

MATHER MINE "B" SHAFT
ANNUAL REPORT
YEAR 1952

1. GENERAL: (Cont'd)

There was a shortage of experienced miners throughout the year. Unskilled labor, although scarce prior to the strike, became plentiful towards the end of the year.

Mather Mine "A" Shaft continued to drive the 5th Level main drift towards "B" Shaft. Work was partially completed during the year on an ore pass from 5th to 6th Level and the drift heading had reached the 8800 W. Coordinate. Cross-cut drifting and main line drifting totaled 3,627' for the year.

A total of 445' of cross-cut drift was driven on 6th Level completing the cross-cutting on this level.

Main level drifting and cross-cutting were carried out on 7th Level throughout the year with two crews. By the end of the year, the main drift heading was 140' west of the Mather "A" and "B" boundary line. A total of 1,255' of mainline drift and 3,010' of cross-cut drifts was driven.

Main level drifting on the 8th Level continued with one crew. Main line and cross-cut drifting amounted to 1,590' and 950' respectively.

Work in the 10th Level pumphouse continued throughout the year. The excavations for the four pumpstalls and concreting of the walls in the first two pump stations were finished by the end of the year.

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2. PRODUCTION,
SHIPMENTS &
INVENTORIES:

a. Production by Grade and Months:

| Months | Special | Standard | Stockpile Overrun | | Total Tons | Rock |
|-----------|---------------|---------------|-------------------|----------|---------------|---------------|
| | | | Special | Standard | | |
| January | 58,800 | - | - | - | 58,800 | 12,744 |
| February | 50,916 | - | - | - | 50,916 | 15,600 |
| March | 43,596 | 13,920 | - | - | 57,516 | 14,196 |
| April | 19,200 | 32,568 | - | - | 51,768 | 12,036 |
| May | 23,460 | 33,024 | - | - | 56,484 | 13,092 |
| June | 383 | 697 | - | - | 1,080 | 324 |
| July | 3,468 | 5,316 | - | - | 8,784 | 1,680 |
| August | 33,892 | 24,172 | - | - | 58,064 | 12,564 |
| September | 43,480 | 25,692 | - | 2,130 | 71,302 | 9,876 |
| October | 30,571 | 48,011 | 7,655 | 2,628 | 88,865 | 10,272 |
| November | 18,406 | 42,146 | 53,008 | - | 113,560 | 8,604 |
| December | <u>37,212</u> | <u>31,788</u> | - | - | <u>69,000</u> | <u>10,140</u> |
| Total | 363,384 | 257,334 | 60,663 | 4,758 | 686,139 | 121,128 |

b. Shipments:

| | Pocket Tons | Stockpile Tons | Total Tons | Total 1951 | Increase or Decrease |
|-----------------|----------------|-------------------|----------------|----------------|-------------------------|
| Mather Special | 84,012 | 101,700 | 185,712 | 341,860 | 156,148 |
| Mather Standard | <u>68,466</u> | <u>368,408</u> | <u>436,874</u> | <u>53,714</u> | <u>383,160</u> |
| Total | <u>152,478</u> | <u>470,108</u> | <u>622,586</u> | <u>395,574</u> | <u>227,012</u> |

The newly constructed loading pocket was put into operation on August 6th and loading continued from the pocket until October 15th. Since shipping space was limited it was decided to stop the pocket loading at this time so that the stockpile could be loaded out before the shipping season closed.

c. Ore Statement:

| | 1952 | 1951 |
|-------------------------|----------------|----------------|
| On Hand January 1, 1952 | 94,343 | 11,674 |
| Output for Year | 620,718 | 471,716 |
| Overrun | <u>65,421</u> | <u>6,527</u> |
| Total | <u>780,482</u> | <u>489,917</u> |
| Shipments | <u>622,587</u> | <u>395,574</u> |
| Balance on Hand | 157,895 | 94,343 |
| Increase in Output | 207,896 | 430,125 |
| Increase in Ore on Hand | 63,552 | 82,669 |

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2. PRODUCTION,
SHIPMENTS &
INVENTORIES: (Cont'd)

c. (Cont'd)

Working Schedule:

- 1952 - Five 3-8 hr. and one 2-8 hr. shifts per week from January 1, 1952 to May 31, 1952. Five and one-half 3-8 hr. shifts per week from June 1, 1952 to November 16, 1952. Five 3-8 hr. shifts per week from November 17, 1952 to December 31, 1952.
- 1951 - Five 3-8 hr. and one 2-8 hr. shifts per week from April 1, 1951 to December 31, 1951.
- 1950 - Five 3-8 hr. shifts per week from July 1, 1950 to August 20, 1950. Six 3-8 hr. shifts per week from August 21, 1950 to December 31, 1950.

d. Division of Product by Levels and by Months:

| Months | 6th Level | | 7th Level | 8th Level | Total Tons | |
|--------------------------------|---------------|--------------|---------------|------------|---------------|---------------|
| | Special | Standard | Standard | Standard | Special | Standard |
| January | 58,800 | - | - | - | 58,800 | - |
| February | 50,916 | - | - | - | 50,916 | - |
| March | 43,596 | 9,060 | 4,860 | - | 43,596 | 13,920 |
| April | 19,200 | 27,833 | 4,735 | - | 19,200 | 32,568 |
| May | 23,460 | 24,056 | 8,968 | - | 23,460 | 33,024 |
| June | 383 | 490 | 207 | - | 383 | 697 |
| July | 3,468 | 3,832 | 1,484 | - | 3,468 | 5,316 |
| August | 33,892 | 16,194 | 7,894 | 84 | 33,892 | 24,172 |
| September | 43,480 | 9,369 | 16,305 | 18 | 43,480 | 25,692 |
| October | 30,571 | 20,211 | 27,800 | - | 30,571 | 48,011 |
| November | 18,406 | 28,893 | 12,837 | 416 | 18,406 | 42,146 |
| December | <u>37,212</u> | <u>1,472</u> | <u>30,045</u> | <u>271</u> | <u>37,212</u> | <u>31,788</u> |
| Total | 363,384 | 141,410 | 115,135 | 789 | 363,384 | 257,334 |
| Current Year Stockpile Overrun | | | | | <u>60,663</u> | <u>4,758</u> |
| | | | | | 424,047 | 262,092 |

e. Production Delays:

A total of 42 1/3 working days was lost during the steel strike in June and July and two shifts were lost in October because of a general walkout resulting from a lay-off given to a miner, Lawrence Rankinen, for a violation of the "No Smoking" rule. Assuming a normal production through the strike periods, approximately 140,000 tons of ore were lost. Very little time was lost in returning to normal production after the strikes. This was due to the excellent state of repair in which the mine workings and equipment were kept by supervisory personnel and that there was very little mining being done in heavy areas at the time of the strikes.

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3. ANALYSIS:

a. Average Mine Analysis on Output (Inc. Stockpile):

| <u>Grade</u> | <u>Iron</u> | <u>Phos.</u> | <u>Silica</u> | <u>Sulphur</u> |
|-----------------|-------------|--------------|---------------|----------------|
| Mather Standard | 57.98 | .097 | 10.19 | .166 |
| Mather Special | 57.60 | .092 | 9.09 | .664 |

b. Average Analysis of Shipments (Total Average):

| <u>Grade</u> | <u>Iron</u> | <u>Phos.</u> | <u>Silica</u> | <u>Sulphur</u> | <u>Moist</u> | <u>Iron Nat'l</u> |
|-----------------|-------------|--------------|---------------|----------------|--------------|-----------------------|
| Mather Standard | 58.20 | .105 | 10.02 | .100 | 9.81 | 52.50 |
| Mather Special | 57.30 | .095 | 9.27 | .756 | 10.05 | 51.55 |

c. Average Analysis of Ore in Stock:

| <u>Grade</u> | <u>Tons</u> | <u>Iron</u> | <u>Phos.</u> | <u>Silica</u> | <u>Mang.</u> | <u>Alum.</u> | <u>Lime</u> | <u>Mag.</u> | <u>Sulph.</u> | <u>Loss</u> | <u>Moist</u> |
|-----------------|-------------|-------------|--------------|---------------|--------------|--------------|-------------|-------------|---------------|-------------|--------------|
| Mather Standard | 97,566 | 57.86 | .095 | 10.40 | .31 | 2.52 | .59 | .38 | .118 | 2.42 | 9.81 |
| Mather Special | 60,329 | 57.76 | .080 | 8.22 | .34 | 2.45 | 1.57 | .29 | .828 | 2.31 | 10.03 |

Two grades of ore, (1) Mather Standard, (2) Mather Special, accounted for the shipments from Mather "B" during the season. As indicated in the table above, the cargo shipments of Standard ore were close to the guarantee of 58.00 Fe., 10.00 Si., and .130 - .135 S. The Mather Special grade also approximated its guarantee of 57.50 Fe., 8.50 Si., and 1.00 S.

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4. ESTIMATED AND
ANALYSIS OF
ORE RESERVES:

The net ore reserves reported to the Tax Commission on December 31, 1952 were 14,251,353 tons. This shows an increase of 4,214,078 tons over the 1951 estimate. Diamond drilling and development increased the 7th Level reserves by 3,500,000 tons. The 8th Level reserves were increased 2,000,000 tons by diamond drilling.

Of the estimated reserve of 14,000,000 tons, approximately 12,000,000 tons are available to the present underground development. The remaining 2,000,000 tons are estimated from surface diamond drill holes. With the increase in the net reserves, there was a corresponding increase in the amount of ore that was available for immediate mining. About 6,000,000 tons of the 12,000,000 tons available to the present underground development are readily accessible for mining during the next four to six years. Of the actual tonnage available, approximately 500,000 tons are high sulphur grade and 5,500,000 tons are standard grade.

| | <u>Mather Standard</u> | <u>High Sulphur</u> | <u>Total Tons</u> |
|--|----------------------------|-------------------------|-----------------------|
| Above 5th Level | | 1,933,437 | 1,933,437 |
| Between 5th and 6th Levels | 1,214,688 | 2,253,749 | 3,468,437 |
| Between 6th and 7th Levels | 5,687,396 | 1,206,979 | 6,894,375 |
| Between 7th and 8th Levels | 2,499,107 | | 2,499,107 |
| Below 8th Level | 205,208 | | 205,208 |
| Sec. 1 Diamond Drill Hole Estimate | 2,046,873 | | <u>2,046,873</u> |
| Total Goss as of Dec. 31, 1952 | | | 17,047,437 |
| Less Total Production of Dec. 31, 1952 | | | <u>1,212,600</u> |
| Total Gross Less Production | | | 15,838,837 |
| Less 10% for Mining and Rock | | | <u>1,583,484</u> |
| Net Total as of Dec. 31, 1952 | | | <u>14,251,353</u> |

Expected Average Natural Analysis of Ore Reserves as of December 31, 1952:

| <u>Grade</u> | <u>Total Tons</u> | <u>Iron</u> | <u>Phos.</u> | <u>Sil.</u> | <u>Mang.</u> | <u>Alum.</u> | <u>Lime</u> | <u>Mag.</u> | <u>Sulph.</u> | <u>Loss</u> | <u>Moist</u> |
|--------------------------------------|-------------------|-------------|--------------|-------------|--------------|--------------|-------------|-------------|---------------|-------------|--------------|
| By Surface Dia- mond Drilling ... | 1,842,186 | 54.40 | .081 | 5.08 | .10 | 2.62 | .58 | .60 | .017 | 2.20 | 11.50 |
| By Underground Development | <u>12,409,167</u> | 52.00 | .090 | 7.00 | .45 | 2.62 | 2.50 | .50 | .500 | 2.00 | 10.50 |
| | 14,251,353 | | | | | | | | | | |

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5. LABOR AND WAGES:

a. Comments:

There was a definite shortage of man power even in the unskilled class from the beginning of the year until after the strike was settled in July. After settlement of the strike, there was an influx of unskilled labor which continued to the end of the year. However, there has been a definite shortage of trained miners to draw from.

Labor relations, with the exception of the strike, were very good during the year. Only one grievance, resulting from a violation of the "No Smoking" rule, by Lawrence Rankinen advanced to Step 2. Later this grievance went to arbitration and was decided in the Company's favor.

Regular meetings were instigated between Union and Management to discuss labor problems which could not be directly answered on the job. These meetings have definitely been a step towards better relationships between Labor and Management.

Union membership increased from 69.8% in January 1952 to 82% in January 1953.

Prior to the strike there appeared to exist a feeling of insecurity and nervousness among the men which possibly was the contributing factor for the increased accident rate during this period.

Employment Record:-

By the end of the year 605 men were employed at the mine which was a net gain of 96 employees for the year.

| | |
|-------------------------------------|------------|
| Number of Men 1/1/52 | 509 |
| Added to Roll During the Year | <u>251</u> |
| Total | 760 |
| Separations | <u>155</u> |
| Total on Payroll 12/31/52 | 605 |
| Net Gain | 96 |

About 25% of the new hires were men with mining experience from other mining districts in the Upper Peninsula. Of the many miscellaneous reasons given for separations, the most predominant were to take other employment and to enter the Armed Forces.

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5. LABOR AND WAGES:(Cont'd)

a. Comments: (Cont'd)

Vacations & Holidays:-

As a result of the steel strike no vacation was scheduled at Mather "B". Actually only a very small percentage of the men took an authorized vacation. However, there was considerable absenteeism which resulted in a loss of production during the deer hunting season in November.

The men benefited by six paid Holidays, which are New Years, Memorial Day, Independence Day, Labor Day, Thanksgiving and Christmas, as a result of, and under the provisions of, the new contract with the Union.

Promotions:-

Twenty-two men were promoted to the following positions during the year.

Underground Foremen

A. Luoma
J. Tregonning
C. Prideaux

Underground Shift Bosses

E. Peterson
A. Baggiore
J. Baldini
V. Jarvi
G. Filizetti
E. LaCahnce
G. Bjork
W. Williams
K. Cain
E. Koski
M. Korpi

Dispatchers

A. Moore
G. Kiiskala
E. Mattson
J. Roberts
V. Beltrame
J. Vercoe

Surface Bosses

D. Dahlstrom
G. Columbo

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5. LABOR AND WAGES: (Cont'd)

b. Comparative Statement of Wages and Product:
(Operating Only - Not Including E&A Work)

| | <u>1952</u> | <u>1951</u> | <u>Increase or Decrease</u> |
|--|-------------|-------------|-------------------------------------|
| <u>Average Wages Per Day:</u> | | | |
| Surface | \$ 15.98 | \$ 14.36 | \$ 1.62 |
| Underground | 18.09 | 16.03 | 2.06 |
| Total | \$ 17.65 | \$ 15.63 | \$ 2.02 |
| <u>Average Wages Contract Miner:</u> | \$ 18.38 | \$ 17.56 | \$.82 |
| <u>Wages Per Mo. of 19 3/4 Days: (1951 based on 23 days)</u> | | | |
| Surface | \$315.60 | \$330.28 | \$14.68 |
| Underground | 357.28 | 368.69 | 11.41 |
| Total | \$348.59 | \$359.49 | 10.90 |
| <u>Tons Per Man Per Day:</u> | | | |
| Surface | 32.86 | 26.84 | 6.02 |
| Underground | 8.63 | 8.34 | .29 |
| Total | 6.84 | 6.36 | .48 |
| <u>Labor Cost Per Ton:</u> | | | |
| Surface | \$.486 | \$.535 | \$.049 |
| Underground | 2.096 | 1.923 | .173 |
| Total | \$ 2.582 | \$ 2.458 | \$.124 |

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6. SURFACE:

Buildings:-

The buildings at the property required only very little maintenance to keep them in an excellent state of cleanliness and efficiency.

New Installations and New Equipment:-

The installation of a Butler cement batching plant was started in September and was approximately 95% completed at the end of the year. The only work that remains is the sheeting and the final testing of the equipment. This plant will use bulk cement in the concrete mix instead of bagged cement as was previously used. With the steadily increasing amounts of concrete being used underground, this installation is a big step towards more efficient and economical handling of large amounts of concrete.

Three new fans were received for cooling the air compressors in the Engine House. Two of the units had been installed by the end of the year, and the third unit will be installed early in 1953.

A dust collecting unit was installed near the crusher, but more work is needed on the set-up before satisfactory results are obtained.

One 60 ton hydraulic press and one punch press and shear unit were put into operation in the shops during the year.

A new D-8 Caterpillar tractor was placed into service on January 11. An automatic greasing system was installed on this unit before it went into operation.

Headframe and Stocking:-

Only minor delays due to equipment failure in the headframe and on the stocking trestles were recorded during 1952. The lacings of the short belt on the tripper was the cause of the minor delays before it was changed from a laced belt to an endless belt by a vulcanizing process.

After a persistent battling of the elements by the construction workers through the winter months, the work was finally completed on the east extension stocking trestle on March 14. By the time this east extension trestle was completed, the stockpile had become very wide, and the stocking of daily production was becoming difficult to handle. The completion of this project helped to relieve this situation.

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6. SURFACE: (Cont'd)

Headframe and Stocking:- (Cont'd)

Work was started on the railroad loading pocket in May and was completed on August 6th. The steel contractor for this project was the Milwaukee Bridge Company of Milwaukee, Wisconsin. The completion of this project proved very timely with the ending of the steel strike in July. The loading pocket is placed so that the ore is taken, by a short shuttle conveyor, from the North Stocking Conveyor, through the pocket into cars. The pocket has a storage capacity of approximately three cars. The pocket was used for approximately three months and worked very satisfactorily.

Footings for the west stocking trestle were completed by mine crews in September and the Worden-Allen Company began erection of the steelwork in October. All of the steel columns and five of the steel spans were in place by the end of the year. Mine carpenters started installing the fir decking after the first spans were completed by the steelworkers. The H. H. Robertson Company began the sheeting work in December.

Road Building:-

Preliminary steps were taken to construct a road between Mather "A" and Mather "B" Shafts. Center lines and profiles were completed by the Engineers, and some mine rock had been dumped in the fill areas by the end of the year. This road will facilitate the moving of equipment and supplies between the two properties without using the public highways.

Real Estate:-

A small number of real estate purchases were transacted during the year as part of the long range program of eventually clearing the property southeast of the shaft for future mining. Eight houses and four lots were purchased at a total cost of \$67,500.

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7. UNDERGROUND:

a. General:

Ore production increased steadily from an average of 55,000 tons per month for the first five months of the year to an average of 67,000 tons per month for the last five months of the year. Of the yearly tonnage mined, 504,794 tons or 82% came from the 6th Level and 115,135 tons or 18% came from 7th Level. Development ore accounted for 13% of the production from 6th Level and 40% of the production from 7th Level.

