612
Total	722,401	476,348
Rock	15,970	11,175
Total Hoist	738,371	487,523

b. Shipments

Grade of Ore	Pocket Tons	Stockpile Tons	Total Tons	Total Last Year
Maas	210,493	220,025	430,518	218,863
Maas Special	86,983	114,079	201,062	91,430
Race Course	25,106	39,299	64,405	57,782
Race Course Special	47,708	55,722	103,430	72,994
Total	370,290	429,125	799,415	441,069
Total Last Year	205,985	235,084	441,069	
Increase	164,305	194,041	358,346	

c. Stockpile Inventories

Grade of Ore	12-31-47	12-31-46
Maas	44,162	78,629
Maas Special	20,153	41,890
Race Course	6,164	21,677
Race Course Special	9,043	12,202
Total	79,522	154,398

d. Division of Product by Levels

	1947	%	1946	%
Third Level			6,210	1.3
Fourth Level	227,092	31.3	105,831	22.2
Fifth Level	376,911	51.9	342,937	72.0
Sixth Level	120,536	16.8	21,370	4.5
Total	724,539	100.0	476,348	100.0

Ore mined on 4th Level was all standard grade.
Ore mined on 5th Level was 56% standard grade.
Ore mined on 6th Level was 95% special grade.

MAAS MINE
ANNUAL REPORT
YEAR 1947

2. PRODUCTION, SHIPMENTS & INVENTORIES (Cont.)

e. Production by Months

Month	Maas	Maas Spcl.	Race Course	R. C. Spcl.	Total	Rock
January	33,578	10,088	8,723	7,799	60,188	1,110
February	29,737	11,395	4,144	7,345	52,621	1,265
March	34,547	10,875	5,032	10,003	60,457	1,245
April	34,744	15,024	3,481	9,115	62,364	1,135
May	33,753	15,242	2,707	11,498	63,200	1,650
June	32,167	12,871	3,261	8,727	57,026	1,500
July	32,007	16,773	6,472	6,508	61,760	1,505
August	24,998	15,768	4,813	2,960	48,539	990
September	27,669	21,197	4,270	7,288	60,424	1,415
October	35,873	19,003	1,924	10,772	67,572	1,180
November	29,610	15,753	1,457	10,354	57,174	970
December	32,047	12,790	2,325	5,594	52,756	2,005
Total	380,730	176,779	48,609	97,963	704,081	15,970
Transferred To & From Prev. Year's Overrun	2,744	2,744	283	283		
Cur. Year's Overrun	2,138				2,138	
Grand Total	10,439	5,290		2,591	18,320	
	396,051	179,325	48,892	100,271	724,539	

The product was distributed by leases as follows:

	1947	1946
George Maas Lease	575,106	331,746
Catholic Cemetery Lease		4,731
C.C.I. Co. or N 1/3 of Rt. of Way		737
Race Course Lease	149,163	130,913
Baldwin Kiln Road Lease	270	8,221
Total	724,539	476,348

f. Ore Statement

	Maas	Race Course	Maas Spcl.	R. C. Spcl.	Total	Total Last Year
On Hand 1-1-1947	78,629	21,677	41,890	12,202	154,398	119,119
Product for Year	380,730	48,609	176,779	97,963	704,081	476,348
Transfers	2,744	283	2,744	283		
Prev. Year's Overrun	2,138				2,138	
Cur. Year's Overrun	10,439		5,290	2,591	18,320	
Total	474,680	70,569	221,215	112,473	878,937	595,467
Shipments	430,518	64,405	201,062	103,430	799,415	441,069
Balance on Hand	44,162	6,164	20,153	9,043	79,522	154,398

MAAS MINE
ANNUAL REPORT
YEAR 1947

2. PRODUCTION, SHIPMENTS & INVENTORIES (Cont.)

g. Schedule of Operations

1947	January 1st to December 31st, 2 8-hour shifts, six days per week, with a small tramming and hoisting crew on the third shift.
1946	January 1st to February 8th, 2 8-hour shifts, six days per week. February 8th to May 21st mine idle on account of strike. May 21st to December 31st, 2 8-hour shifts six days per week. A small tramming and hoisting shift was put on the third shift July 15th and continued to December 31st.
1945 2 8-hour shifts,	5 days per week from January 1st to January 27th, six days per week from January 27th to December 31st, except the afternoon shift on Saturdays was not necessarily a complete mining shift, being used partly for repairing and cleaning up. One shift only was operated from August 12th to August 25th to afford the men one week's vacation.

h. Delays

The only major delay during 1947 was on June 10th, when there was an interruption of power due to the burning of the 2400 Volt cable in the sub station, that was the main source of power for the mine. The afternoon shift had to be sent home, and there was a consequent loss of 1,000 tons.