5th Level:-

Mather Mine "A" Shaft continued to drive the main drift toward "B" Shaft. A total of 2,360' of main drift and cross-cut drift was driven during the year. The main drift heading had reached the 8800 W. Coordinate by the end of the year. In addition to the drifting, an ore pass was partially completed from the 5th Level to the 6th Level.

6th Level:-

Sub level stoping was employed entirely in mining the special grade ore from 6th Level. This was necessary because of the extreme hardness of the ore. The latter was due, in part, to its sulphurous content. Although development costs are comparatively high in sub level stoping, a clean product, with little contamination from the hanging wall, is obtained once mining begins.

The standard ore bodies, which contributed 27% of the production from this level, lent themselves well to the less expensive block caving system of mining.

Area Between 6000 and 6100 Cross-cuts: A 400,000 ton sulphurous ore body was developed north of No. 22 Dike. Sub level stoping began in August and 28,000 tons of ore were produced by the end of the year.

Development was completed on a small ore body of Standard ore south of No. 25 Dike in February and the area was mined out during the year. This small block cave produced 40,000 tons.

Development was completed on a sub level stope north of No. 25 Dike at the end of the year. The estimated tonnage in this ore body is 56,000 tons of Standard ore.

Area Between 6100 and 6200 Cross-cuts: Sub level stoping was continued in the area north of and adjacent to No. 22 Dike. The mining of 36,000 tons of sulphurous ore completed the stoping in this area.

A total of 75,000 tons of Standard ore was mined by caving in the area south of No. 22 Dike. This completed mining in this area.

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7. UNDERGROUND: (Cont'd)

a. General: (Cont'd)

Area Between 6200 and 6300 Cross-cuts: Sub level stoping was continued throughout the year in the area north of No. 22 Dike. A total of 130,000 tons of sulphurous ore was mined from this stope. This was the largest producer in the mine during the year.

Mining was completed in the block cave area south of No. 22 Dike. This block produced 33,000 tons of Standard ore in 1952.

Area Between 6700 and 6800 Cross-cuts: Drifting in the 6800 Cross-cut was completed after a total of 445' of drift was driven.

Development was completed and 91,000 tons of Standard ore were mined by caving between these cross-cuts.

An ore pass and ventilation raise was completed from 6th to 5th Level in the 6700 North Cross-cut. All the ore mined on 5th Level will be crushed and transferred to 6th Level through this ore pass.

7th Level:-

The standard ore bodies on 7th Level appear to be very adaptable to a block caving system of mining. As a result, the development costs will be much lower than in the sub level stoping methods employed on 6th Level.

In mining the first block by the caving method ore draw charts were prepared and extreme caution was exercised in drawing the mills to avoid contamination from the hanging wall.

Area Between 7000 and 7100 Cross-cuts: Development was started in January on the 1,000,000 ton ore body immediately south of No. 22 Dike and was continued throughout the year. Because of the great height of ore some transfers are concreted while others are being driven with double sets of circular steel. This block cave will be producing at its maximum towards the latter part of 1953.

Development was started and continued throughout the year in the area south of the block mentioned above. The estimated tonnage in this area is 350,000 tons. No production is expected from this area until the latter part of 1953.

Development was completed on a 60,000 ton block cave east of the 7000 Cross-cut. This ore body overlies the major intrusive which cuts the end of the 7000 Cross-cut.

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7. UNDERGROUND: (Cont'd)

a. General: (Cont'd)

Area Between 7100 and 7200 Cross-cuts: The only work done in this area was a ventilation drift between the cross-cuts.

Area Between 7200 and 7300 Cross-cuts: The 7300 Cross-cut was driven during January and February with only 30' of ore being encountered in the drift. However, subsequent diamond drilling showed the expected ore body to be lying above the cross-cut.

Development was completed by the end of the year on a 45,000 ton block cave south of No. 22 Dike.

Area Between 7300 and 7400 Cross-cuts: The 7400 Cross-cut was driven during the year after preliminary diamond drilling showed a sizeable ore structure in this area. Although only limited height of ore was expected in this area, diamond drilling proved it to be much greater than anticipated.

Area Between 7400 and 7500 Cross-cuts: The 7500 Cross-cut was driven during February and March. This drift encountered 180' of ore and was stopped in iron formation.

A ventilation drift was the only work completed between these cross-cuts.

Area Between 7500 and 7600 Cross-cuts: The 7600 Cross-cut was completed in February. A total of 160' of ore was encountered.

Development of part of the area between these cross-cuts was completed and 70,000 tons of ore were produced by block caving. Development continued up the foot at the end of the year.

Area Between 7600 and 7700 Cross-cuts: The 7700 Cross-cut was completed in May. A total of 140' of ore was encountered in the drift. Diamond drilling showed the ore body to extend up the dip.

Area Between 7700 and 7800 Cross-cuts: The 7800 Cross-cut was only partly completed during the year. This cross-cut will be driven ahead after the 7th Level is connected through to Mather "A". A large ore section was encountered in an uphole drilled from the end of this drift.

By the end of the year, the main drift heading was 140' west of the Mather "A" and Mather "B" boundary line.

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7. UNDERGROUND: (Cont'd)

a. General: (Cont'd)

8th Level:-

Main level drifting and cross-cutting constituted the greater portion of the work on this level. Only enough of each cross-cut was driven to provide switching room as the mainline was advanced.

A ventilation connection was started in August from 8th to 7th Level in the 8500 Cross-cut. At the end of the year the raises had been extended to 100' above 8th Level.

10th Level:-

Work was continued in developing the pumphouse. The sumps were completed and the walls were concreted in the No. 1 and No. 2 pumpstalls. The first pump installation will possibly be completed by June, 1953.

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7. UNDERGROUND: (Cont'd)

b. Exploration:-

The extensive diamond drilling program that was started in 1950-51 was continued during 1952. The exploration was planned to cover four major objectives. These were:

1. Outlining the 5th Level ore bodies.
2. Detailing the ore outlines for 6th Level mining.
3. Outlining and detailing the 7th Level ore bodies.
4. Outlining the 8th Level ore structures.

Most of the exploration in 1953 will be concentrated on 5th, 7th, and 8th Levels, although several holes will be drilled from 8th Level to explore 9th Level.

5th Level:-

Five holes were drilled by Mather Mine, "A" Shaft to explore the west end of 5th Level "B" Shaft. No mineable ore was encountered in the first stages of the drilling program planned for this level.

Holes No. 83, 92, 104, and 105 tested the area south of the 5900 - B Cross-cut. Encouraging results in Hole No. 83 led to the drilling of the other three holes, but no major ore body was discovered by this drilling.

Hole No. 122 tested the area south of the 5800-B Cross-cut. No ore was encountered.

6th Level:-

Eight holes were drilled from 6th Level and the sublevels related to 6th Level to detail the outlines of the ore for 6th Level mining. This drilling proved to be very valuable for development purposes.

Hole No. 70 was drilled from a station near the 6400 Cross-cut to outline further the high sulphur ore indicated in drill hole No. 35. This drilling substantiated the large tonnage indicated in Hole No. 35.

Holes No. 73 and 82 were drilled from the 6700 and 6800 Cross-cuts respectively to outline further the ore indicated in the cross-cuts and in Hole No. 58.

Hole No. 99 was drilled from the 6200 Cross-cut to test the upward extension of the ore drilled in Hole No. 28. This drilling showed that the ore thins rapidly upwards.

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7. UNDERGROUND: (Cont'd)

b. Exploration:- (Cont'd)

Holes No. 116, 124, and 126 were drilled in the area of the 6000 and 6100 South Cross-cuts to outline the ore indicated in Holes No. 16 and 61. Hole No. 116 added considerable tonnage to what had been indicated in the area.

Hole No. 88 was drilled to test above 6th Level on the 10,300 W. Coordinate. Very little ore was encountered in this drilling.

7th Level:-

The 7th Level exploration program included nine down holes from the 6th Level and twenty-nine holes from the 7th Level workings. The results of this drilling indicates (1) an increase in the ore reserves available to 7th Level, (2) that a considerable amount of drilling is needed to detail the ore outlines for development, (3) that with the exception of small tonnages of high sulphur ore north of #22 dike, the ore will be standard grade.

Holes No. 78, 89, 93, and 130 were down holes drilled from 6th Level to test the hanging-wall and footwall contacts of the ore between the 7000-7100 Cross-cuts.

Holes No. 101, 113, 114, and 120 were down holes drilled from 6th Level to test the footwall contact and the sulphur content of the ore north of #22 dike. The footwall contacts were close to interpretations made on the areas prior to drilling, and the ore was standard in all the holes except in No. 120 which was high sulphur and sulphurous.

Hole No. 85, which was drilled vertically from the 6800 Cross-cut, encountered 70' of ore, and was stopped in ore at 161' because of extreme caving conditions.

Holes No. 71 and 74 were drilled to outline the ore above the 7200 Cross-cut. This drilling indicated large tonnages above the cross-cut.

Holes No. 86, 90, and 100 were drilled to outline the ore above the 7300 Cross-cut. Although Hole No. 86 indicated a large ore body above the cross-cut, further drilling is planned to outline the ore.

Holes No. 81, 87, 135, 136, 137, 138, 139, 144, 146, and 147 were drilled to outline the ore above the 7400 Cross-cut. This drilling, which was done during the last few months of the year, increased the ore reserves by nearly 600,000 tons.

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7. UNDERGROUND: (Cont'd)

b. Exploration:- (Cont'd)

Holes No. 77, 94, and 98 were drilled to outline the ore above the 7500 Cross-cut. Only small tonnages of first class ore were drilled in these holes, but large tonnages of second class ore were encountered.

Holes No. 102, 109, and 123 were drilled to outline the ore above the 7700 and 7800 Cross-cuts. A very large tonnage can be expected from this area.

Holes No. 127 and 142 were drilled on the 10,000 W. Coordinate to test the area near the Cambria-Jackson fault. Hole No. 127 indicated that there is no ore adjacent to the west side of the fault on 7th Level.

Hole No. 151 was a flat hole drilled on the 10,355 W. Coordinate. This hole encountered 112' of first class ore.

Holes No. 131, 148, and 150 were drilled to test hanging wall contacts above 7th Level for mining purposes.

Holes No. 71, 97, 143, and 112 were flat holes drilled to test beyond the ends of the 7th Level Cross-cuts. No significant ore runs were encountered in any of these holes.

Hole No. 95 was drilled to the southeast from the 7th Level plat to test beyond the east mining limit. This hole drilled through 50' of first class ore.

8th Level:-

A total of thirteen holes were drilled to outline the 8th Level ore bodies. These included 7 down holes from the 7th Level and 6 holes from the 8th Level workings. This drilling indicated that large tonnages of standard ore will be available to the 8th Level.

Holes No. 75, 76, 79, 91, and 96 were horizontal holes drilled from the 8th Level Cross-cuts. Very little ore was encountered in this drilling because in the area where these holes were drilled, the ore is lying mainly above the level.

Hole No. 115 tested the area above the 8500 Cross-cut. This hole encountered 125' of first class ore.

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7. UNDERGROUND: (Cont'd)

b. Exploration:- (Cont'd)

The following table shows the drilling for the year.

| <u>Holes Drilled From 5th Level To Explore 5th Level</u> | <u>Drilled From</u> | <u>Footage Drilled</u> | <u>1st Class Ore Drilled</u> | <u>Total Depth</u> |
|--|-------------------------|----------------------------|----------------------------------|------------------------|
| Hole Number: 83 | 0' | 602' | 90' | 602' |
| 92 | 0' | 678' | 4' | 678' |
| 104 | 0' | 78' | 0' | 78' |
| 105 | 0' | 642' | 0' | 642' |
| 122 | 0' | 314' | 0' | 314' |
| <u>Holes Drilled From 6th Level To Explore 6th Level</u> | | | | |
| 70 | 375' | 3' | 0' | 418' |
| 73 | 0' | 160' | 0' | 160' |
| 82 | 0' | 217' | 39' | 217' |
| 99 | 0' | 209' | 15' | 209' |
| 116 | 0' | 151' | 131' | 151' |
| 124 | 0' | 131' | 0' | 131' |
| 126 | 0' | 105' | 0' | 105' |
| 88 | 0' | 326' | 12' | 326' |
| <u>Holes Drilled From 6th Level To Explore 7th Level</u> | | | | |
| 78 | 0' | 207' | 154' | 207' |
| 85 | 0' | 161' | 69' | 161' |
| 89 | 0' | 142' | 59' | 142' |
| 93 | 0' | 198' | 45' | 198' |
| 101 | 0' | 151' | 100' | 151' |
| 113 | 0' | 124' | 101' | 124' |
| 114 | 0' | 138' | 112' | 138' |
| 120 | 0' | 110' | 85' | 110' |
| 130 | 0' | 221' | 48' | 221' |
| <u>Holes Drilled From 7th Level To Explore 7th Level</u> | | | | |
| 71 | 292' | 11' | 0' | 330' |
| 74 | 0' | 328' | 190' | 328' |
| 77 | 0' | 368' | 58' | 368' |
| 80 | 0' | 193' | 60' | 193' |
| 81 | 0' | 250' | 70' | 250' |
| 86 | 0' | 255' | 175' | 255' |
| 87 | 0' | 780' | 205' | 780' |
| 90 | 0' | 310' | 40' | 310' |
| 94 | 0' | 105' | 57' | 105' |

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7. UNDERGROUND: (Cont'd)b. Exploration:- (Cont'd)

| <u>Holes Drilled from 7th Level To Explore 7th Level</u> | <u>Drilled From</u> | <u>Footage Drilled</u> | <u>1st Class Ore Drilled</u> | <u>Total Depth</u> |
|--|-------------------------|----------------------------|----------------------------------|------------------------|
| Hole Number: 97 | 0' | 299' | 0' | 299' |
| 98 | 0' | 195' | 26' | 195' |
| 100 | 0' | 128' | 0' | 128' |
| 102 | 0' | 188' | 87' | 188' |
| 109 | 0' | 99' | 35' | 99' |
| 112 | 0' | 283' | 55' | 283' |
| 123 | 0' | 202' | 155' | 202' |
| 127 | 0' | 540' | 34' | 540' |
| 131 | 0' | 99' | 40' | 99' |
| 135 | 0' | 156' | 46' | 156' |
| 95 | 0' | 1260' | 50' | 1260' |
| 136 | 0' | 121' | 105' | 121' |
| 137 | 0' | 206' | 55' | 206' |
| 139 | 0' | 184' | 167' | 184' |
| 142 | 0' | 314' | 85' | 314' |
| 143 | 0' | 151' | 0' | 151' |
| 146 | 0' | 121' | 90' | 121' |
| 148 | 0' | 65' | 45' | 65' |
| 150 | 0' | 10' | 10' | 10' |
| 151 | 0' | 28' | 28' | 28' |
| | | | | |
| <u>Holes Drilled From 7th Level To Explore 8th Level</u> | | | | |
| 72 | 10' | 177' | 52' | 187' |
| 84 | 0' | 200' | 113' | 200' |
| 103 | 0' | 88' | 66' | 88' |
| 108 | 0' | 168' | 149' | 168' |
| 138 | 0' | 110' | 70' | 110' |
| 144 | 0' | 125' | 65' | 125' |
| 147 | 0' | 50' | 29' | 50' |
| | | | | |
| <u>Holes Drilled From 8th Level To Explore 8th Level</u> | | | | |
| 75 | 0' | 510' | 95' | 510' |
| 76 | 0' | 410' | 0' | 410' |
| 79 | 0' | 355' | 0' | 355' |
| 91 | 0' | 525' | 0' | 525' |
| 96 | 0' | 485' | 0' | 485' |
| 115 | 0' | 246' | 125' | 246' |
| | | | | |
| Totals | 64 | 15,766' | 3,796' | |

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7. UNDERGROUND: (Cont'd)

c. Timbering:

Statement of Timber Used Under Operating Account "Timbering"

| | <u>Lineal Feet</u> | <u>Avg. Price Per Foot</u> | <u>Amount</u> |
|--|------------------------|--------------------------------|------------------|
| Cribbing | 118,088 | .14419 | \$ 17,027.51 |
| Stulls | 67,800 | .35333 | 23,956.17 |
| Stulls | 913 | .20788 | 189.80 |
| Total | <u>186,801</u> | <u>.22041</u> | <u>41,173.48</u> |
| Lagging | 1,445,562 | .022099 | 31,945.80 |
| Poles | 284,807 | .038852 | 11,065.47 |
| Total | <u>1,730,369</u> | <u>.024856</u> | <u>43,011.27</u> |
| W. F. Beams | 162 | .9858 | 159.70 |
| "I" Beams | 45 | 1.38 | 62.10 |
| Miscellaneous | - | - | 851.05 |
| Cement | 17,941 Bags | 1.0808 | 19,391.42 |
| Sand | 1,442 Yds. | 2.81495 | 4,059.16 |
| Gravel | 1,675 Yds. | 3.90316 | 6,537.80 |
| Pozzolith | 250 lbs. | .17996 | 44.99 |
| Reinforcing Rod | 4,878 Ft. | .13023 | 635.27 |
| Total | | | <u>31,741.49</u> |
| Grand Total Including Steel and Concrete Materials | | | \$115,926.24 |

The proportion of concrete to timber was considerably higher in 1952 than in 1951 due to the increased use of concrete in top timbers and transfer drifts in areas where extreme heights of ore were known to exist. It is hoped that when mining begins very few repairs will be necessary to maintain a continuous production in the concrete drifts.

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7. UNDERGROUND: (Cont'd)c. Timbering: (Cont'd)Statement of Timber Used - All Operations

| | <u>Lineal Feet</u> | <u>Avg. Price Per Foot</u> | <u>Amount</u> |
|--|------------------------|--------------------------------|---------------------|
| Cribbing | 104,089 | .13489 | \$ 14,040.58 |
| Timber | 68,978 | <u>.35304</u> | <u>24,352.36</u> |
| Total | <u>173,067</u> | <u>.22183</u> | <u>\$ 38,392.94</u> |
| | | <u>Per 100'</u> | |
| Lagging | 2,060,967 | 2.1993 | \$ 45,326.92 |
| Poles | <u>351,183</u> | <u>3.9525</u> | <u>13,880.84</u> |
| Total | <u>2,412,150</u> | <u>2.4545</u> | <u>\$ 59,207.76</u> |
| | | <u>Per Foot</u> | |
| W.F. Beams | 52,976 | 1.04877 | \$ 55,559.90 |
| "I" Beams | 320 | 1.00546 | 321.755 |
| W.F. Beams | 5,979 | 1.32618 | 7,929.24 |
| "I" Beams | 578 | 1.19204 | 689.00 |
| "I" Beams | 26 | <u>2.43692</u> | <u>63.36</u> |
| Total | <u>59,879</u> | <u>1.07822</u> | <u>\$ 64,563.25</u> |
| Galbestos | 52 Pcs. | 6.94596 Ea. | \$ 361.19 |
| Hat Sections | 8,956 " | 2.36072 " | 21,142.61 |
| Minecrete Back Poles | 1,167 " | 1.54801 " | 1,806.53 |
| Minecrete Blocks | 1,244 " | .22075 " | 274.62 |
| Cement | 34,520 Bags | 1.09147 " | 37,677.73 |
| Sand | 2,343 Yds. | 2.8402 Yd. | 6,654.63 |
| Gravel | 2,642 " | 3.81676 " | 10,083.89 |
| Pozzoloth | 500 Lbs. | .17996 lb. | 89.98 |
| Reinforcing Rod | 82,658 Ft. | .12811 Ft. | <u>10,589.87</u> |
| Total | | | <u>\$ 88,681.05</u> |
| Grand Total Including Steel and Concrete Materials | | | \$250,845.00 |

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7. UNDERGROUND: (Cont'd)d. Explosives:

The following table includes the type, quantity and price of blasting supplies used on all operations.

| | <u>Pounds</u> | <u>Average Price</u> | <u>Amount</u> |
|--------------|----------------|--------------------------|---------------------|
| Hercomite | 175,674 | 16.17 CWT | \$ 28,408.64 |
| Gelatin | 101,905 | 22.36 CWT | 22,787.84 |
| Gelamite | 421,925 | 16.98 CWT | 71,661.03 |
| Hercomite | 2,700 | 16.35 CWT | 441.45 |
| Gelamite | 2,000 | 16.35 CWT | 327.00 |
| Total Powder | <u>704,204</u> | <u>17.55 CWT</u> | <u>\$123,625.96</u> |

Explosives Used In Breaking 686,139 Tons of Ore
In Stopping and Development in Ore

| | <u>Quantity</u> | <u>Average Price</u> | <u>Amount</u> |
|--|-----------------|--------------------------|---------------------|
| Gelamite | 202,037 | 16.997 CWT | \$ 34,340.72 |
| Hercomite | 175,191 | 16.17 CWT | 28,329.66 |
| Gelatin | 100,900 | 22.361 CWT | 22,562.90 |
| Hercomite | 2,700 | 16.35 CWT | 441.46 |
| Gelamite | 2,000 | 16.35 CWT | 327.00 |
| Total | <u>482,828</u> | <u>17.812 CWT</u> | <u>\$ 86,001.74</u> |
| Blasting Caps | 123,000 | 1.5714 C | \$ 1,932.85 |
| Dry Fuse | 995,000 | 9.4587 M | 9,411.50 |
| Elec. Caps | 9,935 | 24.702 C | 2,454.19 |
| Ignitacord | 8,000 | .755 C | 60.40 |
| Lead Wires | 7,500 | 19.90 M | 149.25 |
| Powder Bags | 105 | 4.47 ea. | 469.40 |
| Fuse Lighters | 27,266 | 9.00 M | 245.40 |
| Primacord | 490,000 | 34.00 M | 16,660.00 |
| Ignitacord Conn. | 7,500 | 2.00 C | 150.00 |
| Total | | | <u>\$ 31,532.99</u> |
| Grand Total Explosives and Blasting Supplies | | | <u>\$117,534.73</u> |

| | |
|-----------------------------------|-------|
| Pounds of Powder Per Ton of Ore | .704 |
| Tons of Ore Per Pound of Powder | 1.421 |
| Cost Per Ton For Powder | .1253 |
| Cost Per Ton For Fuse, Caps, Etc. | .046 |
| Cost Per Ton For All Explosives | .171 |

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7. UNDERGROUND: (Cont'd)

e. Pumping:

All the shaft water is collected and stored behind the 4th Level dam and used as drilling water. All the mine water at "B" Shaft flows to "A" Shaft along the 6th Level footwall drift. During the month of December, the average flow from 6th Level was 82 G.P.M., 7th Level 70 G.P.M., and 8th Level 15 G.P.M. The water from 7th Level and 8th Level flows towards the shaft where it is pumped up to the 6th Level.

MATHER MINE "B" SHAFT
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8. COST OF OPENING, EQUIPPING,
DEVELOPING AND OPERATING:

a. Comparative Mining Costs:

| | | |
|------------------------------------|---|--|
| Product | 1952 686,139 | 1951 478,243 |
| Underground Costs | \$ 3.066 | \$ 3.065 |
| Surface Costs | .373 | .352 |
| General Mine Expense | .713 | .794 |
| Cost of Production | <u>\$ 4.152</u> | <u>\$ 4.211</u> |
| Allowance Under Section 309 | .984 | 1.985 |
| Amortization of Defense Facilities | .457 | .432 |
| Depreciation: | | |
| Plant and Equipment | .172 | .183 |
| Development after 12/31/44 | .151 | .188 |
| Pre-Production Development | .023 | .023 |
| Movable Equipment | .021 | .024 |
| Taxes | .184 | .180 |
| Loading and Shipping | .044 | .044 |
| Total Cost at Mine | <u>\$ 6.188</u> | <u>\$ 7.270</u> |
| Budget-Estimated Cost Per Ton | \$ 5.601 | \$ 5.427 |
| Number of Shifts and Hours | 12 1-8 hr. 30 2-8 hr. 213 3-8 hr. | 2 1-8 hr. 42 2-8 hr. 251 3-8 hr. |
| Total 8 hr. Operating Shifts | 711 | 839 |
| Number of Operating Days | 237 | 279-2/3 |
| Average Daily Product | 2,895 | 1,722 |

Proportion of Labor and Supplies

| | <u>Amount</u> | <u>Per Ton</u> | <u>Per Cent</u> |
|--------------------|---------------------|----------------|-----------------|
| Labor | \$1,960,646.22 | \$2.858 | 46% |
| Supplies | <u>2,285,314.35</u> | <u>3.330</u> | <u>54%</u> |
| Total Cost at Mine | \$4,245,960.57 | \$6.188 | 100% |

MATHER MINE "B" SHAFT
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YEAR 1952

8. COST OF OPENING, EQUIPPING,
DEVELOPING AND OPERATING: (Cont'd)

Comments:-

In spite of increased labor and supply costs the total cost at the mine decreased \$1.082 per ton over that of the previous year. Cost of Production decreased \$0.059 per ton. Of this item Surface Costs increased \$0.021 and General Mine Expenses decreased \$0.081 per ton. A decrease in overall Depreciation amounted to \$0.051 per ton. Taxes and loading and shipping remained approximately the same.

These favorable costs are a reflection of increased production, and of the increase in areas being mined by the less expensive block caving system.

Idle Expense, as shown on page 28, which was due to the Steelworkers' Strike in June and July of 1952, amounted to \$95,125.08.

MATHER MINE "B" SHAFT
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8. COST OF OPENING, EQUIPPING,
DEVELOPING AND OPERATING: (Cont'd)

b. Detailed Cost Comparison (Operating):

| | 1952 | | 1951 | |
|----------------------------------|----------------|---------|----------------|---------|
| | Amount | Per Ton | Amount | Per Ton |
| Estimated Wage Adjustment | \$ 175,522.57 | .256 | \$ 75,118.57 | .157 |
| Exploring in Mine | 9,763.49 | .014 | 28,808.53 | .061 |
| Development in Rock | 147,435.98 | .215 | 14,030.55 | .029 |
| Development in Ore | 23,194.65 | .413 | 556,622.61 | 1.164 |
| Stoping | 556,367.39 | .811 | 223,910.51 | .468 |
| Timbering | 407,947.45 | .595 | 245,442.86 | .513 |
| Tramming | 228,306.56 | .333 | 159,930.39 | .334 |
| Ventilation | 10,021.59 | .015 | 5,544.45 | .012 |
| Pumping | 5,018.88 | .007 | 4,535.84 | .010 |
| Compressors and Air Pipes | 48,092.82 | .070 | 29,992.19 | .063 |
| Underground Superintendence | 89,260.51 | .130 | 53,681.94 | .112 |
| Maint. Comp. & Power Drills | 1,013.18 | .001 | 574.23 | .001 |
| Scrapers & Mechanical Loaders | 108,364.52 | .158 | 50,587.23 | .106 |
| Tramming Equipment | 26,304.21 | .038 | 14,685.17 | .031 |
| Pumping Machinery | 7,176.16 | .010 | 2,076.55 | .004 |
| Total Underground Costs | \$2,103,789.96 | 3.066 | \$1,465,541.62 | 3.065 |
| Hoisting | \$ 92,489.71 | .135 | \$ 41,592.33 | .087 |
| Stocking Ore | 35,199.93 | .051 | 34,418.79 | .072 |
| Screening - Crushing at Mine | 23,982.96 | .035 | 8,575.92 | .018 |
| Dry House | 36,774.69 | .054 | 26,000.00 | .054 |
| General Surface Expense | 35,046.11 | .051 | 28,975.84 | .061 |
| Maint. Hoisting Equipment | 15,013.45 | .022 | 18,833.54 | .039 |
| Shaft | 5,111.21 | .007 | 5,162.99 | .011 |
| Top Tram Equipment | 3,782.11 | .006 | 3,319.35 | .007 |
| Docks, Trestles and Pockets | 3,152.65 | .005 | 762.85 | .001 |
| Mine Buildings | 5,065.07 | .007 | 904.89 | .002 |
| Total Surface Costs | \$ 255,617.89 | .373 | \$ 168,546.50 | .352 |
| Geological | \$ 8,424.66 | .012 | \$ 8,944.27 | .019 |
| Mining Engineering | 39,897.14 | .058 | 32,045.80 | .067 |
| Mechanical and Electrical Eng. | 7,918.15 | .012 | 12,160.39 | .025 |
| Analysis and Grading | 55,388.94 | .081 | 7,621.72 | .016 |
| Safety and Personnel Departments | 5,327.15 | .008 | 4,714.06 | .011 |
| Telephones and Safety Devices | 35,727.01 | .052 | 17,656.95 | .037 |
| Local and General Welfare | 6,399.98 | .009 | 5,909.74 | .012 |
| Spec. Exp. Pensions & Allow. | 15,657.24 | .023 | 9,750.37 | .020 |
| Ishpeming Office | 46,547.97 | .068 | 40,818.68 | .085 |
| Mine Office | 84,102.62 | .123 | 81,274.64 | .171 |
| Insurance | 37,614.79 | .055 | 30,425.99 | .064 |
| Personal Injury | 21,395.88 | .031 | 25,063.24 | .052 |
| Social Security Taxes | 47,672.03 | .069 | 38,925.77 | .081 |
| Employees Vacation Pay | 78,307.28 | .114 | 64,288.24 | .134 |
| Rental of Training Facilities | 1,050.00 | .002 | | |
| Total General Mine Expenses | \$ 489,330.84 | .713 | \$379,599.86 | .794 |
| COST OF PRODUCTION | \$2,848,738.69 | 4.152 | \$2,013,687.98 | 4.211 |

MATHER MINE "B" SHAFT
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8. COST OF OPENING, EQUIPPING,
DEVELOPING AND OPERATING: (Cont'd)

b. Detailed Cost Comparison: (Idle - Due to Steelworkers' Strike 1952)

| | 1952 | 1951 |
|----------------------------------|---------------------|--------------------|
| | <u>Amount</u> | <u>Amount</u> |
| Exploring in Mine | \$ 214.39 | \$ 583.98 |
| Estimated Wage Adjustment | 906.18 | 95.58 |
| Development in Rock | 39.19 | - |
| Development in Ore | 1,617.49 | 167.79 |
| Stopping | 929.01 | 181.85 |
| Timbering | 914.32 | - |
| Tramming | 2,410.93 | - |
| Ventilation | 40.93 | - |
| Pumping | 2,200.43 | 28.16 |
| Compressors and Air Pipes | 1,277.36 | 594.82 |
| Underground Superintendence | 16,276.94 | 1,937.49 |
| Maint. Comp. & Power Drills | - | 21.12 |
| Scrapers & Mechanical Loaders | 843.53 | 47.52 |
| Tramming Equipment | 365.50 | - |
| Pumping Machinery | 363.09 | 106.73 |
| | <u>\$ 28,399.29</u> | <u>\$ 3,765.04</u> |
| Hoisting | \$ 3,505.99 | \$ 657.52 |
| Stocking Ore | 7.98 | - |
| Screening - Crushing at Mine | 213.20 | - |
| Dry House | 1,263.25 | 137.27 |
| General Surface Expense | 3,216.90 | 639.62 |
| Maint. Hoisting Equipment | 297.21 | 72.23 |
| Top Tram Equipment | 40.18 | - |
| Total Surface Costs | <u>\$ 8,544.71</u> | <u>\$ 1,506.64</u> |
| Geological | \$ 1,083.71 | \$ 226.00 |
| Mining Engineering | 4,580.54 | 1,003.00 |
| Mechanical and Electrical Eng. | 1,782.83 | 394.74 |
| Analysis and Grading | 4,283.88 | 83.00 |
| Safety and Personnel Departments | 1,422.00 | 69.00 |
| Telephones and Safety Devices | 1,424.28 | 28.15 |
| Local and General Welfare | 908.00 | 108.00 |
| Spec. Exp. Pensions & Allow. | 3,144.00 | 174.00 |
| Ishpeming Office | 15,039.00 | 685.00 |
| Mine Office | 8,152.37 | 1,840.31 |
| Insurance | 7,927.14 | 1,058.16 |
| Personal Injury | 1,489.37 | 549.54 |
| Social Security Taxes | 643.96 | 302.94 |
| Employees Vacation Pay | 6,300.00 | 530.00 |
| Total General Mine Expenses | <u>\$ 58,181.08</u> | <u>\$ 7,051.84</u> |
| COST OF PRODUCTION | \$ 95,125.08 | \$12,323.52 |

MATHER MINE "B" SHAFT
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8. COST OF OPENING, DQUIPPING,
DEVELOPING AND OPERATING: (Cont'd)

Capital account expenditures for the year amounted to \$1,742,127.61, which brings the cumulative expenditures in E&A NM-44 to \$10,668,849.95.

| | |
|-------------------------------|------------------|
| Capital Expenditures For Year | \$ 1,742,127.61 |
| E&A NM-44 to Dec. 31, 1952 | \$ 10,668,849.95 |
| E&A 79 to Dec. 31, 1952 | <u>4,922.49</u> |
| Total E&A to Dec. 31, 1952 | \$ 10,673,772.44 |

Following are comments on E&A expenditures for 1952:

| | <u>Percentage of Total E&A Expenditures</u> |
|--|---|
| E&A 44-J Pump station increase due to purchase of pump. | 7.7 |
| E&A 44-L Decrease in main level development due to fewer contracts in construction in 1952 than in 1951. | 47.8 |
| E&A 44-N Purchase and erection of bulk cement plant. | 1.4 |
| E&A 44-O Purchase of underground crusher for 5th Level. | 3.7 |
| E&A 44-R Erection of a loading pocket. | 2.1 |
| E&A 44-T Purchase and erection of west extension conveyor stocking system. | 21.2 |
| E&A 44-U Purchase of scrapers and hoists for expanding mining operations. | 7.5 |

The average cost per foot of main level drifting for the year was \$74.84. No extremely heavy ground conditions were encountered, however, all drifting done during the year required ground support.

| | |
|---------------------------------------|---------------------|
| Total Capital Expenditures 1952 | \$ 1,742,127.61 |
| Total Charge Offs 1952 | <u>1,240,387.22</u> |
| Net Increase in Capital Account | \$ 501,740.39 |

AUTHORIZATIONS AND EXPENDITURES
MATHER MINE "B" SHAFT DEVELOPMENT:

| | TOTAL AUTHORIZED | EXPENDITURES TO DEC. 31, 1952 | UNEXPENDED BALANCE | 1952 EXPENDITURES |
|---|---------------------|----------------------------------|-----------------------|----------------------|
| <u>44-A GENERAL EXPENSE:</u> | | | | |
| a. Insurance | | 17,562.12 | | - |
| b. Engineering | | 71,134.33 | | - |
| c. Analysis | | 6,794.35 | | - |
| d. Mine Office | | 62,315.02 | | - |
| e. Ishpeming Office | | 29,169.57 | | - |
| f. Superintendence | | 51,406.92 | | - |
| g. Legal | | 635.30 | | - |
| h. Personal injury | | 12,886.13 | | - |
| j. Taxes - Social Security | | 58,743.42 | | 9,383.14 |
| k. Vacation expense | | 20,861.52 | | - |
| m. Safety Department | | 5,174.54 | | - |
| n. Geological | | 6,959.32 | | - |
| o. Policing | | 30,531.18 | | - |
| p. Compensation Department | | 1,541.87 | | - |
| q. General surface and miscellaneous | | 28,683.37 | | - |
| r. General and district welfare | | 5,019.24 | | - |
| s. Special expense | | 1,298.92 | | - |
| t. Pensions and retirements | | 8,339.95 | | - |
| u. Hospital loss | | 9,383.22 | | - |
| v. Examinations | | 540.00 | | - |
| TOTALS | 480,000.00 | 428,980.29 | 51,019.71 | 9,383.14 |
| <u>44-B PREPARING SITE:</u> | | | | |
| a. Building roads | | 53,449.57 | | 1,088.71 |
| b. Grading for site | | 55,371.91 | | 77.12 |
| c. Purchase and moving of dwellings | | 22,273.72 | | - |
| d. Landscaping | | 19,432.19 | | 1,948.76 |
| e. Drainage | | 13,794.20 | | - |
| f. Water meter | | 1,818.75 | | - |
| p. Prop'n of Distribution Expense | | 2,122.21 | | - |
| TOTALS | 176,000.00 | 168,262.55 | 7,737.45 | 3,114.59 |
| <u>44-C TEMPORARY BUILDING & TEMPORARY EQUIPMENT:</u> | | | | |
| a. Tool shed | | 413.64 | | - |
| b. Office and Dry | | 19,591.30 | | - |
| d. Engine house | | 12,735.46 | | - |
| e. Head frame | | 4,876.01 | | - |
| f. Shop building | | 3,146.57 | | - |
| g. Heating Plant | | 3,418.70 | | - |
| h. Rotary dump and cars | | 3,631.75 | | - |
| i. Ventilating fans | | 1,093.31 | | - |
| j. Sinking hoists and accessories | | 22,843.75 | | - |
| k. Compressors and accessories | | 14,863.38 | | - |
| l. Air lines | | 2,915.96 | | - |
| m. Power lines | | 2,460.47 | | - |
| n. Water lines | | 1,623.47 | | - |
| o. Sewer lines | | 1,460.70 | | - |
| p. Electrician's shed | | 137.01 | | - |
| r. Machine Shop | | 1,054.47 | | - |
| s. Lamp room | | 1,025.32 | | - |
| t. Rock trestle | | 258.38 | | - |
| TOTALS | 97,575.00 | 97,540.65 | 34.35 | - |