3. ANALYSIS

a. Average Mine Analysis on Output

	1947				1946			
	Iron	Phos.	Sil.	Sul.	Iron	Phos.	Sil.	Sul.
Maas	59.53	.113	8.95	.036	59.18	.110	9.22	.038
Maas Special	60.00	.092	8.06	.216	59.80	.101	8.19	.225
Race Course	59.81	.109	8.48	.044	59.46	.112	8.82	.040
Race Course Special	59.79	.092	7.82	.218	59.75	.109	7.90	.235

It was surprising that with the increase in the amount of mining done by sub level stoping and sub level caving, that the percentage of silica showed a slight decrease as compared with 1946, when it was expected that, although there might possibly be more dilution from these two methods, the decrease in cost of mining would more than offset the penalty for the higher silica.

b. Average Mine Analysis on Ore Shipped

Grade	Iron	Phos.	Sil.	Mang.	Alum.	Lime	Mag.	Sul.	Loss	Moist.
Maas & Race Course	59.30	.114	9.35	.19	2.69	.49	.23	.028	1.81	12.94
Maas & R.C. Special	59.70	.087	8.44	.22	2.53	.72	.12	.245	2.19	12.82

MAAS MINE
ANNUAL REPORT
YEAR 1947

3. ANALYSIS

d. Average Natural Analysis of Ore in Stock - December 31, 1947

Grade	Tons	Iron	Phos.	Sil.	Mang.	Alum.	Lime	Mag.	Sul.	Loss	Moist.
Maas	44,162	50.939	.096	8.837	.166	2.347	.427	.201	.042	1.398	12.76
Maas Special	20,153	51.804	.081	7.335	.191	2.191	.624	.104	.156	1.678	13.40
Race Course	6,164	51.433	.094	8.254	.166	2.347	.428	.201	.047	1.398	12.75
Race Course Spcl.	9,043	51.621	.085	7.517	.191	2.191	.624	.104	.154	1.680	13.30

4. ESTIMATE OF ORE RESERVES

a. Developed Ore

Assumption: 12 Cu. Ft. equals one ton.
10% Deduction 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	126,413	1,207,228	7,559	1,341,200
4th to 5th Levels	122,765	328,381		451,146
Gross Total 11-30-47	249,178	1,535,609	7,559	1,792,346
Less Dec. 1947 Product	2,325	31,881	166	34,372
Gross Total 12-31-47	246,853	1,503,728	7,393	1,757,974
Less 10% for Mining & Rock	24,918	153,561	756	179,235
Net Total Standard Grade	221,935	1,350,167	6,637	1,578,739
Special				
4th to 5th Levels	250,700	642,385	30,300	923,385
5th to 6th Levels	875,544	2,022,694		2,898,238
Below 6th Level	18,542	1,028,750		1,047,292
Gross Total 11-30-47	1,144,786	3,693,829	30,300	4,868,915
Less Dec. 1947 Product	5,594	12,790		18,384
Gross Total 12-31-47	1,139,192	3,681,039	30,300	4,850,531
Less 10% for Mining & Rock	114,479	369,383	3,030	486,892
Net Total Special Grade	1,024,713	3,311,656	27,270	4,363,639
Total All Grades	1,246,648	4,661,823	33,907	5,942,378

In the Maas Area leased to Negaunee Mine, including N 1/3 and N 1/6 of right-of-way, there were 327,379 tons as of December 31, 1947, of which 53,100 tons were of special grade.

There was a total increase of 125,000 tons in the developed ore reserves, after the production for 1947 had been deducted. The distribution of the increase is as follows:

	Maas	Race Course	Total
Standard Grade	78,612 Tons	63,184 Tons	141,796 Tons
Special Grade	24,827 "	42,424 "	17,597 "
Total	103,439 Tons	20,760 Tons	124,199 Tons

MAAS MINE
ANNUAL REPORT
YEAR 1947

4. ESTIMATE OF ORE RESERVES

a. Developed Ore (Cont.)