AUTHORIZATIONS AND EXPENDITURES
MATHER MINE "B" SHAFT DEVELOPMENT:

TOTAL
AUTHORIZED

EXPENDITURES TO
DEC. 31, 1952

UNEXPENDED
BALANCE

1952
EXPENDITURES

44-D INITIAL EQUIPMENT:

| | | |
|---|-----------|---|
| a. Tractor, trailbuilder and Athey wagon | 13,449.28 | - |
| b. ½ yard combination crane and clamshell | 12,960.89 | - |
| c. 5 ton truck | 6,091.58 | - |
| d. ½ ton pickup truck | 2,689.96 | - |
| e. Shop equipment | 17,489.30 | - |
| f. Fuel tanks | 123.15 | - |
| h. Water main | 327.49 | - |
| j. Hopper | 1,817.14 | - |
| k. Concrete mixer | 3,676.93 | - |
| l. Pumperete | 9,512.00 | - |
| m. Ford dump truck | 2,604.55 | - |

TOTALS

70,747.27

70,747.27

-

-

44-E SINKING SHAFT:

| | | |
|---|------------|----------|
| a. Equipment | 31,478.31 | - |
| b. 1 - Shaft Sinking | 659,732.43 | 717.62 |
| 2 - Stocking Rock | 1,136.07 | - |
| 3 - Temporary Air Lines | 1,786.80 | - |
| c. Steel sets, sheathing and skip guides | 271,151.76 | 1,125.04 |
| d. Installing sets, sheathing and skip guides | 104,182.76 | 68.39 |
| e. Concreting and guniting | 93,484.59 | - |
| f. Ventilating seal | 52,466.23 | - |
| g. Discharge line | 27,794.71 | - |
| h. Counterweight pipe | 32,878.21 | - |
| i. Air lines | 19,312.67 | 66.40 |
| j. Power cables | 27,688.80 | - |
| k. Water lines | 847.39 | 99.60 |
| l. Cage guides | 21,259.70 | - |
| m. Signal cables | 8,191.80 | 283.06 |

TOTALS

1,379,000.00

1,363,392.23

15,607.77

924.87

44-F ENGINE HOUSE:

| | | |
|---------------------------------|------------|----------|
| Contract adjustment | 2,634.44 | 2,634.44 |
| a. Foundations | 41,114.96 | - |
| b. Main buildings | 193,677.55 | - |
| c. Heating, plumbing and wiring | 32,994.12 | - |
| d. Traveling cranes | 29,576.93 | - |
| e. Skip hoist - foundations | 10,675.73 | - |
| f. Skip hoist - mechanical | 151,218.60 | 1,516.87 |
| g. Skip hoist - electrical | 57,192.92 | 223.08 |
| h. Cage hoist - foundations | 9,148.54 | - |
| i. Cage hoist - mechanical | 137,071.47 | - |
| j. Cage hoist - electrical | 26,868.06 | 226.57 |
| k. Compressors - foundations | 11,923.03 | - |
| l. Compressors - mechanical | 67,185.49 | 1,200.59 |
| m. Compressors - electrical | 6,069.24 | 286.72 |
| n. Compressors - air lines | 1,917.83 | - |
| o. Main switchboard and P. C. | 33,309.38 | 33.71 |
| q. Bell lines and signals | 4,580.94 | 1,677.63 |
| r. Motor generator sets | 169,770.34 | - |

TOTALS

999,425.00

986,929.57

12,495.43

7,799.61

| AUTHORIZATIONS AND EXPENDITURES MATHER MINE "B" SHAFT DEVELOPMENT: | TOTAL AUTHORIZED | EXPENDITURES TO DEC. 31, 1952 | UNEXPENDED BALANCE | 1952 EXPENDITURES |
|---|---------------------|----------------------------------|-----------------------|----------------------|
| <u>44-G SHOPS, OFFICE AND DRY BUILDING:</u> | | | | |
| a. Shop wing | | 362,305.95 | | 7,145.05 |
| b. Dry wing | | 410,234.39 | | 1,488.92 |
| c. Office wing | | 173,564.54 | | 4,657.47 |
| d. Heating plant wing | | 221,967.85 | | 50.27 |
| TOTALS | 1,188,000.00 | 1,168,072.73 | 19,927.27 | 13,341.71 |
| <u>44-H HEAD FRAME:</u> | | | | |
| a. Head frame foundations | | 11,086.02 | | - |
| b. Main structure | | 161,781.82 | | - |
| c. Shaft house foundations | | 13,052.37 | | - |
| d. Shaft house | | 83,511.02 | | 527.70 |
| e. Shaft house orehandling machine | | 129,146.93 | | 7,153.88 |
| f. Hold down and idler sheaves | | 40,123.69 | | - |
| g. Shaft air heating equipment | | 14,927.82 | | - |
| h. Dust collection equipment | | 9,024.15 | | 9,024.15 |
| TOTALS | 464,000.00 | 462,653.82 | 1,346.18 | 16,705.73 |
| <u>44-I SERVICE TUNNELS:</u> | | | | |
| a. Shops to shaft | | 23,312.43 | | - |
| b. Shaft to timber year | | 90,423.16 | | 2,720.19 |
| c. Shaft to engine house | | 29,675.65 | | - |
| d. Ore conveyor tunnel | | 514.21 | | - |
| e. Heating tunnel | | 1,520.79 | | - |
| TOTALS | 148,500.00 | 145,446.24 | 3,053.76 | 2,720.19 |
| <u>44-J PUMPING PLANT:</u> | | | | |
| a. Pumphouse and sump | | 129,494.80 | | 58,293.04 |
| b. Pumps and erecting | | 89,846.58 | | 75,283.25 |
| TOTALS | 185,000.00 | 219,341.38 | 34,341.38 | 133,576.29 |
| <u>44-K ELECTRIC HAULAGE:</u> | | | | |
| a. Locomotive | | 239,466.80 | | 37,968.06 |
| b. Cars | | 163,248.56 | | 21,123.59 |
| c. Timber trucks | | 50,304.59 | | 15,352.02 |
| d. Signals | | 3,593.10 | | 1,443.82 |
| e. Motor generator set | | 7,660.93 | | 4,135.62 |
| f. Trolley line | | 11,850.18 | | 4,450.79 |
| TOTALS | 465,000.00 | 476,124.16 | 11,124.16 | 84,473.90 |
| <u>44-L MAIN LEVEL DEVELOPMENT:</u> | | | | |
| b. Pockets, trenches and equipment | | 823,704.13 | | 52,245.24 |
| c. Timbering | | 397,186.77 | | 147,703.94 |
| d. Drifting | | 1,091,027.96 | | 392,681.87 |
| e. Drifting Equipment | | 138,709.72 | | - |
| f. Installed drift equipment | | 282,724.58 | | 93,805.23 |
| g. Sub-station | | 23,834.19 | | 8,730.86 |
| h. Battery station | | 9,726.32 | | 1,791.56 |
| j. Exploration | | 224,090.24 | | 77,078.80 |
| k. Raise above level | | 79,553.94 | | 31,167.81 |
| l. Drift above level | | 15,659.18 | | 3,364.69 |
| m. Pumping station | | 63,612.25 | | 4,739.21 |

| AUTHORIZATIONS AND EXPENDITURES MATHER MINE "B" SHAFT DEVELOPMENT: | TOTAL AUTHORIZED | EXPENDITURES TO DEC. 31, 1952 | UNEXPENDED BALANCE | 1952 EXPENDITURES |
|---|---------------------|----------------------------------|-----------------------|----------------------|
| 44-L MAIN LEVEL DEVELOPMENT: -continued- | | | | |
| n. Pumping equipment | | 3,310.78 | | - |
| q. Fan station | | 5,436.05 | | 391.17 |
| r. Fan and construction equipment | | 12,531.00 | | - |
| s. Skip pit | | 43,676.38 | | - |
| t. Pumping | | 17,185.59 | | - |
| u. Communication systems | | 19,282.83 | | 17,660.81 |
| w. Social Security Taxes | | 1,507.99 | | 1,420.69 |
| TOTALS | 3,835,000.00 | 3,252,757.90 | 582,242.10 | 832,781.88 |
| 44-M MOVABLE EQUIPMENT: | | | | |
| a. Tractor and bulldozer | | 24,918.56 | | 4,474.75 |
| b. Sno-go | | 11,422.79 | | 550.00 |
| c. Pickup truck | | 1,105.00 | | - |
| TOTALS | 44,105.00 | 37,446.35 | 6,658.65 | 5,024.75 |
| 44-N CEMENT PLANT: | 20,000.00 | 24,006.68 | 4,006.68 | 24,006.68 |
| 44-O UNDERGROUND CRUSHING PLANT: | | | | |
| a. Crusher, pan feeder and grizzly | | 33,542.91 | | 33,542.91 |
| b. Belt and starting equipment | | 10,025.80 | | 10,025.80 |
| c. Steel support for belt, crusher, feeder | | 1,720.38 | | 1,720.38 |
| d. 200' of belt drift | | 1,386.00 | | 1,386.00 |
| e. Trench and loading and excavation | | 17,044.19 | | 17,044.19 |
| f. Discharge and excavation and steel | | 252.04 | | 252.04 |
| g. Social Security Taxes | | 192.17 | | 192.17 |
| TOTALS | 170,000.00 | 64,163.49 | 105,836.51 | 64,163.49 |
| 44-Q SEWERS: | | | | |
| a. Sanitary | | 5,403.82 | | - |
| b. Storm | | 8,712.45 | | - |
| TOTALS | 25,000.00 | 14,116.27 | 10,883.73 | - |
| 44-R CONVEYOR AND POCKETS: | | | | |
| a. Trestles | | 163,331.27 | | - |
| b. Conveyor | | 62,308.65 | | 1,682.42 |
| c. Heating equipment | | 772.89 | | 1,174.03 |
| d. Pockets and equipment | | 28,113.85 | | 28,113.85 |
| e. Heating equipment | | 9,757.90 | | 8,185.63 |
| TOTALS | 272,000.00 | 264,284.56 | 7,715.44 | 36,807.87 |
| 44-S TIMBER YARD: | | | | |
| a. Tunnel | | 22,809.20 | | 1,803.42 |
| b. Tracks | | 11,865.99 | | 109.76 |
| c. Haulage equipment | | 8,533.94 | | - |
| d. Timber handling and framing equipment | | 28,934.25 | | 2,110.00 |
| e. Lighting | | 158.49 | | - |
| TOTALS | 85,000.00 | 72,301.87 | 12,698.13 | 4,023.18 |

| AUTHORIZATIONS AND EXPENDITURES MATHER MINE "B" SHAFT DEVELOPMENT: | TOTAL AUTHORIZED | EXPENDITURES TO DEC 31, 1952 | UNEXPENDED BALANCE | 1952 EXPENDITURES |
|---|------------------------|---------------------------------|-----------------------|-----------------------|
| <u>44-T STOCKING AND LOADING:</u> | | | | |
| a. Haulage equipment | | 35,612.20 | | - |
| b. Electric shovel | | 139,482.98 | | 1,874.98 |
| c. Weightometer | | 3,075.44 | | - |
| d. 30' conveyor belt | | 542,767.99 | | 367,244.15 |
| <u>TOTALS</u> | <u>800,000.00</u> | <u>720,938.61</u> | <u>79,061.39</u> | <u>369,119.13</u> |
| <u>44-U MINING EQUIPMENT:</u> | | | | |
| a. Drill machines and accessories | | 81,627.96 | | 4,315.00 |
| b. Scrapers, hoists and accessories | | 394,211.69 | | 114,311.97 |
| c. Exploratory drill equipment | | 37,910.28 | | 356.06 |
| d. Miscellaneous equipment | | 38,317.80 | | 12,263.46 |
| <u>TOTALS</u> | <u>669,000.00</u> | <u>552,067.73</u> | <u>116,932.27</u> | <u>131,246.49</u> |
| <u>44-V FIRE PROTECTION EQUIPMENT:</u> | | | | |
| a. Surface hydrants, mains and hoses | | 2,688.86 | | 696.55 |
| b. Portable fire extinguishers | | 3,332.82 | | 491.58 |
| c. Underground fire protection equipment | | 2,015.86 | | 1,640.80 |
| <u>TOTALS</u> | <u>18,000.00</u> | <u>8,037.54</u> | <u>9,962.46</u> | <u>2,828.93</u> |
| <u>44-W SKIPS, CAGES AND HOISTING ROPES:</u> | | | | |
| a. Skips | | 28,614.21 | | 85.18 |
| b. Cages | | 13,044.83 | | - |
| c. Hoisting ropes | | 29,579.02 | | - |
| <u>TOTALS</u> | <u>119,000.00</u> | <u>71,238.06</u> | <u>47,761.94</u> | <u>85.18</u> |
| <u>GRAND TOTAL E&A NM-44</u> | <u>\$11,710,352.27</u> | <u>\$10,668,849.95</u> | <u>\$1,041,502.32</u> | <u>\$1,742,127.61</u> |

MATHER MINE "B" SHAFT
ANNUAL REPORT
YEAR 1952

9. TAXES:

Mather Mine "B" Shaft, including Stockpile, Supplies & Equipment as placed by State Tax Commission:

| | 1952 | | | 1951 | | |
|--|--------------------|----------------|---------------------|--------------------|----------------|--------------------|
| | Valuation | Rate | Taxes | Valuation | Rate | Taxes |
| Section 1, 47-27 | | | | | | |
| Real | \$2,100,000 | | \$104,895.00 | \$1,475,000 | | \$67,038.75 |
| Personal | 800,000 | | 39,960.00 | 460,000 | | 20,907.00 |
| Total | <u>\$2,900,000</u> | <u>49.9500</u> | <u>\$144,855.00</u> | <u>\$1,935,000</u> | <u>45.4500</u> | <u>\$87,945.75</u> |
| Coll. Fee | - | .4995 | 1,448.55 | - | .4545 | 879.45 |
| Total Mather Mine "B" Shaft (Sec. 1, City of Negaunee) | \$2,900,000 | 50.4495 | \$146,303.55 | \$1,935,000 | 45.9045 | \$88,825.20 |

| | 1952 | | |
|--------------|---------------------|------------------|-----------------|
| | Taxes | Per Ton Produced | Per Ton Shipped |
| Operating | \$126,393.55 | \$0.184 | \$0.203 |
| Idle Expense | 19,910.00 | 0.029 | 0.032 |
| Total | <u>\$146,303.55</u> | <u>\$0.213</u> | <u>\$0.235</u> |

| | 1951 | | |
|--------------|---------------------|------------------|-----------------|
| | Taxes | Per Ton Produced | Per Ton Shipped |
| Operating | \$ 86,055.20 | \$0.180 | \$0.218 |
| Idle Expense | 2,770.00 | 0.006 | 0.007 |
| Total | <u>\$ 88,825.20</u> | <u>\$0.186</u> | <u>\$0.225</u> |

Taxes increased \$57,478.35 in 1952 as a result of an increase of \$965,000 in the valuation. This large increase in the valuation was due mainly to the increase of developed reserves, and to larger tonnages in stock at the end of the year.

MATHER MINE "B" SHAFT
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10. ACCIDENTS AND PERSONAL INJURY:

There were twenty-two compensable injuries during the year. The twenty-two compensable injuries occasioned lost time of 1,160 days. There were also thirty-five non-compensable injuries, which added 93 days lost time, for a grand total of 1,253 days. This resulted in a severity rate of 1.232 days lost per thousand man hours, and a frequency rate of 56.05 injuries per million man hours, compared with Company averages for underground mines of 6.050 and 45.08. The total hours worked were 1,016,955 as compared with 935,918 $\frac{1}{2}$ for 1951.

The following is a brief summary of the compensable accidents:

| <u>Date</u> | <u>Name</u> | <u>Nature of Injury</u> |
|-------------|------------------|--|
| 1-2-52 | Steve Schuster | Smashed right thumb. |
| 1-3-52 | Arne Lintula | Contusion and leg injury - right leg. |
| 1-5-52 | Peter White | Broken little finger, right hand. |
| 1-21-52 | James Marietti | Bruised and sprained right foot. |
| 1-25-52 | Emil Saari | Middle finger right hand amputated at first joint. |
| 2-8-52 | John Kronick | Concrete in both eyes, abrasions on both cheeks, bruised chest and back. |
| 2-8-52 | Clifford Borlace | Bruised right foot. |
| 2-16-52 | Heimo Laitinen | Bruised hip and thigh. |
| 2-14-52 | John Vercoe | Broken bone, little finger left hand. |
| 3-11-52 | Elmer Peterson | Laceration middle finger left hand. |
| 3-15-52 | Oliver Tikkanen | Bruised instep of right foot. |
| 3-18-52 | Charles Delmont | Bruised back. |
| 4-9-52 | Arne Laitala | Bruised right leg. |
| 4-14-52 | Arne Saari | Strained muscle, left leg. |
| 5-10-52 | Walter Lakari | Sprained left ankle, contusion left side of body and leg. |
| 5-17-52 | Wilho Seppanen | Broken bone right arm. |
| 5-16-52 | Jerry Bergeron | Strained back. |
| 8-13-52 | Edward Choquette | Smashed finger, right hand. |
| 8-18-52 | Thomas Paquette | Dislocated right ankle. |
| 9-6-52 | William Keveran | Sprained ankle, left foot. |
| 9-22-52 | Reino Lepisto | Bruised left shoulder and cut on head. |
| 10-14-52 | John Lampanen | Fractured bone, right foot. |
| 10-14-52 | John Torreano | Strained back. |
| 11-11-52 | William Sivula | Bruised left thigh. |

MATHER MINE "B" SHAFT
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11. POWER:

| | <u>CONSUMPTION</u> <u>K.W. HOURS</u> | <u>AVERAGE</u> <u>MAX. DEMAND</u> | <u>AVERAGE</u> <u>DEM. FACTOR</u> | <u>COST OF</u> <u>CURRENT</u> | <u>AVERAGE PRICE</u> <u>PER K.W. HOUR</u> |
|--------|---|--------------------------------------|--------------------------------------|----------------------------------|--|
| 1952 - | 10,626,000 | 1,161 K.W. | 66.7% | \$170,935.03 | \$0.01608 |

NEGAUNEE SHAFT
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1. GENERAL:

Shaft sinking was discontinued in the first quarter of the year and plat development on the 6th, 10th and 12th levels was started immediately. By the end of the year, the plats were completed except for installation of some of the bumper beams and tail sheaves in the trenches. Initial work in the skip pit was started late in December—this consisted of mucking out the spillage at the bottom in preparation to cutting out of the skip pit.