A decrease of approximately 70,000 tons between the 3rd and 4th Levels in the Maas Standard, occasioned by larger areas of jasper being encountered, was more than offset by a gain of nearly double that between 4th and 5th, where the hanging flattened. The increase in the Race Course Standard and decrease in the RaceCourse Special was in part due to being able to ship some 30,000 tons of standard ore which was produced in the so-called special areas. There was also an increase in the area between the 3rd and 5th Levels, also due to flattening of the hanging. These differences were all relatively small when considered in percentage of the total reserves.

c. Estimated Natural Reserve Analysis

Grade	Iron	Phos.	Sil.	Mang.	Alum.	Lime	Mag.	Sul.	Loss	Moist.
Maas & Race Course Standard	52.50	.100	7.70	.19	2.50	.500	.20	.031	1.40	12.70
Maas & Race Course Special	52.50	.085	7.20	.18	2.45	.520	.16	.200	1.60	13.00

d. Estimated Production
January 1st to December 31st, 1948

Grade	Estimated Production 12 Shifts Per Week
Maas & Race Course Standard	403,000
Maas & Race Course Special	302,000
Plus 4% Overrun on Ore Stocked	10,000
Total	715,000

Grade	Iron	Phos.	Sil.	Mang.	Alum.	Lime	Mag.	Sul.	Loss	Moist.
Maas & Race Course Standard	59.50	.115	8.80	.22	2.50	.65	.25	.035	1.60	13.00
Maas & Race Course Special	59.50	.100	8.50	.22	2.28	.60	.18	.250	1.80	13.00

5. LABOR & WAGES

a. Comments

The labor turnover was naturally very much less in 1947 as compared with the war years. Only two more men returned from the service, making a total of 60% who continued in their former vocation. There were only approximately half as many men hired as had left the employ of the Company during the year, on account of the decrease in the number of available working places. It was also possible to maintain the same production with less men, due to more sub caving and sub level stoping.

The men received an increase in wages of 12½ cents per hour, effective May 9th, and the salaries of the supervisors and office force were also adjusted comparably.

MAAS MINE
ANNUAL REPORT
YEAR 1947

5. LABOR & WAGES

a. Comments (Cont.)

There were no men retired on account of age during 1947, and the average age of the employees was 42, the same as in 1946. There were 36 men 60 years of age or over, 17 who had been in the employ of the Company for at least 40 years and 79 from 25 to 40 years. The vacation plan was changed in that the men who had been in the employ of the Company for 25 years or longer received three weeks' vacation pay. The mine was closed from the 25th to the 31st of August to allow the men one week of their vacation, and they also received pay for the remaining one or two weeks for which they were eligible.

31 Men, or 8% of the total, received one week's pay.
250 Men, or 65% of the total, received two weeks' pay.
95 Men, or 24% of the total, received three weeks' pay.
12 Men, or 3% were ineligible, having worked less than one year.

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

	1947	1946	1945
Died	1	0	3
Fatal Accident	2	0	1
Retired on Account of Age or Total Disability	0	7	9
Unable to Continue Work on Account of Ill Health	5	5	2
Transferred to Other C.C.I.Co. Properties	12	4	2
Quit for Other Occupations	23	26	18
Discharges & Lay-Offs	2	1	0
Total Loss	45	43	35
Hired or Transferred to Maas	22	75	16
Net Loss	23		19
Net Gain		32	
Experienced Miners Included in Total Loss	18	13	7

Proportion of surface to underground men:

1947	1946	1945	1944	1943
1 - 5.0	1 - 5.1	1 - 4.5	1 - 5.1	1 - 5.1

b. Comparative Statement of Wages & Product

	1947	1946	Increase
Product	722,401	476,348	246,053
Number of Shifts & Hours	300	218	82
1 8-hour	4	3	1
2 8-hour	296	215	81

MAAS MINE
ANNUAL REPORT
YEAR 1947

5. LABOR & WAGES

b. Comparative Statement of Wages & Product (Cont.)