Construction work on the footings for the new headframe and conveyer galleries progressed rapidly during the summer months; as they were completed in October, well in advance of the steel erection which was started in December of the year. Footings were poured for the concrete batching plant adjacent to the south side of the shaft. The batching plant was placed in operation in the third quarter of the year.

The underground and surface plant are being rushed to completion to hasten the transfer of the Athens Mine to the Negaunee Shaft, as the Athens shaft and buildings continue to show the effects of subsidence.

The U.S.A., C.I.O. strike during June and most of July caused considerable delay in the underground and surface progress, however, no damage was caused to the mine during the idle period.

5. LABOR AND WAGES:

Labor Relations:

Generally, labor was cooperative with the supervisory force and no grievances were advanced to Step 2. The good relations were primarily due to the men who were picked for the shaft sinking and form the core of the labor group at the Negaunee Shaft. Relations still remained good after the strike, however, there was some unrest caused by job classification and the applicable wage rates. The general attitude of the group had taken a slight downward trend in morale after the strike. The December labor statement indicates 104 men employed and an average of 91½ men actually working in December.

Employment:

| | |
|---|-----|
| Number of Men Beginning of the Year | 83 |
| Added during the Year. | 38 |
| Separations. | 17 |
| Total End of the Year | 104 |
| Average Number of Men as per December | |
| Labor Statement. | 91½ |

Seven men quit during the year and one was discharged. The remainder of the separations were due to retirements, transfers and military service, with four men returning to college.

New men were added during the year to fill the additional requirements when shaft sinking ended and work was started on the plats. Some of these men were new hires and the remainder were transfers from other mines.

NEGAUNEE SHAFT
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5. LABOR AND WAGES: (Cont'd.)Employment:

The following tables give data pertinent to paid vacations and holidays.

Vacations 1952

| | <u>Number of Men</u> | <u>Number of Hours</u> | <u>Amount</u> | <u>Rate Per Hour</u> |
|-------------|----------------------|------------------------|---------------|----------------------|
| One Week | 30 | 1440 | \$ 2,841.62 | \$1.973 |
| Two Weeks | 23 | 2208 | 4,903.49 | 2.221 |
| Three Weeks | 23 | 3312 | 6,681.60 | 2.017 |
| Total: | 76 | 6960 | \$14,426.71 | \$2.073 |

Paid Holidays 1952

| | <u>Number of Men</u> | <u>Number of Hours</u> | <u>Amount</u> | <u>Rate Per Hour</u> |
|------------------|----------------------|------------------------|---------------|----------------------|
| Labor Day | 84 | 672 | \$1,310.84 | \$1.950 |
| Thanksgiving Day | 93 | 752 | 1,588.28 | 2.112 |
| Christmas | 89 | 704 | 1,533.24 | 2.178 |
| Total: | 266 | 2128 | \$4,432.36 | \$2.083 |

Statement of Wages:

The following tables indicate the average wage per day and per month as compared with the previous year. The underground wages were primarily decreased because shaft sinking was discontinued early in the year. The increase in the surface wages was due to a general wage increase effective July 26, 1952.

| <u>Average Wages Per Day:</u> | <u>1952</u> | <u>1951</u> | <u>Increase</u> | <u>Decrease</u> |
|-------------------------------|-------------|-------------|-----------------|-----------------|
| Surface | \$14.39 | \$12.94 | \$1.45 | |
| Underground | 20.76 | 21.31 | | \$.55 |
| Total: | 17.82 | 16.19 | .90 | |

Average Wages Per Month:

| | | | | | | |
|-------------|--------|----------|----------|--------|---------|--------|
| Surface | 368.10 | \$368.10 | \$317.68 | 317.68 | \$60.99 | |
| Underground | 531.04 | 531.04 | 523.16 | 523.16 | | \$3.23 |
| Total: | 455.85 | 455.85 | 397.47 | 397.47 | 58.38 | |

Average Days Worked Per Month:

| | | |
|------|---|-------|
| 1952 | — | 25.58 |
| 1951 | — | 24.55 |

In the average wages per month table, the figures are based on 10.25 months per year in 1952. All tables include paid holidays.

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6. SURFACE:

The final stages of work in the engine house were completed early in the year. Inspection of the Ingersoll-Rand Compressor foundation indicated the concrete to be broken and the Intrusion-Prepac Company was called in to grout and stabilize the foundation.

Construction work on the footings for the new headframe and conveyor galleries was started in the third quarter and was completed in the fourth quarter. Fourteen footings of various sizes were poured, excluding the walls which were poured for the crusher and conveyor enclosures adjacent to the shaft.

The rotary dump was removed from the headframe preparatory to erection of the new headframe. Erection of the headframe was delayed because of a shortage of steel and actual erection was not started until the latter half of December. At this time, two of the backleg members were erected and the main structure extended to final height. As this constituted a small portion of the total steel to be erected, the crew was to return in January 1953 to complete the erection.

Rehabilitation of the stocking trestles was started with the removal of the old ties and 40 lb. rail. New treated ties and 60 lb. rail will be used to replace the 40 lb. rail. It has been planned to paint the four trestles and a thorough structural check will be made for loose rivets and faulty members.

Two footings were poured for the cage hoist idler stands. The stands were not erected as they were being fabricated in the shops. They will be erected early in 1953.

A concrete batching plant was erected south of the shaft. This plant was erected primarily to reduce costs as ready mix concrete had been purchased locally prior to this time. The batching plant consists essentially of the weight batcher, three yard mobile mixer and pneumatic concrete placer for servicing the underground requirements.

The old surface loading track system will not be adequate nor properly located to serve the new railroad pocket and because of the nature of the Athens ore, some of the tracks will be moved north and south of the stocking areas. Some of the relocation work has been done--namely, the laying of a track to serve the north side of the railroad loading pocket. In conjunction with the loading system, installation of a drainage line was started. This line will drain the west end of the property and also the west stocking ground. Fifty percent of the line is completed.

With a number of individual projects in the process of construction, there was considerable work for the surface crew.

The mine discharge water is directed with a pipe line to the east of the property where it combines with the Athens water into a stream which has a gradient to the east.

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7. UNDERGROUND:

Shaft Sinking:

Shaft sinking was discontinued early in March. When sinking operations were terminated, the shaft was at a total depth of 2861 feet below the collar. The material penetrated was for the most part slate and graywacke, except for 60 feet of hard diorite sill. During the year, the best advance was made in January, which had a total of 160 feet for the month.

The bottom of the shaft had a considerable amount of spillage from the plat development work. During the latter part of December, the work of cleaning out the bottom was started. This was done in preparation to cutting out of the skip pit. The skip pit will have a trench on the skip compartment side with a raise extending to the 14th level trench for cleaning.

The following table reviews the shaft sinking progress during the year.

Shaft Sinking Advance - 1952

| <u>Month</u> | <u>Shaft Advance</u> | <u>No. Cuts Blasted</u> | <u>Avg. Break Per Cut</u> | <u>Pocket and Plat Advance (equiv. Shaft ft.)</u> | <u>Total Advance</u> | <u>Advance Per Working Day</u> |
|--------------|----------------------|-------------------------|---------------------------|---|----------------------|--------------------------------|
| January | 160 | 25 | 6.40 | 25 | 185 | 7.12 |
| February | 121 | 18 | 6.72 | 35 | 156 | 6.32 |
| March 1-5 | 13 | 2 | 6.50 | | 13 | 3.90 |
| Total: | 294 | 45 | 6.54 | 60 | 354 | 5.78 |

The following table gives a time analysis of the various operations in the shaft sinking cycle.

Shaft Sinking Time Analysis - 1952

| <u>Month</u> | <u>Drilling & Blasting Hrs. Per Cycle*</u> | <u>Mucking Hrs. Per Cycle</u> | <u>Placing Steel Hrs. Per Cycle</u> | <u>Misc. Hrs. Per Cycle**</u> | <u>Total Hrs. Per Cycle</u> |
|--------------|--|-------------------------------|-------------------------------------|-------------------------------|-----------------------------|
| January | 5.2 | 14 | 4.9 | 0.93 | 25.03 |
| February | 7.3 | 17.3 | 6.1 | 2.8 | 33.50 |
| Mar. 1-5 | 4.5 | 18.2 | 12.0 | 5.2 | 39.90 |
| Total: | 5.66 | 16.5 | 7.66 | 2.98 | 32.81 |

* Includes drilling, blasting, charging, blowing holes and clearing smoke.

** Includes moving of pumps, tugger, pipes, etc.

Plat Development and Drifting:

With the termination of shaft sinking, the crew was rearranged and work was started on cutting out of the 6th, 10th and 12th level plats. By the end of the year, the plats had been completed. During this period, the pockets were installed, trenches concreted and permanent tracks laid in addition to the actual work of cutting out the plats. The 10th level main line drift was connected with the Athens and the 12th level main line was advanced a short distance toward the Athens property. The plats were not 100 percent completed at the end of the year as there remained a few items of equipment to be installed in the trenches such as bumper beams and tail sheaves.

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7. UNDERGROUND: (Cont'd.)

Plat Development and Drifting: (Cont'd.)

Generally, the material encountered in the plat development was slate and graywacke with some hard diorite sills. The explosive most frequently used was 60 percent gelatin but grading into the higher strength gelatins as the material grew harder. Drilling was done with jack legs for the most part with some use of the piston feed post mounted drill, however, the Jumbo drill rig was used for all drifting and some of the plat work.

Explosives:

The following table shows the amount of explosives used:

Cost of Various Blasting Supplies for Shaft Sinking - 1952

| <u>Item</u> | <u>Quantity</u> | <u>Amount</u> |
|------------------------------|-----------------|---------------|
| Soft Bare Copper Wire | 20,000' | \$ 82.78 |
| No. 14, 2 Cdr. Red Shot Cord | 2,035' | 79.86 |
| Electric Blasting Caps | 2,980 | 685.73 |
| 80% Gelatin Dynamite | 12,750# | 2,557.76 |
| Total: | | \$3,406.13 |

Cost of Various Blasting Supplies for Plats and Drifting - 1952

| <u>Item</u> | <u>Quantity</u> | <u>Amount</u> |
|------------------------------|-----------------|---------------|
| Electric Blasting Caps | 23,179 | \$ 5,289.39 |
| No. 14, 2 Cdr. Red Shot Cord | 27,440' | 1,076.76 |
| No. 18, 2 Cdr. Shot Cord | 500' | 13.37 |
| 60% Gelatin Dynamite | 43,000# | 8,234.55 |
| 80% Gelatin Dynamite | 27,800# | 5,679.63 |
| 90% Gelatin Dynamite | 2,000# | 478.00 |
| Gelamite lx | 10,000# | 1,710.00 |
| Total: | | \$22,481.70 |

Pumping:

The old pumping system on the upper levels will eventually be replaced with an automatic centrifugal pumping system. No work was done on the new pumping except that it was in the final stages of planning.

The number of gallons per minute for each month for the past four years is indicated in the following table.

| <u>Month</u> | <u>1952</u> | <u>1951</u> | <u>1950</u> | <u>1949</u> |
|--------------|-------------|-------------|-------------|-------------|
| January | 1327 | 1075 | 1090 | 776 |
| February | 1227 | 966 | 1086 | 781 |
| March | 1168 | 911 | 1063 | 771 |
| April | 1119 | 933 | 1084 | 750 |
| May | 1175 | 1031 | 1201 | 781 |
| June | 1044 | 1015 | 1359 | 818 |
| July | 1048 | 1097 | 1407 | 776 |

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7. UNDERGROUND: (Cont'd.)
Pumping: (Cont'd.)

| <u>Month</u> | <u>1952</u> | <u>1951</u> | <u>1950</u> | <u>1949</u> |
|--------------|-------------|-------------|-------------|-------------|
| August | 1067 | 1168 | 1400 | 932 |
| September | 878 | 1198 | 1323 | 1034 |
| October | 910 | 1254 | 1162 | 1031 |
| November | 1005 | 1307 | 1165 | 1046 |
| December | <u>930</u> | <u>1285</u> | <u>1210</u> | <u>1068</u> |
| Average: | 1075 | 1095 | 1212 | 880 |

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

| <u>Year</u> | <u>Gallons Per Minute</u> |
|-------------|---------------------------|
| 1952 | 1075 |
| 1951 | 1095 |
| 1950 | 1212 |
| 1949 | 880 |
| 1948 | 757 |
| 1947 | 745 |
| 1946 | 682 |
| 1945 | 681 |
| 1944 | 713 |
| 1943 | 770 |

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8. COST OF OPENING, EQUIPPING AND DEVELOPING: (Cont'd.)

Cost of Plat Development and Drifting:

The following table shows the cost of plat development:

E&A AM-31

| | <u>Labor</u> | <u>Supplies</u> | <u>Total</u> |
|------------------------|-----------------|-----------------|-----------------|
| <u>6TH LEVEL:</u> | | | |
| Plats | 13511.48 | 9260.18 | 22771.66 |
| Pockets | 10850.46 | 7935.50 | 18785.96 |
| Trenches | <u>24193.17</u> | <u>18588.95</u> | <u>42782.12</u> |
| Total: | 48555.11 | 35784.63 | 84339.74 |
| <u>10TH LEVEL:</u> | | | |
| Plats | 29078.48 | 15132.63 | 44211.11 |
| Pockets | 8403.83 | 7223.10 | 15626.93 |
| Trenches | <u>27119.52</u> | <u>16641.69</u> | <u>43761.21</u> |
| Total: | 64601.83 | 38997.42 | 103599.25 |
| <u>12TH LEVEL:</u> | | | |
| Plats | 45653.15 | 16428.77 | 62081.92 |
| Pockets | 8640.84 | 7012.55 | 15653.39 |
| Trenches | <u>30959.65</u> | <u>22301.03</u> | <u>53260.68</u> |
| Total: | 85253.64 | 45742.35 | 130995.99 |
| <u>14TH LEVEL:</u> | | | |
| Plats | 1734.50 | 146.90 | 1881.40 |
| Pockets | 2923.13 | 978.33 | 3901.46 |
| Trenches | _____ | _____ | _____ |
| Total: | 4657.63 | 1125.23 | 5782.86 |
| Grand Total: | 203068.21 | 121649.63 | 324717.84 |

Labor - 62½% of total cost.

Supplies - 37½% of total cost.

The above costs represent only the charges originating at Negaunee Shaft and hence cannot be reconciled with E & A AM-31 which includes all charges for underground development including work done at the Athens and Negaunee Shaft

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8. COST OF OPENING, EQUIPPING AND DEVELOPING: (Cont'd.)

Cost of Plat Development and Drifting: (Cont'd.)

The 14th level costs consist of work done in the shop in fabricating the pockets. The plat cost is from shaft sinking as the plat opening was cut during the sinking operation.

The following table shows the cost of 10th level drifting. This cost is for a total footage of 791 feet. There was no drifting in December and the expenditures for December were for the grading and ballasting of the track in the drift.

| | <u>E&A AM-31</u> | | |
|--------------------------|----------------------|-----------------|-----------------|
| | <u>Labor</u> | <u>Supplies</u> | <u>Total</u> |
| Drifting | 22387.86 | 5539.61 | 27927.47 |
| Explosives | | 6446.23 | 6446.23 |
| Carset Bits | | 1622.50 | 1622.50 |
| Drill Steel | | 152.76 | 152.76 |
| Sharpen Bits & Drills | 955.25 | 43.38 | 998.63 |
| Ventilation | 353.43 | 550.94 | 904.37 |
| Repairs, Piping, etc. | 1328.20 | 2147.96 | 3476.16 |
| Prop. Hoisting | | | |
| Compressor and Dry | 2944.68 | 2743.10 | 5687.78 |
| Handling Rock & Supplies | 3918.24 | 40.34 | 3958.58 |
| Underground Supervision | 3231.84 | | 3231.84 |
| Fire Doors | 695.25 | | 695.25 |
| Total: | 35814.75 | 19286.82 | 55101.57 |
| Footage | | | 791 |
| Cost Per Ft. | | | 69.66 |

The following table shows cost of 12th level drifting.

| | <u>E&A AM-31</u> | | |
|--------------------------|----------------------|-----------------|-----------------|
| | <u>Labor</u> | <u>Supplies</u> | <u>Total</u> |
| Drifting | 13731.34 | 2462.55 | 16193.89 |
| Explosives | | 4254.86 | 4254.86 |
| Carset Bits | | 2138.75 | 2138.75 |
| Drill Steel | | 475.45 | 475.45 |
| Sharpen Bits & Drills | 622.70 | 225.96 | 848.66 |
| Ventilation | 48.40 | 474.66 | 523.06 |
| Repairs, Piping, etc. | 1683.67 | 2284.86 | 3968.53 |
| Prop Hoisting | | | |
| Compressor & Dry | 1862.68 | 2482.96 | 4345.64 |
| Handling Rock & Supplies | 1746.55 | 26.98 | 1773.53 |
| Underground Supervision | 1286.94 | | 1286.94 |
| Total: | 20982.28 | 14827.03 | 35809.31 |
| Footage | | | 443 |
| Cost Per Ft. | | | 80.83 |

The above costs represent only the charges originating at Negaunee Shaft and hence cannot be reconciled with E & A AM-31 which includes all charges for underground development including work done at both the Athens and Negaunee Shaft.

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9. TAXES:

The following is a statement of taxes for 1952 and 1951.

| | Valuation | Taxes | Valuation | Taxes |
|--|-------------|-----------|-------------|-----------|
| | <u>1952</u> | | <u>1951</u> | |
| <u>E&A CC-345 Negaunee Shaft</u> | | | | |
| That part of NW $\frac{1}{4}$ Sec. 5, 47-26 | 250,000 | 12,487.50 | 200,000 | 9,090.00 |
| E $\frac{1}{2}$ of NE $\frac{1}{4}$ of Sec. 6, " | | | | |
| SW $\frac{1}{4}$ of Sec. 32, 48-26 | | | | |
| as described and assessed by Mich. State Tax Commission. 235 acres. Personal Prop., Stock-piles, Sup. & Equip. | 115,000 | 5,744.25 | 30,000 | 1,363.50 |
| Total: | | 18,231.75 | | 10,453.50 |
| Collection Fee: | | 182.32 | | 104.54 |
| TOTAL NEGAUNEE MINE: | 365,000 | 18,414.07 | 230,000 | 10,558.04 |

The tax rate was \$45.45 per \$1,000.00 in 1951. In 1952, the rate was \$49.95 per \$1,000.00.

10. ACCIDENTS AND PERSONAL INJURY:

The Negaunee Shaft severity rating was 2.296 which was well below the 5.02 average for all the mines. The supervisory force can be complimented on this record as a number of the new men were inexperienced in underground and surface work.

The following table lists the compensable injuries for 1952.