	1947	1946	Increase	Decrease
AVERAGE NO. MEN WORKING				
Surface	61	53	8	
Underground	307	244	63	
Total	368	297	71	
AVERAGE WAGES PER DAY				
Surface	10.11	9.56	.55	
Underground	11.35	10.40	.95	
Total	11.14	10.24	.90	
AVERAGE WAGES PER MONTH				
12 Shifts per Week				
Surface	252.75	239.00	13.75	
Underground	283.75	260.00	23.75	
Total	278.50	256.00	22.50	
PRODUCT PER MAN PER DAY				
Surface	35.88	32.09	3.79	
Underground	7.85	7.17	.68	
Total	6.44	5.86	.58	
LABOR COST PER TON				
Surface	.288	.298		.010
Underground	1.449	1.450		.001
Total	1.737	1.748		.011
AVERAGE PRODUCT MINING				
Stoping	22.72	19.09	3.63	
Ore Development		13.43		13.43
Total	22.72	19.03	3.69	
AVERAGE WAGES CONTRACT LABOR	11.90	10.66	1.24	
TOTAL NUMBER OF DAYS				
Surface	20,134	14,842 3/4	5,291 1/4	
Underground	92,028 3/4	66,411	25,617 3/4	
Total	112,162 3/4	81,253 3/4	30,909	
AMOUNT FOR LABOR				
Surface	207,832.97	141,873.66	65,959.31	
Underground	1,046,996.34	690,513.65	356,482.69	
Total	1,254,829.31	832,387.31	422,442.00	
AVERAGE WAGES PER MONTH BASED ON MEN CARRIED ON MINE PAYROLL				
Surface	251.85	212.54	39.31	
Underground	282.70	240.67	42.03	
Total	277.58	235.65	41.93	

MAAS MINE
ANNUAL REPORT
YEAR 1947

5. LABOR & WAGES

c. Nationality of Employees

As to Parentage	1947	%	1946	%
Finnish	153	40.5	160	39.7
English	75	19.8	79	19.6
American	56	14.9	69	17.0
Italian	35	9.3	39	9.7
Swedish	22	5.9	23	5.7
French (Canadian)	18	4.9	17	4.2
German	6	1.6	6	1.5
Norwegian	6	1.6	5	1.2
Danish	3	.8	3	.7
Austrian	2	.5	2	.5
Irish	1	.2	1	.2
Total	377	100.0	404	100.0

As to Birth	American Born		Foreign Born	
	1947	1946	1947	1946
Finnish	106	110	47	50
English	46	49	29	30
American	56	69		
Italian	14	17	21	22
Swedish	18	19	4	4
French (Canadian)	18	17		
German	6	6		
Norwegian	5	5	1	
Danish	3	3		
Austrian	1	1	1	1
Irish	1	1		
Total	274	297	103	107

6. SURFACE

a. Buildings & Repairs

There were only minor repairs made on any of the buildings, and there was no new construction during 1947. The North end of the old coal dock, which had been used lately for storage purposes only and had become dangerous due to decaying of the timbers, was dismantled early in the fall.

b. Location Buildings & Repairs

It was found possible to accomplish all the necessary repairs to rented houses with two carpenters and one painter. A truck driver and helper spent part of their time as carpenter helpers and doing other odd jobs around the location and the remainder of their time hauling emergency supplies to the various mines in the Negaunee District.

MAAS MINE
ANNUAL REPORT
YEAR 1947

6. SURFACE

b. Location Buildings & Repairs (Cont.)

Several houses, which were located in areas which would not be affected by mining, were sold during the year, as well as those whose sale had been held up due to obtaining the necessary signatures for the outstanding ownership of the land, due to overlapping of the boundaries of the Cleveland-Cliffs Iron Company's First Addition and former additions to the City of Negaunee.

The following tables show those that were sold during the year and the total remaining on December 31st, 1947:

House No.	Address	Lot	Block	Addition	Sold To	Date
170	535 Cherry St.	2	30	Corbitt's	Eino Maki	4/1/47
182	Ann St.	Unplatted Lot East of Sterling's			Mario Airaudi	4/1/47
77	516 Prince St.	6	3	C.C.I.Co.'s 1st	Mrs. Chapman	6/1/47
178	Ann St.	Unplatted Lot East of Sterling's			Dom. Jacobetti	8/1/47
6	Water St.	8 & 9	2	Harris	Nick Reichel	9/1/47
7	Water St.	5	2	Harris	Walfred Lehtonen	9/1/47
30	608 Baldwin Av.	2	4	C.C.I.Co.'s 1st	Arne Parkkonen	9/1/47
84	654 Lake St.	14	6	C.C.I.Co.'s 1st	Percy Evans, Sr.	9/1/47
98	609 Baldwin Av.	11,12 & W 17' of 13	2	Harris	Ed. Ollila	9/1/47
129	512 Cherry St.	24	1	Corbitt's	Allen Johns	9/1/47
141	539 Cherry St.	22	6	C.C.I.Co.'s 1st	Martin Renaldi	10/1/47