NEGAUNEE SHAFT

| | |
|-----------------------------------|----------|
| Fatal | 0 |
| Time lost over 4 months | 1 |
| 1 to 4 months | 4 |
| less than 1 month | <u>2</u> |
| Total: | 7 |

| Acc. No. | Date of Accident | Name | Injury | Days Lost |
|----------|------------------|-----------------|---|-----------|
| 3 | 2-23-52 | Werner Manninen | Fractured ribs, 3rd to 7th. Compression 2 lumbar vertebrae. Frac. 3 transverse processes. | 150 |
| 4 | 3- 1-52 | Nick Donato | Fractured 2nd 3rd 4th metatarsals, left foot. | 66 |
| 5 | 4- 5-52 | Fenerd Granlund | Fracture 2nd cervical vertebra, body | 16 |
| 6 | 4-21-52 | Edward R. Aho | Laceration between index and middle fingers, left | 12 |
| 7 | 8-15-52 | Oliver Kimar | Amputation tip left middle finger | 86 |

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10. ACCIDENTS AND PERSONAL INJURY: (Cont'd.)

| <u>Acc. No.</u> | <u>Date of Accident</u> | <u>Name</u> | | <u>Days Lost</u> |
|-----------------|-------------------------|------------------|---|------------------|
| 8 | 10-22-52 | Carl Johnson | Fracture 8th & 9th ribs, left | 43 |
| 9 | 12- 1-52 | Robert Tresedder | Laceration & partial avulsion above right knee. | 29 |

11. POWER:

Power is purchased according to the standard schedule defined as follows.

\$.041 per k.w.h. for the first 72 k.w.h. of demand and \$.0096 per k.w.h. for all additional k.w.h. The demand is the lowest average k.w. of the three fifteen minute periods of maximum use during the month.

The fuel adjustment is in addition to the above and is a factor depending on the cost of coal as delivered. That is \$.00018 per k.w.h. for each \$.01 above \$.29 in company's cost per million B.T.U. This adjustment does not apply to the total k.w.h. as part of the power is furnished by hydro-electric plants.

The following table lists the costs of power for the year 1952.

| | |
|--------------------|--------------------|
| Compressor | \$22,244.88 |
| Hoisting | 10,137.49 |
| Pumping | 42,686.61 |
| Shops | 215.32 |
| Change House | 1,996.69 |
| Office | 138.06 |
| Other Mines (Maas) | 10,558.50 |
| Total: | <u>\$87,977.55</u> |

The twelve month average for 1952 is \$.0166 per k.w.h.

SPIES-VIRGIL MINE
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1. GENERAL

The Spies mine production for 1952 was 155,010 tons which is a decided decrease in the annual tonnage, as compared to 1951. The decrease in tonnage was due to the two-months strike and also the depleting of ore reserves on 6th level before 8th level mining was in full operation. Shipments from the mine were approximately half of the previous year, being 126,727 tons as compared to 250,123 tons in 1951.

There were two different operating schedules in effect at the Spies mine in 1952. The 6th level was on regular production work and the 8th level was on an accelerated development program. The operating schedule for 6th level was two eight-hour shifts per day, five and one-half days per week from January 1, 1952 to November 15, 1952. Effective November 16, 1952, the schedule was decreased to two eight-hour shifts per day, five days per week. The 8th level development program operated on three shifts per day, six days per week from January 1, 1952 to February 29, 1952. Beginning March 1, 1952, the 8th level program was operated three eight-hour shifts per day, five and one-half days per week until November 15, 1952. As previously mentioned, on November 16, 1952, the entire mine was reduced to two shifts per day, five days per week.

After the completion of the 8th level drift in the latter part of September, the sixteen men who had been working on the E & A program were released for production.

A diamond drill program was conducted underground throughout the year. There were a total of eight underground holes drilled from the 6th and 8th levels.

Diamond drill hole no. 56 was drilled south of 6th level drift to test the westerly extension of the Spies east deposit. No ore was encountered by this hole.

Diamond drill holes no. 57 and no. 58 obtained information on the north limb of the iron-formation cut in the 8th level drift. One was a flat hole and the other was drilled at a minus 60° inclination. Neither of these holes indicated any extension of the iron-formation to the north nor did they find any ore.

Underground drill holes nos. 59 to no. 63 were drilled below the 8th level to outline the orebody below the 8th level elevation. The information obtained by these drill holes indicates a very slight flattening of the orebody with no appreciable increase in volume of ore 300 feet below the 8th level elevation. Additional holes have been planned for drilling to the southwest and directly west of the Spies east orebody.

Surface drilling done at the Spies mine, Sec. 24, 43-35, during 1952 amounted to three holes - nos. 80, 81 and 82. These holes were located near Ice Lake in the same vicinity as diamond drill hole no. 79, in an effort to try and determine whether there is an extension of the ore found in hole no. 79. Iron-formation was located but no ore was encountered in any of these drill holes. Hole no. 80 was drilled to a depth of 633 feet, hole no. 81 was drilled to a depth of 388 feet and hole no. 82 was drilled to a total depth of 1156 feet.

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1. GENERAL (Continued)

Five holes were drilled on the McGillis property, in Sec. 13, 43-35, during the year. These holes cut unoxidized iron-formation at approximately the same depth and crossing indicating faulting in this area. Drilling has been abandoned on the McGillis, but will be started on the Grossbusch property in 1953 as part of the same program.

On the hilltop property, two holes, one each in sec. 26 and sec. 27, 43-35, showed considerable amount of oxidized iron-formation but insufficient concentration of ore to warrant additional drilling.

Production for 6th level for 1952 was 123,202 tons of ore. The producing areas on 6th level were the two shrinkage stopes, no. 7 and no. 10 and the no. 11 sublevel stope.

No. 11 stope was abandoned because the footwall caved filling the stope with a carbonaceous pyritic slate. There were approximately 1,000 tons of ore left unmined and unavailable in this stope. The no. 7 and no. 10 shrinkage stopes were pulled until the grade became prohibitive because of sulphur and silica. Approximately 95 per-cent recovery of ore was realized in the shrinkage stopes and costs were very good. During the latter part of the year, a small scam stope recovered the pillar between the transfer and the mill sub in no. 7 stope.

In the 6th level rock development, drainage drifts were driven parallel to the orebody on the east side, and are serving as a sump for collecting a greater portion of the highly acid water that is flowing out of the burning stopes above 6th level. This water is being pumped up to the 4th level from a small pumphouse inside on 6th level. The purpose of this pumping setup is to eliminate the possibility of the acid water from eating up the track in the 6th level main drift. It also relieves the inadequate pumping setup at shaft on 6th level. The pumping problems at shaft on this level are in the process of being rectified. Excavation of a new flooded suction pumphouse was initiated during the latter part of December. In summarazing, it can be stated that all 6th level rock work has been for water drainage and pumping purposes.

All the old stopes above 6th level have been closed off with concrete brattices and it is believed that all possible fires are inert due to the exclusion of fresh air from these stopes. The highly acid water is continuing to flow out from the bottom of these old stopes thus continuing the ever present problem of pumping highly acid water.

The old 6th level Virgil drift was re-entered to determine whether or not it would be possible, without too great a development cost, to get back in to mine the remaining fire pillar in the Virgil orebody. The drift was in good shape, but the idea was abandoned after a disastrous accident befell one of the neighboring properties in a similar fire pillar area.

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1. GENERAL (Continued)

Development of 8th level drifts and crosscuts was completed in September of 1952. The ore development program above 8th level was continued on a three shift basis until November 15, 1952, when actual stoping operations were begun in two stopes. Due to the timbering that was necessary in the advancement of the 8th level drift, the entire development program was delayed, thus causing a decrease in production from the Spies mine. Because of this delay the reserves above the 6th level were almost completely depleted and by the latter part of the year most of the mine product was made up of development ore from 8th level.

Mining of the Spies east 8th level orebody will be continued as on the 6th level. Supporting pillars will be carried in approximately the same position as on the old 6th and 4th levels, thus dividing the orebody into six operating stopes. The stopes are numbered starting at the north end with no. 1 stope and finishing with no. 6 stope on the south end of the orebody.

At the end of the year, the no. 1 and no. 2 stopes were being opened up for the regular sublevel stope type of mining. They should both be in full production in the first part of 1953. The no. 3 stope will be mined by the long-hole shrinkage stope method of mining. The undercutting of this stope, preparatory to the actual long-hole drilling program, was begun in December of 1952. Exploratory drifting on the first sublevel above the transfer elevation was carried on in the no. 4 and no. 5 stopes, in order to outline the orebody and to aid in planning the locations of the transfers underneath these stopes. The exploration work in no. 4 stope has proved very disappointing and it is questionable that there will be any mining in this area. If no. 4 stope does show up any mineable width of ore, the sublevel method of stoping will be employed to mine out this area. The no. 5 stope will be mined by the long-hole shrinkage type of mining. This area appears to be larger than was anticipated and should prove to be the best producing stope above the 8th level. Development of the no. 6 stope will be begun in the early part of 1953, and it will be mined by the sublevel stope method.

It is planned to bring the three northend stopes into production first and develop the southend stopes during this period. When the northend is beginning to be depleted, the southend will be coming into full production, thus maintaining a constant daily hoist for the life of the 8th level.

The only notable new equipment that has been purchased for the operation of the 8th level is a 40 h.p. slusher hoist with an AC motor for the trench at shaft. Previously, 25 h.p. slusher hoists have been used in the trenches at shaft on 6th and 4th levels, but these lighter hoists have required considerable repairs to keep them operating.

Wages remained the same with the deferred adjustment of 8½¢ being withheld until March 1, 1952 at which time a 12½¢ per hour increase in wages was administered. This 12½¢ increase was carried until July 26, 1952, when the new contract and the completed job-evaluation program were agreed upon between the company and the union. To get away from an additional add-on for the contract miner's pay, a new incentive program for development and production miners was initiated in

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1. GENERAL (Continued)

September of 1952, retroactive to July 26, 1952. All new incentives that were installed complied with the unions' request that each miner shall receive for substantially the same quantity of work under substantially the same conditions, at least the same straight time average hourly earnings he would have received prior to March 1, 1952 plus 28¢ per hour. It should probably be mentioned that between June 2, 1952 and July 25, 1952, the CIO called a strike against the entire steel industry over the inability to agree on terms of the new contract and the job-evaluation program.

Spies ore continued to be mined by the Pickands-Mather and Company through the James mine shaft in accordance with the operating agreement entered into on January 1, 1948, by the Cleveland-Cliffs Iron Company and the James Mining Company. All Spies mine ore above the James mine bottom level has been mined out as of November, 1952. To our knowledge, the James Mining Company has no intentions of deepening their shaft to recover any ore below their present bottom level elevation.

2. PRODUCTION

a. Production by Grade and Months

| <u>Month</u> | <u>Days</u> | <u>Spies Grade Tons</u> | <u>Total Rock Tons</u> | <u>Tons Per Man Per Day</u> |
|--------------|-------------|---------------------------------|--------------------------------|-------------------------------------|
| January | 24 | 17,569 | 5,769 | 7.24 |
| February | 23 | 17,935 | 3,616 | 8.47 |
| March | 23½ | 19,854 | 3,036 | 9.08 |
| April | 24 | 16,626 | 3,212 | 7.62 |
| May | 23 | 16,472 | 2,800 | 8.43 |
| June | 1 | 573 | 44 | 6.21 |
| July | 4 | 2,758 | 232 | 7.42 |
| August | 23 | 12,211 | 2,448 | 5.36 |
| September | 23 | 12,951 | 1,164 | 5.31 |
| October | 25 | 13,677 | 1,768 | 5.00 |
| November | 21 | 9,821 | -- | 4.12 |
| December | 20½ | 14,563 | 160 | 5.83 |
| Total | 235 | 155,010 | 24,249 | 6.54 |

b. Shipments

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

| <u>Year</u> | <u>Pocket</u> | <u>Stockpile</u> | <u>Total</u> |
|-------------|---------------|------------------|--------------|
| 1952 | 59,642 | 67,085 | 126,727 |
| 1951 | 156,988 | 93,135 | 250,123 |
| 1950 | 120,240 | 137,598 | 257,838 |
| 1949 | 53,839 | 34,614 | 88,453 |
| 1948 | 108,640 | 74,934 | 183,574 |

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2. PRODUCTION (Continued)

b. Shipments (Continued)

There was a considerable decrease in the shipments from the Spies mine in 1952 as compared to 1951. The two-month strike last summer had a great deal of bearing on the lack of shipping. More ore could have been moved if the ore boats hadn't been so pressed for time in the latter part of the shipping season. Of the shipments, 67,085 tons were shipped from stockpile and 59,642 tons were shipped directly from the pocket. There were no all-rail shipments from the Spies as in 1951. The Marquette LS&I dock handled 9,105 tons of Spies ore as Cliffs-Group. At the Escanaba docks, 56,947 tons were shipped as straight cargo, and 60,675 tons were shipped as Cliffs-Group.

c. Ore Statement

| | <u>Spies Grade</u> | <u>Total</u> | <u>Total Last Year</u> |
|-------------------------|------------------------|----------------|----------------------------|
| On hand January 1, 1952 | 34,990 | 34,990 | 47,524 |
| Output for Year | <u>155,010</u> | <u>155,010</u> | <u>237,589</u> |
| Total | 190,000 | 190,000 | 285,113 |
| Shipments | <u>126,727</u> | <u>126,727</u> | <u>250,123</u> |
| Balance on hand | 63,273 | 63,273 | 34,990 |
| Decrease in Output | | 82,579 | |
| Decrease in Shipments | | 123,396 | |
| Increase in Ore on Hand | | 28,283 | |

The Operating Schedule for the Past Five Years Follows:

- 1952 - Hoisting and mining operations: two eight hour shifts per day, five and one-half days per week January 1 to November 15. Effective November 16, two eight hour shifts per day, five days per week.
- 1951 - Hoisting and mining operations: two eight hour shifts per day, six days per week January 1 to February 1. Effective February 1, two eight hour shifts per day, five and one-half days per week.
- 1950 - Hoisting and mining operations: two eight hour shifts per day, four days per week January 1 to May 15. Schedule increased to five days per week effective May 15 and later to six days per week effective August 21.
- 1949 - Hoisting and mining operations: two eight hour shifts per day, six days per week January 1 to June 27. Schedule decreased to five days per week effective June 27 and later four days per week effective September 1.
- 1948 - Hoisting and mining operations: two eight hour shifts per day, six days per week.

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2. PRODUCTION (Continued)

d. Division of Product by Levels and Months

| <u>Month</u> | <u>6th Level</u> | <u>8th Level</u> | <u>Total</u> |
|--------------|----------------------|----------------------|---------------|
| January | 17,409 | | 17,409 |
| February | 17,772 | | 17,772 |
| March | 18,943 | 730 | 19,673 |
| April | 16,078 | 545 | 16,623 |
| May | 14,855 | 1,640 | 16,495 |
| June | 528 | 93 | 621 |
| July | 2,103 | 637 | 2,740 |
| August | 9,542 | 2,600 | 12,142 |
| September | 9,859 | 3,636 | 13,495 |
| October | 7,711 | 5,871 | 13,582 |
| November | 3,672 | 6,356 | 10,028 |
| December | <u>4,730</u> | <u>9,700</u> | <u>14,430</u> |
| Total | 123,202 | 31,808 | 155,010 |

e. Production Delays

There were a number of minor delays to operations which were of no serious consequence, but the one delay listed below was serious and caused a definite loss in production.

On August 20 through August 24, the 6th level four-stage, Byron-Jackson pump was down for repairs. In this time it was necessary to insert the logs in the 6th level dam, thus cutting out all operations on this level causing an actual three-day production loss or approximately 1,800 tons of ore.

The strike called by the CIO against the entire steel industry, which lasted from June 2, 1952 to July 25, 1952, caused a decrease in production from the Spies mine in 1952 of approximately 30,000 tons of ore. The Spies was able to resume normal production almost immediately at the termination of the strike. However, the two-month delay in 8th level development was a great loss to Spies production.

3. ANALYSIS

a. Average Mine Analysis on Output

| <u>Grade</u> | <u>Tons</u> | <u>Iron</u> | <u>Phos</u> | <u>Sil</u> | <u>Sul</u> |
|--------------|-------------|-------------|-------------|------------|------------|
| Spies | 155,010 | 57.24 | .247 | 7.89 | .115 |

b. Average Analysis of Shipments

| <u>Grade</u> | <u>Tons</u> | <u>Iron</u> | <u>Phos</u> | <u>Sil</u> | <u>Mang</u> | <u>Alum</u> | <u>Lime</u> | <u>Mag</u> | <u>Sul</u> | <u>Loss</u> | <u>Moist</u> |
|--------------|-------------|-------------|-------------|------------|-------------|-------------|-------------|------------|------------|-------------|--------------|
| Spies | 126,727 | 57.30 | .228 | 7.58 | .19 | 2.23 | .09 | .26 | .105 | 6.83 | 9.22 |

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3. ANALYSIS (Continued)

c. Average Analysis of Ore in Stock

| | <u>Grade</u> | <u>Iron</u> | <u>Phos</u> | <u>Sil</u> | <u>Mang</u> | <u>Alum</u> | <u>Lime</u> | <u>Mag</u> | <u>Sul</u> | <u>Loss</u> | <u>Moist</u> |
|-------------|--------------|-------------|-------------|------------|-------------|-------------|-------------|------------|------------|-------------|--------------|
| Spies Dried | 56.59 | .238 | 9.23 | .19 | 2.13 | .09 | .26 | .129 | 6.33 | 9.22 | |
| Spies Nat'l | 51.37 | .216 | 8.38 | .17 | 1.93 | .08 | .24 | .117 | 5.75 | | |

d. Analysis of Straight Cargo Shipments

| | <u>Grade</u> | <u>Tons</u> | <u>Iron</u> | <u>Phos</u> | <u>Sil</u> | <u>Mang</u> | <u>Sul</u> | <u>Moist</u> |
|-------------|--------------|-------------|-------------|-------------|------------|-------------|------------|--------------|
| Spies Dried | 56.947 | 56.49 | .249 | 8.23 | .20 | .130 | 9.16 | |

4. ESTIMATE AND ANALYSIS OF ORE RESERVES

a. Estimated Reserves

The following is an estimate of reserves submitted to the Michigan State Tax Commission as of December 31, 1951, using a factor of 12 cubic feet per ton.

| | <u>Spies</u> | <u>Total</u> |
|---|--------------|--------------|
| Above 6th level | 19,786 | 19,786 |
| Between 6th and 8th levels | 290,121 | 290,121 |
| Total gross as of July 31, 1952 | 309,907 | 309,907 |
| Less August, 1952 production | 12,142 | 12,142 |
| Total gross as of August 31, 1952 | 297,765 | 297,765 |
| Less production Aug. 31 - Dec. 31, 1952 | 51,535 | 51,535 |
| Total gross as of December 31, 1952 | 246,230 | 246,230 |
| Less 10% for mining loss and rock | 29,776 | 29,776 |
| Net total as of December 31, 1952 | 216,454 | 216,454 |

The reserves were considerably less than a year ago due to the mining which was done in 1952. The tonnage shown as reserves included only ore that is available for mining. Excluded from these figures is a substantial unavailable tonnage that must be left as supporting pillars. The narrow width of the Spies east deposit continues to be very disappointing from the standpoint of both reserves and mining. A comparison between the 1951 and 1952 estimates shows a decrease of only 13,697 tons of mineable ore, thus illustrating the fact that approximately 141,000 additional tons of ore were developed during the current year. This increase in estimated reserves is due to the outlining of the ore limits more completely by mining.

b. Expected Analysis of Ore Reserves as Submitted to the Michigan State Tax Commission

| | <u>Grade</u> | <u>Iron</u> | <u>Phos</u> | <u>Sil</u> | <u>Mang</u> | <u>Alum</u> | <u>Lime</u> | <u>Mag</u> | <u>Sul</u> | <u>Loss</u> | <u>Moist</u> |
|-------------|--------------|-------------|-------------|------------|-------------|-------------|-------------|------------|------------|-------------|--------------|
| Spies Dried | 56.50 | .256 | 8.11 | .23 | 2.67 | .24 | .21 | .100 | 7.78 | | |
| Spies Nat'l | 50.85 | .230 | 7.30 | .21 | 2.40 | .22 | .19 | .090 | 7.00 | 10.00 | |

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5. LABOR AND WAGES

a. Labor Relations

As in the past, the Spies mine has had 100 per-cent employee membership in the union. The relationship between the company and the union has been good, which is demonstrated by the fact that there were no grievances submitted in 1952. Although there were no grievances filed at the Spies mine, nevertheless, the steel industry, as a whole, suffered a two-months set-back from June 2, 1952 to July 25, 1952, because of a steel strike called by the CIO. The strike was supposedly over the inability of the company and the union to reach an agreement on their new contracts as well as the job-evaluation program.

b. Employment

The following is a table of employment statistics:

| | |
|--|-----------|
| Number of men on payroll beginning of year | 111 |
| Number of men added during year | 15 |
| Number of separations during year | <u>10</u> |
| Number of men on payroll end of year | 116 |

Average number of men as per Dec. labor statement 114 $\frac{3}{4}$

The percentage of absenteeism in 1952 was 5.5 per-cent.

There were 116 employees on the payroll compared with 111 employees a year ago. Of the ten separations, six were quits, two were deceased, one was inactive and one was called into military service. Fifteen new men were hired, resulting in a net increase of five men in 1952. These five new men were utilized in the accelerated development program on 8th level.

c. Statement of Wages

| <u>Average Wages per Day</u> | <u>1952</u> | <u>1951</u> | |
|--------------------------------|---------------|---------------|-----------------|
| Surface | 16.63 | 13.97 | |
| Underground | <u>18.68</u> | <u>16.04</u> | |
| Total | 18.04 | 15.42 | |
| | | | |
| <u>Average Wages per Month</u> | | | <u>Increase</u> |
| Surface | 382.49 | 321.31 | 61.18 |
| Underground | <u>429.64</u> | <u>368.92</u> | <u>60.72</u> |
| Total | 414.92 | 354.66 | 60.26 |
| | | | |
| <u>Tons per Man per Day</u> | | | |
| Surface | 20.83 | 30.31 | |
| Underground | <u>9.53</u> | <u>12.72</u> | |
| Total | 6.54 | 8.97 | |

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5. LABOR AND WAGES (CONTINUED)

c. Statement of Wages (Continued)

| <u>Labor Cost per Ton</u> | <u>1952</u> | <u>1951</u> |
|---------------------------|--------------|--------------|
| Surface | .798 | .461 |
| Underground | <u>1.961</u> | <u>1.258</u> |
| Total | 2.759 | 1.719 |

6. SURFACE

New construction work on surface amounted to the erecting of an electrical storage shed, a garage and a stocking trestle. The electrical storage shed has a concrete floor and corrugated-galvanized metal sheet sides and roof, with wooden rafters and studdings. The garage was constructed adjacent to the boiler house for the pick-up truck. The floor is made of cinders, the walls are corrugated sheeting and the roof is made of composition roofing.

The east trestle was replaced for this winter's stocking ore. This trestle and stockpile had been standing since 1947, and when the pile was loaded out the legs were found to be punky, so an entirely new trestle was constructed.

A new bosses' and office force parking lot was cleared out near the coal dock to relieve the congested condition in the main parking area.

The construction of a new settling sump immediately west of the present sump was again deferred for another year because of the difficulty in obtaining the complete surface rights for the parcel of land where the sump is to be located. The Water Resources Commission of the State is getting a bit anxious, however, they realize our problem and have been cooperative and understanding, thus far. The water discharge from the Spies mine continued to be highly acid, as well as, high in solids count.

A new Ford F-6 long wheelbase, platform dump truck was purchased to replace the old GMC 3-ton, 1942 model truck that was at the mine. The old 1940 Chevrolet coupe, that had served as a pick-up truck, was replaced by a new Ford F-3 pick-up truck. These old units were in such worn-out condition that they were immediately junked by the dealer when they were traded in.

Due to the excessive amount of trouble that was encountered with the old steam shovel during stockpile shipping season, arrangements have been completed to transfer the Lloyd mine, Bucyrus Erie 54-B electric shovel to the Spies mine in 1953.

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7. UNDERGROUND

a. General

There was very little development work done on or above 6th level during 1952. In rock development, the drainage drift project, which had been started inside on 6th level in 1951, was completed in the first part of the year. This project serves as a collecting sump for the greater portion of highly-acid water emitting from the old 6th level stopes. The water in the sump is pumped up to 4th level, discharged down the 4th level drift to shaft and then pumped to surface. The only notable development in ore was a new traveling road in the supporting pillar between no. 10 and no. 11 stopes.

The only operating stopes above 6th level during the year were the no. 7 and no. 10, which were mined by the long-hole shrinkage method of mining, and the no. 11, which was mined by the sublevel stope type of mining.

The rock drift development work done on 8th level amounted to the completion of the last 650 feet of drifting to the orebody and the driving of the crosscuts in the mining area. Other rock development, 8th level, consisted of cutting out of five diamond drill stations, a powder house and a lunch room.

During the latter part of the year the no. 1 and no. 2 stopes were developed and actual stoping operations were begun. Both of these areas were developed for the sublevel type of stoping. The no. 3 area is being undercut in preparation for a long-hole shrinkage stope.

To date, the drilling program at the Spies mine proved a continuation of the east deposit down full size for another 300 feet and more, but the tonnage doesn't warrant sinking the Spies shaft for an approximate "break even" investment. If any additional ore can be found by the present drilling program, to enhance the picture, a 10th level at the Spies mine may be feasible. Along with trying to uncover additional ore for a new level, the future drilling program has been planned to penetrate the heretofore unexplored areas immediately west of the east deposit above the 8th level. It is entirely possible that some of the oxidized iron-formation that was found in the 8th level main drift, could extend to the south, and along with some signs of faulting in this area, there may be concentration of ore. This, of course, is supposition and will either be proved or disproved by the 1953 drilling program.

b. Timbering

On 8th level, continued use of 4" x 4" H-beam steel sets were necessary for support in the remainder of the main level drift and crosscut. In cutting out top-timber transfers, the heavier 6½" x 8"-24# wide flange beam was substituted for the lighter beam. Regular wood stull timber was used for support in the regular transfer drifts. Other than the main drift, crosscuts and transfer drifts, very little additional support is needed underground.

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7. UNDERGROUND (Continued)

b. Timbering (Continued)

The following is the comparative timber statement:

| <u>Kind</u> | <u>Lineal Feet</u> | <u>Avg. Price Per Foot</u> | <u>1952 Amount</u> | <u>1951 Amount</u> |
|---------------|--------------------|----------------------------|--------------------|--------------------|
| Lagging | 6113 | .1445 | 883.07 | 137.80 |
| Poles | 1361 | .2712 | 369.09 | 557.78 |
| Stull Timbers | 2674 | .1505 | 402.32 | 33.85 |
| Steel Sets | 120 Sets | 22.63 (per set) | <u>2715.93</u> | <u>515.72</u> |
| Total | | | 4370.41 | 1245.15 |

c. Explosives

Electric blasting is being continued in all types of work and advantages offered by this method of detonation from a safety and ventilation standpoint warrant its continuance in preference to the conventional fuse blasting.

The following is the comparative explosives statement:

| <u>Type</u> | <u>Unit Cost</u> | <u>Quantity</u> | <u>1952 Amount</u> | <u>1951 Amount</u> |
|-----------------------|------------------|-----------------|--------------------|--------------------|
| No. 1 Gelex | | | | 12,869.63 |
| No. 2 Gelex | 17.10 Cwt. | 133,972 | 22,909.32 | 18,274.25 |
| Duplex 40% Spec. Gel. | | | | 2,210.25 |
| Electric Caps | 21.23 C | 52,012 | 11,042.29 | 14,367.91 |
| Wire - Feet | .0003 Ft. | 530,995 | 1,784.14 | 1,754.59 |
| Fuse - Feet | 9.46 M Ft. | 16,265 | 153.86 | 289.35 |
| Other Supplies | | | <u>318.13</u> | <u>602.85</u> |
| Total Explosives | | | 36,207.74 | 50,368.83 |

d. Pumping

The pumping of the highly-acid water from the Spies mine has again been the outstanding problem confronting the mine personnel. The very poor performance of some of the Byron-Jackson stainless-steel pumps in service at the mine was a constant source of headache to all persons concerned. However, with numerous quick "patch up" jobs performed by the Spies mine personnel and excellent cooperation from the Ishpeming Mechanical Department, the pumps have continued to operate with only one major delay in production.

The new four-stage Barrett-Haentjens stainless-steel pumps were on order for 6th level. One was delivered in December and the other should arrive at the mine early in 1953. A small single stage stainless-steel pump was bought to duplicate the pump in service inside on 6th level which pumps to 4th level.

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7. UNDERGROUND (Continued)

d. Pumping (Continued)

A new flooded suction pumphouse is to be constructed on 6th level to eliminate the need for the Byron-Jackson primer pump that has been a constant source of trouble throughout the year. This station will house the two Barrett-Haentjen pumps.

Good ventilation has been maintained in the mine by the Aerodyne fan at the collar of the ventilation shaft. Prior to the completion of the air connection between 6th and 8th levels, more than adequate ventilation was supplied on 8th level by three auxiliary fans with 14 inch metal pipe extending to all main working areas with small fans and pipe reaching the more remote headings.

8. COST OF OPERATING

| a. <u>Comparative Mining Costs</u> | <u>1952</u> | <u>1951</u> | <u>Increase</u> | <u>Decrease</u> |
|------------------------------------|-------------|-------------|-----------------|-----------------|
| Production | 155,010 | 237,589 | | 80,579 |
| Underground Costs | 3.198 | 2.046 | 1.052 | |
| Surface Costs | .567 | .344 | .223 | |
| General Mine Expense | .798 | .530 | .268 | |
| Cost of Production | 4.563 | 2.920 | 1.643 | |
| Depreciation | .658 | 1.230 | | .545 |
| Taxes | .100 | .092 | .008 | |
| Loading and Shipping | .121 | .103 | .018 | |
| Total Cost at Mine | 5.442 | 4.318 | 1.124 | |
| Budget: Estimated Cost | 5.635 | 4.297 | 1.338 | |
| Number of shifts and hours | 2-8 | 2-8 | | |
| Number of operating days | 235 | 268½ | | 33½ |
| Average Daily Hoist | 660 | 885 | | 225 |

Comparison of Labor and Supplies

| | <u>1952</u> <u>Amount</u> | <u>Per-Cent</u> | <u>1951</u> <u>Amount</u> | <u>Per-Cent</u> |
|----------|------------------------------|-----------------|------------------------------|-----------------|
| Labor | 467,903.32 | 55.5 | 451,030.74 | 44.0 |
| Supplies | <u>375,672.74</u> | 44.5 | <u>574,978.74</u> | 56.0 |
| Total | 843,576.06 | | 1,026,009.48 | |

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8. COST OF OPERATING (Continued)b. Detailed Cost Comparison

| | <u>1952</u> | | <u>1951</u> | |
|------------------------------------|-------------------|----------------|-------------------|----------------|
| | <u>Amount</u> | <u>Per Ton</u> | <u>Amount</u> | <u>Per Ton</u> |
| <u>Underground Cost</u> | | | | |
| 1. Exploring in Mine | 261.24 | .002 | 342.94 | .001 |
| 2. Additional Wage Adjustment | 39,322.03 | .254 | 20,687.03 | .087 |
| 3. Development in Rock | 4,386.24 | .028 | 1,659.67 | .007 |
| 4. Development in Ore | 105,522.02 | .681 | 58,441.59 | .246 |
| 5. Stopping | 77,097.32 | .497 | 157,126.55 | .661 |
| 6. Timbering | 24,501.93 | .158 | 13,406.35 | .056 |
| 7. Trammig | 34,500.92 | .223 | 41,842.75 | .176 |
| 8. Ventilation | 13,180.58 | .085 | 8,015.39 | .033 |
| 9. Pumping | 41,415.98 | .267 | 42,912.66 | .181 |
| 10. Compressor and Air Pipes | 21,873.56 | .141 | 21,033.02 | .089 |
| 11. Underground Superintendance | 33,763.71 | .218 | 25,354.53 | .107 |
| 12. Compressor and Power Drills | 1,000.35 | .006 | 3,432.17 | .015 |
| 13. Scrapers and Mech. Loaders | 47,830.10 | .309 | 39,263.08 | .165 |
| 14. Trammig Equipment | 22,829.59 | .147 | 24,646.36 | .104 |
| 15. Pumping Machinery | 28,174.82 | .182 | 27,958.56 | .118 |
| Total Underground Cost | <u>495,660.39</u> | <u>3.198</u> | <u>486,122.65</u> | <u>2.046</u> |
| <u>Surface Costs</u> | | | | |
| 16. Hoisting | 24,365.00 | .157 | 24,183.46 | .102 |
| 17. Stocking Ore | 13,470.79 | .087 | 9,008.15 | .038 |
| 18. Screening and Crushing at Mine | 9,489.80 | .061 | 10,683.42 | .045 |
| 19. Dry House | 5,430.63 | .035 | 6,858.49 | .029 |
| 20. General Surface Expense | 15,426.51 | .100 | 13,686.16 | .058 |
| 21. Hoisting Equipment | 11,272.45 | .073 | 8,307.04 | .035 |
| 22. Shaft | 2,748.14 | .018 | 525.94 | .002 |
| 23. Top Tram Equipment | 1,388.74 | .009 | 907.98 | .003 |
| 24. Docks, Trestles and Pockets | 1,566.42 | .010 | 1,020.31 | .004 |
| 25. Mine Buildings | 2,679.32 | .017 | 6,724.23 | .028 |
| Total Surface Cost | <u>87,837.80</u> | <u>.567</u> | <u>81,905.18</u> | <u>.344</u> |
| <u>General Mine Expense</u> | | | | |
| 26. Geological | 507.60 | .003 | 1,178.45 | .005 |
| 27. Insurance | 9,950.50 | .064 | 8,824.70 | .037 |
| 28. Mining Engineering | 8,970.59 | .058 | 10,281.72 | .043 |
| 29. Mech. and Elect. Engineering | 2,325.12 | .015 | 2,039.20 | .009 |
| 30. Analysis and Grading | 9,296.41 | .060 | 9,685.45 | .041 |
| 31. Personal Injury | 10,770.10 | .069 | 8,642.55 | .036 |
| 32. Safety and Personnel Dept. | 3,175.32 | .021 | 2,709.64 | .011 |
| 33. Telephone and Safety Devices | 2,907.13 | .019 | 1,903.30 | .008 |
| 34. Local and General Welfare | 1,615.49 | .010 | 1,941.18 | .008 |
| 35. Special Exp., Pensions, Allow. | 3,476.42 | .022 | 4,298.00 | .018 |
| 36. Ishpeming, Office | 14,220.77 | .092 | 13,710.63 | .058 |
| 37. Social Security Taxes | 10,888.63 | .070 | 11,705.27 | .049 |
| 38. Mine Office | 30,709.85 | .198 | 26,705.20 | .113 |
| 39. Employees Vacation Pay | 14,986.64 | .097 | 22,224.20 | .094 |
| Total General Mine Expense | <u>123,800.57</u> | <u>.798</u> | <u>125,849.49</u> | <u>.530</u> |
| Cost of Production | 707,298.76 | 4.563 | 693,877.32 | 2.920 |

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8. COST OF OPERATING (Continued)

b. Detailed Cost Comparison (Continued)

| | <u>1952</u> | | <u>1951</u> | |
|----------------------------|---------------|----------------|---------------|----------------|
| | <u>Amount</u> | <u>Per Ton</u> | <u>Amount</u> | <u>Per Ton</u> |
| 40. General Supplies | 29,300.23 | .189 | 24,274.73 | .102 |
| 41. Iron and Steel | 14,099.81 | .091 | 15,325.48 | .065 |
| 42. Oil and Grease | 2,321.65 | .015 | 2,652.16 | .011 |
| 43. Machinery Supplies | 35,257.58 | .227 | 38,901.18 | .164 |
| 44. Explosives | 26,160.65 | .169 | 32,978.74 | .139 |
| 45. Lumber and Timber | 7,311.81 | .047 | 4,149.41 | .017 |
| 46. Fuel | 6,758.05 | .044 | 7,891.81 | .033 |
| 47. Electric Power | 65,502.18 | .423 | 62,720.26 | .264 |
| 48. Other Items of Expense | 15,157.35 | .098 | 15,245.48 | .064 |
| Total per cost sheet | 201,869.31 | 1.303 | 204,139.25 | .859 |

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

There is a general increase in the majority of the expenditures for this year because of a smaller annual hoist as compared to 1951, along with the increase in wages brought about by the job-evaluation program.

2. Additional Wage Adjustment

The deferred wage adjustment of 8½¢ an hour, previously being withheld until completion of the job-evaluation program, was found to be insufficient, therefore, in 1952, the amount was increased to 25¢ per hour.

3-4. Development in Ore and Rock

The large increase in this expenditure was due to the accelerated development program on and above the 8th level during the year.

5. Stoping

The decrease in the stoping expenditure was due to the lesser stoping activity that was carried on during 1952 and also reflects the fact that a large portion of the yearly hoist came from shrinkage stopes where the ore had been broken in 1951.