Houses remaining as of December 31st, 1947:

Single-Family Houses	38
Two-Family Houses	5
Legion Club	1
Stores	1
Church	1
Total	46

c. Stockpiles

Loading from stockpile started on April 17th and more trouble was experienced with frozen ore than ever before. Although the tops of all the piles were drilled and blasted, it was necessary to continue blasting in the sides of the piles well into June. Practically all the ore was cleaned up, there being only a small amount of Race Course Standard and wet ore of the other grades and royalties, which had been hoisted very recently, on hand when loading was terminated on November 21st.

It was intended to erect a new steel trestle West of the shaft, but the columns being manufactured by the Worden Allen Company have not arrived. This work will be done as early next year as it seems advisable to start pouring concrete.

MAAS MINE
ANNUAL REPORT
YEAR 1947

6. SURFACE

c. Stockpiles (Cont.)

The following overruns were developed during the year, credit being received in all but the Race Course Standard, which was not entirely cleaned up.

	Maas	Race Course	Maas Spcl.	R. C. Spcl.	Total
Previous Year	2,138	2,027*			4,165
Current Year	10,439	1,234*	5,290	2,591	19,554
Total	12,577	3,261	5,290	2,591	23,719

*Estimated by Engineering Department, 1946 and 1947.

d. Tracks, Roads, etc.

The main entrance to the mine was macadamized for a distance of 1,350', the work being done by the City of Negaunee Highway Department. This as a great improvement, as it was almost impossible to keep this road from becoming very rough and dusty, due to the heavy traffic. A ramp was also built up of dirt and rock at the East entrance to the engine house so that heavy equipment could be trucked directly into the building.

e. Timber Yard

Although early in the year there was considerable trouble obtaining sufficient stull timber to keep up operations, this situation was soon remedied, and by the end of the year there was approximately six months' supply on hand. 9½' spiling poles continue to be received very sparingly, but there is sufficient lagging on hand, and cribbing is being supplied as needed. An electric chain saw was received in the spring and has greatly facilitated the framing of timber. It is light to handle but is of very rugged construction and speedy in operation. There was also approximately 5,000 feet of special timber peeled and treated during the season. This has been used mostly on the 6th Level.

The detail of the operations of the treating plant is shown below:

Maas Mine Timber Treating Plant

Lineal feet of Mine timber treated	4,959
Lineal feet of trestle decking treated (Equivalent to mine timber)	18,000
Total Lineal Feet Treated	22,959
Amount chromated zinc chloride used	555 lbs.
Price per pound	.0827
Cost of preservative	$ 45.90
Miscellaneous supplies	.00
Plant depreciation	.00
Labor, peeling & treating timber	567.47
Total Cost, excluding cost of timber	$613.37
Cost per foot for peeling & treating	.022

The decided reduction in cost per foot was due to treating the large amount of trestle decking, which required no peeling and much less labor in handling.

f. Insurance

MAAS MINE
ANNUAL REPORT
YEAR 1947

6. SURFACE (Cont.)

f. Drainage

Nos. 1 and 2 Wells were in almost continuous operation during 1947. Their combined output remains approximately the same as in previous years, and while their effect on the underground operations is only partial, the water is used entirely for surface operations, thus eliminating a large cost for city water and providing a much better water for drinking.

7. UNDERGROUND

a. Shaft-Sinking

There was no shaft-sinking at the Maas Mine during 1947, nor is there any contemplated for the future, as if and when a 7th Level is developed, the ore will probably be hoisted through a winze adjacent to the ore body.

b. Development

There was practically no main level development carried on in 1947, but toward the last of the year two drifts were started in the footwall on the 4th and 5th Levels, and these will be completed in 1948.

An extensive ventilation program was in progress, and this will be taken up later in this report.

Table of Main Level Development

Location	Rock Drifting
4th Level	61'
5th Level	110'
Total	171'

c. Stoping
General

There was an average of 33 contracts engaged in mining during 1947, and they were located approximately in the same areas as were worked last year. The only new place being opened was near the old 3rd Level winze, where mining was temporarily stopped several years ago.

Three contracts were mining most of the year in the East footwall pillar above 4th Level, which is decreasing rapidly in size on account of the very flat dip of the footwall.

Mining was continuous throughout 1947 in the pillar controlled by the 4200 Cross-Cut by three contracts using the sub level caving system. This is one of the very few entirely dry areas in the mine. The mining to the West at the 4100 Cross-Cut was completed near the end of the year, as the workings had then reached too close to the level. Mining will be stopped temporarily until raises are put up from the 5th Level.

MAAS MINE
ANNUAL REPORT
YEAR 1947

7. UNDERGROUND

c. Stoping
General (Cont.)

After spending almost two years opening up along the North footwall in the center of the ore body above 4th Level to drain off the excessive water in this area, two transfers were driven on the 185' and 200' Subs, and raises put up to the 280' Sub some 50' above these drainage drifts and to the South and West. Mining was then started, but as soon as there was an opening to the old workings above, the water changed its course and interfered with production. The only remedy now remaining is to control the water in launders and pipes in so far as possible and continue mining.

The only other area being worked in 1947 above the 4th Level was the mining of the small ore body in the race Course Lease, and one contract was employed there.

Five contracts were employed in the 5300 Mining Block and the majority of the mining was by sub caving. In the Southeast end of this pillar considerable trouble had always been experienced on account of mud runs, but since changing the type of mining this has been entirely eliminated. Mining had reached the 50' elevation by the end of the year, and the footwall had cut off all of the ore to the North of the 5318 and 5320 Raises.

One contract attempted to mine the small area between the North footwall and the dike in theRace Course Lease by sub caving, but the ore was blocky, requiring too much secondary blasting of chunks, so top slicing will again be resumed on the next sub level.

Two contracts were sub caving and one sub level stoping to the West along the North footwall and mining will be stopped temporarily early in 1948 upon completion of the present sub levels. A new sub level stope is being opened to replace this one, and mining by the other contracts will have to wait until the 5th Level drift is no longer needed.

With the exception of the two sub level stopes just above the 6th Level near the Western limits of the ore body, the remaining contracts were all engaged in the main ore body between the dikes in the Maas and Race Course Lease. By the end of the year there were several of them mining on the -25' elevation or one sub below the 5th Level. Practically all of the ore produced by these contracts was of special grade, although it was possible occasionally to obtain some standard ore.

Detail

300' Sub Level - East Footwall Pillar

Top slicing was in progress in the West end of this pillar from January to May, when mining at this elevation was completed.

MAAS MINE
ANNUAL REPORT
YEAR 1947

7. UNDERGROUND

c. Stoping

Detail (Cont.)

280' Sub Level

In the East footwall pillar mining, mostly by top slicing was continuous from January to August of this year. Also in August one contract started to connect the tops of raises put up from the 185' Transfer in the vicinity of the old winze. It was supposed that this area, which formerly had been very wet and where mining had therefore been stopped temporarily, had been drained by the work to the East and below, but in November both headings encountered a large flow of water. A four-inch pipe was installed from the workings to the 4th Level and then mining was resumed with fairly good results, as most of the water was controlled. In December two contracts were sub caving here.

270' Sub Level - East Footwall Pillar

This sub level was opened in May at #433 Raise and development for sub level caving started. The footwall here is very flat and some of the development had to be done in lean ore in order to reach the ore above on the footwall. The ore body is also being cut off very rapidly to the East by the 15° pitch and by November all of the ore East of #433 Raise had been removed. In December Contracts #3 and #6 were sub caving between #429 and #431 Raises.

260' Sub Level

Work of an exploratory nature was carried out along the Baldwin Kiln Lease between the 200' Sub and 3rd Level last year, which proved there was very little ore lying East of this lease and therefore mining of the block to the West was resumed. #16 Contract, in single shift since July, has been mining this pillar, which extends to the 300' Sub, the entire year, and by December there only remained a small amount of ore adjacent to #300 Raise. The sub below will be cut at 12' and top slicing used, as sub level caving was found to be uneconomical on account of the ground breaking so large with too much secondary blasting required. The majority of the ore removed came from the Race Course Lease.

245' Sub Level

Very extensive work was carried out on this and the sub below in the center of the ore body lying on the footwall above the 4th Level in an endeavor to drain the water from the area to the West and South. Drifts were driven along the footwall for about 400' and then sub caving of the ore to the North was carried out. A large volume of water was thus drained through these workings and the adjacent raises showed little or no water. However, when mining was started to the West some 40' above, the water course again shifted and that area became wet. Mining has not yet been started to the South, but it is anticipated that this area will be much drier than formerly.

230' Sub Level

In December one contract was drifting along the footwall to the East of #419 Raise in continuance of the work mentioned above.

MAAS MINE
ANNUAL REPORT
YEAR 1947

7. UNDERGROUND

c. Stoping

Detail (Cont.)

200' Sub Level

Some of the work done at this elevation in 1947 was the driving of a transfer drift from #416 to #422 Raise, from which to put up raises to the area above, which was supposed to be drained. This was completed in February, and a connection was made between #416 and #418 Raises on the 250' Sub, but so much water was encountered that it was decided to wait until further work on the footwall had been done.

During the first six months of the year three contracts were engaged in sub caving the area above the 4200 Cross-Cut. The jasper hanging was very irregular and it was possible in some cases to cave ore for a height of 50'. This was one of the first areas where sub caving was introduced last year, and the results were very good, and as far as the jasper outlines could be determined, better than 90% recovery was obtained with very little dilution.

185' Sub Level

A transfer drift was also driven from #412 Raise 80' West to the dike and also East to #416 Raise and then one double and five single raises were put up to the 280' Sub and mining started. This drift has been very heavy, requiring considerable retimbering, but even this is more economical than putting up more main level raises which would be over 100' in rock.

170' Sub Level

Cutting out at this elevation below the above-mentioned territory was started in May, and mining has been continuous through December, except for very extensive retimbering of the raises and main level cross-cut, as the ground is very heavy.

150' Sub Level

Mining of the 4100 block above 4th Level was continuous during 1947, with two contracts, one top slicing and one sub caving until August, when the latter moved to another area. Mining was completed here in December and will not be resumed until new raises are put up from the 5th Level, as the next sub level below will be at practically the 4th Level elevation.

4th Level

Beyond the necessary repairs to main level timber, there was no work done on the 4th Level until November, when #5 Contract started a new footwall drift at the East line of the race course lease. This drift will be extended to the West about 200' to open a sub level stope in the V-shaped ore body above.

100' Sub Level

#27 Contract completed mining in the small ore body between the North footwall and the dike in the Race Course Lease by February, and cut out 25' below in order to start mining by the sub caving system.

MAAS MINE
ANNUAL REPORT
YEAR 1947

7. UNDERGROUND

c. Stoping

Detail (Cont.)

90' Sub Level

Mining of the 5300 block was in progress at this elevation from January to June, at which time the ore was exhausted and the contracts moved to the sub below.

75' Sub Level

Mining of this small pillar in the Race Course Lease was attempted by the use of sub caving, but on account of the blocky nature of the ore it has not been very satisfactory, and on the sub below top slicing will again be used. In December there were only two slices remaining to be mined.

One contract, the first to use the sub caving system in the Maas Mine, was engaged in mining the pillar at the South end of the 5300 block, with very excellent results. This area is quite wet and when using top slicing the water was constantly causing runs of rock and most of the ore had to be scraped directly into the cars. Under the sub caving system most of the mining has been fairly dry, and the average cars per shift increased from five under the old system to 22 by caving. Almost complete recovery has been obtained, with practically no dilution of grade. Work was completed here in July.

All of the above-mentioned contracts were producing ore of standard grade, and with the exception of two that were mentioned as being in other leases, the ore all came from the Maas Lease.

65' Sub Level

Mining at this elevation in the 5300 Block was continuous throughout the year and the four contracts working here were all using the sub caving system. The very flat footwall has cut off almost all of the ore on the footwall side of the raises in the North half of this area and it will be possible to mine only one more sub level from the 5300 Raises. Then either new raises will be put up from the 6th Level further to the West, or it may be possible to use the 5400 series if they have not become too badly crushed since mining was abandoned in that area last year. The ore was about 75% standard grade and was from the Maas Lease. At the end of the year there remained three large pillars to be mined.

50' Sub Level

#28 Contract cut out on this elevation in July at #5327 Raise in the South end of the 5300 Block and was still sub caving in this pillar in December. The ore has been about equally divided between special and standard grade.

During the first three months of the year two contracts were completing the mining of the small area of standard grade ore on the footwall lying West of the Race Course Lease. All of the ore mined on this elevation during the year was from the Maas Lease.

MAAS MINE
ANNUAL REPORT
YEAR 1947

7. UNDERGROUND

c. Stoping

Detail (Cont.)

25' Sub Level

From January to March two contracts were top slicing in the area between the North footwall and the dike in the Race Course Lease. When this work was completed, the contracts were moved elsewhere, as this mining was only 40' above the 5th Level, and it is necessary to maintain this footwall drift until mining is completed to the West. A small area just West of the Race Course Lease was also completed early in the year and the contract broken up to fill vacancies. In the footwall pillar further to the West two contracts have been mining, mostly sub caving, except under low hanging, from March to the end of the year. Still further to the West in the same ore body one contract on single shift continued to mine in the sub level stope started last year. This stope is quite wet and there has been considerable delay due to breaking up the large chunks of blue ore which are very hard and necessitated secondary blasting or drilling with pickhammer. About the middle of the year the jasper hanging started to slough off, causing dilution and therefore a pillar had to be left to cut off the rock and the stope started again further to the East. This stope should be completed about May of next year, but by that time the 4th Level stope should be ready to take its place. All of the ore mined on this elevation during the year was of standard grade and with the exception of the first two contracts mentioned, the ore came from the Maas Lease.

10' Sub Level

All of the mining on this elevation during 1947 was by top slicing in the Race Course Lease, and it was completed by May. Some standard ore was recovered, but in the most part it was of special grade.

00' Sub Level

Mining was continuous throughout the year on this sub, with the majority of the ore being removed by the sub caving method. The two contracts mining in the Northeast corner of the Race Course Lease were considerably handicapped by water, but the results by sub caving were better than had been obtained heretofore in this area. In December there were four contracts remaining at this elevation and the ore produced was all of special grade, with three contracts in the Race Course Lease and one in the Maas Lease.

5th Level

The majority of the actual mining accomplished on the 5th Level was located in the Race Course Lease and divided about equally between top slicing and sub caving. Further to the West the ore in the two sub level stopes extended to this elevation and slightly above.

MAAS MINE
ANNUAL REPORT
YEAR 1947

7. UNDERGROUND

c. Stoping

Detail (Cont.)

5th Level

In December there were three contracts mining and one developing. This development contract was advancing 5200 Cross-Cut in the East footwall and had started this drift in July. The purpose of this new development is to remove the ore extending slightly above the 4th Level in which mining has had to be stopped temporarily on account of the crushing of the 4th Level main drifts when mining reached too close to their elevation. Three raises will be put up to the ore contact and then transfer drifts driven as close to the contact as possible and the ore above removed through transfer raises, thus eliminating considerable rock development.

-25' Sub Level

With the exception of the two sub level stopes, this is the lowest elevation on which there was actual mining in 1947. This sub level was opened in February, and all of the ore was removed by the sub caving system. In December three contracts were mining to the West of the Race Course Lease, the workings of one of which extended slightly into this lease. This area being mined extends between the main North dike and the limit of mining to the South, which was set to protect the surface where outstanding ownerships still exist. It is fortunate that this limit almost coincides with the South footwall and therefore very little ore has been lost. The area between the East-West dike and the South footwall is very wet, but to the North excellent conditions prevail.

Sub Level Stopes

#17 Stope situated above the 6700 Cross-Cut and running North and South, has been in progress the entire year, with the mining extending from the -65' Transfer to the 10' elevation.

#29 Stope, situated above the South end of the 6700 Cross-Cut and running Southwest parallel to the dike, has been in production since April, when the development was completed. Here the ore block reaches from the -100' Sub to 25'. In both stopes it was necessary to leave pillars to cut off dilution from broken jasper which started to fall from the hanging after the ore was removed. There is considerable water flowing in both stopes, but this only causes trouble at the shaft as the cars would be loaded directly by scraping in any case, there being no storage in #29 and very little in #17.

Almost all of the ore produced below the 5th Level during the year contained too much sulphur for the standard grade, but it was possible to separate a small tonnage from time to time and thus obtain the higher selling price.