6. Timbering

There was a slight increase in timbering due to the additional timbering required in the development program on 8th level and the building of brattices in the old stoping areas above 6th level.

13. Scrapers and Mechanical Loaders

The increase in this expenditure was due to purchasing of several new scraper hoists and scrapers along with the additional costs of maintaining the old equipment.

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8. COST OF OPERATING (Continued)

15. Pumping

This expenditure showed an increase due to the purchase and installation of several new automatically controlled, stainless-steel, centrifugal pumps. It may also be stated that the Byron-Jackson pumps have given us considerable trouble. There was an increase in maintenance costs.

43. Machinery Supplies

There was an increase in this expenditure due to more repairs on mining equipment.

45. Lumber and Timber

The increase in this expenditure was due to the amount of timber that was required in the development of the 8th level drifts and transfers.

47. Electric Power

The increase in this item was due to the operation of two levels which naturally required more equipment for operations and the installation of additional pumping units in the mine.

In summarizing, it should probably be repeated that the increase in the majority of these items is due to the decrease in the yearly production, as well as the increase in wages affected by the job-evaluation program.

9. TAXES

There was a decrease in taxes in the Iron River Township due to a lower valuation of the Virgil mine list no. 51, however, the tax rate in Iron River Township was increased from \$2.20 to \$2.40 per \$1,000 valuation. The Spies mine valuation in the Village of Mineral Hills was decreased and so was the tax rate. In the City of Iron River, both the Spies-Johnson fee and Virgil Mineral Lands reduced a total of \$100,000, however, the tax rate was increased from \$3.70 to \$3.90. This resulted in an overall decrease in taxes in the City of Iron River. The following is a comparison of the taxes in the past two years in Iron County.

| <u>Description</u> | <u>1952</u> | | <u>1951</u> | |
|--------------------------|------------------|------------------|------------------|------------------|
| | <u>Valuation</u> | <u>Taxes</u> | <u>Valuation</u> | <u>Taxes</u> |
| <u>Spies Mine</u> | | | | |
| Iron River Township | 255,000 | 6,120.00 | 300,000 | 6,600.00 |
| Village of Mineral Hills | | 1,889.35 | | 2,272.28 |
| Iron River City | <u>255,000</u> | <u>10,044.45</u> | <u>355,000</u> | <u>13,266.35</u> |
| Total | 510,000 | 18,053.80 | 655,000 | 22,138.63 |

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9. TAXES (Continued)

| <u>Description</u> | <u>1952</u> | | <u>1951</u> | |
|--|------------------|------------------|------------------|------------------|
| | <u>Valuation</u> | <u>Taxes</u> | <u>Valuation</u> | <u>Taxes</u> |
| <u>Mineral Lands Iron County</u> | | | | |
| Iron River Township | 5,225 | 125.43 | 700 | 15.40 |
| Iron River City | 19,950 | 786.18 | 19,950 | 745.88 |
| Crystal Falls Township | 5,600 | 197.33 | | |
| Bates Township | 250 | 8.58 | | |
| Total | <u>31,025</u> | <u>1,117.52</u> | <u>20,650</u> | <u>761.28</u> |
| <u>Operating Spies Dwellings</u> | | | | |
| Iron River Township | 1,250 | 30.00 | 1,250 | 27.50 |
| Village of Mineral Hills | | 9.26 | | 9.47 |
| Total | <u>1,250</u> | <u>39.26</u> | <u>1,250</u> | <u>36.97</u> |
| <u>Village of Mineral Hills</u> | | | | |
| <u>Spies Mine</u> | | | | |
| NE $\frac{1}{4}$ of NW $\frac{1}{4}$ of Sec. 24, 43-35, 40 A | | | | |
| SE $\frac{1}{4}$ of NW $\frac{1}{4}$ of Sec. 24, 43-35, 40 A | | | | |
| <u>Virgil Mine Lease No. 51</u> | | | | |
| SW $\frac{1}{4}$ of NW $\frac{1}{4}$ of Sec. 24, 43-35, 40 A | 35,000 | 259.32 | 35,000 | 265.10 |
| Per. Prop., Stkpile, Supplies, Equip. | 220,000 | 1,630.03 | 265,000 | 2,007.18 |
| Total - Spies Mine | <u>255,000</u> | <u>1,889.35</u> | <u>300,000</u> | <u>2,272.28</u> |
| Spies Dwellings | 1,250 | 9.26 | 1,250 | 9.47 |
| Total - Village of Mineral Hills | <u>256,250</u> | <u>1,898.61</u> | <u>301,250</u> | <u>2,281.75</u> |
| Tax Rate | | .74091972 | | .75742764 |
| <u>City of Iron River</u> | | | | |
| <u>Spies-Johnson Fee</u> | | | | |
| SE $\frac{1}{4}$ of NE $\frac{1}{4}$ of Sec. 24, 43-35, 40 A | 127,500 | 4,972.50 | 177,500 | 6,567.50 |
| NE $\frac{1}{4}$ of SE $\frac{1}{4}$ of Sec. 24, 43-35, 40 A | <u>127,500</u> | <u>4,972.50</u> | <u>177,500</u> | <u>6,567.50</u> |
| <u>Mineral Lands</u> | | | | |
| NE $\frac{1}{4}$ of NW $\frac{1}{4}$ of Sec. 24, 43-35, 40 A | 2,000 | 78.00 | 2,000 | 74.00 |
| NW $\frac{1}{4}$ of NE $\frac{1}{4}$ of Sec. 24, 43-35, 40 A | 1,600 | 62.40 | 1,600 | 59.20 |
| NW $\frac{1}{4}$ of SE $\frac{1}{4}$ of Sec. 24, 43-35, 40 A | 1,600 | 62.40 | 1,600 | 59.20 |
| NE $\frac{1}{4}$ of SW $\frac{1}{4}$ of Sec. 24, 43-35, 40 A | 1,400 | 54.60 | 1,400 | 51.80 |
| Mineral Lands | <u>13,350</u> | <u>520.99</u> | <u>13,350</u> | <u>494.29</u> |
| Collection Fees | | 107.24 | | 138.74 |
| Total City of Iron River | | <u>10,830.63</u> | | <u>14,012.23</u> |
| Paid in August, 1951-52 | | 5,553.99 | | 7,573.99 |
| Paid in January 1952-53 | | <u>5,276.64</u> | | <u>6,438.24</u> |
| Total City of Iron River | <u>274,950</u> | <u>10,830.63</u> | <u>374,950</u> | <u>14,012.23</u> |

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9. TAXES (Continued)

| <u>Description</u> | <u>Valuation</u> | <u>1952</u> <u>Taxes</u> | <u>Valuation</u> | <u>1951</u> <u>Taxes</u> |
|--|------------------|-----------------------------|------------------|-----------------------------|
| <u>Iron County</u> | | | | |
| <u>Iron River Township</u> | | | | |
| <u>Spies Mine</u> | | | | |
| NE $\frac{1}{4}$ of NW $\frac{1}{4}$ of Sec. 24, 43-35, 40 A | | | | |
| SE $\frac{1}{4}$ of NW $\frac{1}{4}$ of Sec. 24, 43-35, 40 A | | | | |
| <u>VIRGIL MINE LEASE No. 51</u> | | | | |
| SW $\frac{1}{4}$ of NW $\frac{1}{4}$ of Sec. 24, 43-35, 40 A | 35,000 | 840.00 | 35,000 | 770.00 |
| Pers. Prop., Stkpile, Supplies, Equip | 220,000 | 5,280.00 | 265,000 | 5,830.00 |
| Total Spies Mine | 255,000 | 6,120.00 | 300,000 | 6,600.00 |
| Mineral Lands | 5,225 | 125.43 | 700 | 15.40 |
| Spies Dwellings and Mineral Lands | 1,250 | 30.00 | 1,250 | 27.50 |
| Total - Iron River Township | 261,475 | 6,275.43 | 301,950 | 6,642.90 |
| Tax Rate | | 2.40 | | 2.20 |
| <u>Bates Township</u> | | | | |
| Mineral Lands: | | 23.70 A | | |
| Lot 3, SW $\frac{1}{4}$ of SW $\frac{1}{4}$ Sec. 18, 43-34 | 250 | 8.58 | | |
| Tax Rate | | 3.40 | | |
| <u>Crystal Falls Township</u> | | | | |
| Mineral Lands | 5,600 | 197.33 | | |
| Tax Rate | | 3.70 | | |

10. ACCIDENTS AND PERSONAL INJURY

a. Compensable Injuries

Following is a list of compensable injuries for 1952:

- Jan. 24, William J. Carlson - Trammatic amputation distal half right little finger.
- Feb. 7, Carl Quarless - Bruises, left leg and knee.
- Jan. 31, Wade Comish - Ruptured disc lower portion of spinal column.
- May 14, Dallas Gayhart - Bruised left ankle.
- Nov. 11, Tauno Poikonen - Amputation of terminal phalynx of middle finger left hand.

b. Accident Statistics

| | <u>Frequency Rate</u> | <u>Severity Rate</u> |
|------|-----------------------|----------------------|
| 1952 | 30.68 | 2.550 |
| 1951 | 26.02 | .739 |

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11. POWER

There was more electric power consumed in 1952 as compared to 1951 because in 1951, nearly all the hoisting was done from 6th level. In 1952 there was a steady increase in the amount of hoisting of men, supplies, rock and ore from the 8th level elevation. The additional 250 feet of hoisting, along with the additional pumps that have been installed and the additional equipment needed to operate two levels, has increased the power consumption at the mine. There were no major delays due to power failure, although there were several short interruptions that were of no serious consequence.

| <u>Year</u> | <u>Average Maximum Demand</u> | <u>Rate Per K.W.H.</u> | <u>Total K.W.H.</u> | <u>Cost Per Ton</u> |
|-------------|-----------------------------------|----------------------------|-------------------------|-------------------------|
| 1952 | 938 | .0140 | 5,502,900 | .498 |
| 1951 | 864 | .0140 | 4,847,500 | .286 |

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1. GENERAL

Mining operations at the Agnew Mine were carried forward from the first of the year to November 24 on a two shift, six day a week basis. Starting on November 24 all operations were started on a two shift, five day a week basis. In addition, to time lost on holidays, forty-six regular working days were lost due to the strike from June 2nd through July 26, 1952.

Ore was placed in stockpile from January 3rd to April 7th. Loading of direct ore into cars from pocket started on April 7th and continued until November 25th, at which time stockpiling was resumed for the balance of the year. The direct ore stockpile was loaded out as cars were available from April 7th to May 9th.

The M. A. Hanna Company loaded ore intermittently all through the season under the Agnew-South Agnew cross-mining agreement.

2. PRODUCTION,
SHIPMENTS &
INVENTORIES

k. Production - Crude Ore

| | <u>Tons</u> |
|--------------------------|-------------|
| Agnew Crude | 50,377 |
| - <u>Concentrates</u> | |
| Agnew Bess. Concentrates | 5,506 |
| Agnew N.B. Concentrates | 29,479 |
| Total | 34,984 |
| - <u>Direct Ore</u> | |
| Agnew N.B. Shaft | 130,379 |
| Agnew Bess. Direct | 28,291 |
| Agnew N.B. Direct | 40,818 |
| Total | 199,488 |

b. Shipments

| | |
|--------------------------|---------|
| Agnew Bess. Concentrates | 5,505 |
| Agnew N.B. Concentrates | 29,479 |
| Agnew N.B. Shaft | 159,238 |
| Agnew Bess. Direct | 28,291 |
| Agnew N.B. Direct | 40,818 |
| Total | 263,331 |

c. Stockpile Inventories

| | |
|-------------|-------|
| Agnew Shaft | 6,559 |
|-------------|-------|

d. Production by Months -Crude Ore

| <u>Month</u> | <u>Tons</u> |
|-----------------|-------------|
| April | 2,351 |
| May | 29,513 |
| September | 6,721 |
| October | 11,792 |
| Total | 50,377 |

2. PRODUCTION,
SHIPMENTS &
INVENTORIES (Continued)

e. Production by Months -

| <u>Month</u> | <u>Agnew</u> <u>Concts.</u> | <u>Agnew</u> <u>Direct</u> | <u>Agnew</u> <u>Shaft</u> | <u>Total</u> |
|--------------|--------------------------------|-------------------------------|------------------------------|--------------|
| January | | | 18,810 | 18,810 |
| February | | | 17,343 | 17,343 |
| March | | | 14,791 | 14,791 |
| April | 1,726 | 11,099 | 12,802 | 25,627 |
| May | 20,518 | 25,269 | 14,732 | 60,519 |
| June | 89 | 235 | 461 | 785 |
| July | | | 496 | 496 |
| August | | | 14,262 | 14,262 |
| September | 4,667 | 8,812 | 13,975 | 27,454 |
| October | 8,984 | 23,694 | 9,467 | 41,145 |
| November | | | 7,185 | 7,185 |
| December | | | 6,055 | 6,055 |
| Total.. | 34,984 | 69,109 | 130,379 | 234,472 |

3. ANALYSIS

a. Tonnage & Analysis - Crude Ore

| | <u>Tons</u> | <u>Iron</u> | <u>Phos</u> | <u>Silica</u> |
|-------------|-------------|-------------|-------------|---------------|
| Agnew Crude | 50,377 | 52.60 | .052 | 16.66 |

b. Tonnage & Analysis of Ore Produced

| | <u>Tons</u> | <u>Iron</u> | <u>Phos</u> | <u>Sil.</u> | <u>Mn.</u> | <u>Alu.</u> | <u>Moist.</u> | <u>Iron Nat.</u> |
|---------------------|-------------|-------------|-------------|-------------|------------|-------------|---------------|------------------|
| Agnew Bess. Concts. | 5,505 | 59.21 | .032 | 11.11 | .28 | .87 | 11.06 | 52.66 |
| Agnew N.B. Concts. | 29,479 | 55.03 | .061 | 11.25 | .66 | 1.93 | 11.85 | 48.51 |
| Agnew N.B. Shaft | 130,379 | 54.81 | .059 | 11.57 | .99 | 1.93 | 14.99 | 46.59 |
| Agnew Bess. Direct | 28,291 | 57.81 | .029 | 13.48 | .23 | 1.30 | 11.13 | 51.38 |
| Agnew N.B. Direct | 40,818 | 55.56 | .056 | 10.72 | .67 | 1.77 | 12.85 | 48.42 |
| Total | 234,472 | 55.44 | .055 | 11.60 | .78 | 1.80 | 13.67 | 47.86 |

c. Tonnage & Analysis of Ore Shipped

| | | | | | | | | |
|---------------------|---------|-------|------|-------|-----|------|-------|-------|
| Agnew Bess. Concts. | 5,505 | 59.21 | .032 | 11.11 | .28 | .87 | 11.06 | 52.66 |
| Agnew N.B. Concts. | 29,479 | 55.03 | .061 | 11.25 | .66 | 1.93 | 11.85 | 48.51 |
| Agnew N.B. Shaft | 159,238 | 54.48 | .059 | 11.95 | .98 | 1.97 | 14.77 | 46.43 |
| Agnew Bess. Direct | 28,291 | 57.81 | .029 | 13.48 | .23 | 1.30 | 11.13 | 51.38 |
| Agnew N.B. Direct | 40,818 | 55.56 | .056 | 10.72 | .67 | 1.77 | 12.85 | 48.42 |
| Total | 263,331 | 55.17 | .055 | 11.83 | .80 | 1.84 | 13.68 | 47.62 |

d. Mine Analysis of ore in Stockpile

| | | | | | | | | |
|-------------|-------|-------|------|------|-----|------|-------|-------|
| Agnew Shaft | 6,559 | 55.96 | .058 | 9.78 | .67 | 1.62 | 15.12 | 47.50 |
|-------------|-------|-------|------|------|-----|------|-------|-------|

e. Complete Analysis of Season's Shipments

| | <u>Iron</u> | <u>Phos</u> | <u>Sil.</u> | <u>Mn.</u> | <u>Alu.</u> | <u>Lime</u> | <u>Mag.</u> | <u>Sulph.</u> | <u>Loss</u> |
|---------------------|-------------|-------------|-------------|------------|-------------|-------------|-------------|---------------|-------------|
| Agnew Bess. Concts. | 59.21 | .032 | 11.11 | .28 | .87 | .12 | .12 | .008 | 2.64 |
| Agnew N.B. Concts. | 55.03 | .061 | 11.25 | .66 | 1.93 | .32 | .20 | .011 | 6.52 |
| Agnew N.B. Shaft | 54.48 | .059 | 11.95 | .98 | 1.97 | .34 | .21 | .011 | 6.08 |
| Agnew Bess. Direct | 57.81 | .029 | 13.48 | .23 | 1.30 | .07 | .07 | .012 | 2.01 |
| Agnew N.B. Direct | 55.56 | .056 | 10.72 | .67 | 1.77 | .07 | .07 | .012 | 6.83 |

4. ESTIMATE OF
ORE RESERVES

a. Ore Factors

| | <u>Cu. Ft. Per</u> <u>Ton</u> | <u>Rock Deduction</u> | <u>Recovery</u> |
|--------|----------------------------------|-----------------------|-----------------|
| Merch. | 14 | 0 | 100% |

4. ESTIMATE OF ORE RESERVES (Continued)

| | Reserve <u>12-31-51</u> | Mined <u>1952</u> | Balance <u>After Mng.</u> | Changed <u>by Re-Est.</u> | Reserve <u>12-31-52</u> |
|------------------------|----------------------------|----------------------|------------------------------|------------------------------|----------------------------|
| Agnew NE-NE, 11, 57-21 | 594,648 | 249,865 | 344,783 | - | 344,783 |

Estimated Analysis of Ore Reserves

| NE-NE 11, 57-21 | N.B. Ore | Iron | Phos | Si.l. | Mn. | Alu. |
|-----------------|----------|-------|------|-------|-----|------|
| | 594,648 | 57.08 | .054 | 9.53 | .67 | 1.40 |

5. LABOR & WAGES

a. Comments

The labor supply was ample throughout the year. The number of gangs were reduced from nine in January to four in December. As mining places were worked out, the men were transferred to the Alworth, local labor relations continuing satisfactorily. From March 1, 1952, a general increase of \$.125 per hour was granted. On July 26, 1952, the job classification program went into effect. Under this program, the base pay, of job class 1, was set at \$1.435 per hour and the increment between job classes at \$.045. The miner was set at job class 14 with a minimum rate of \$2.020 per hour.

b. Comparative Statement of Production & Wages

| | Agnew | 1952 Alworth | Combined |
|----------------------------------|---------|-----------------|--------------|
| <u>Production</u> | | | |
| Direct Ore | 130,943 | 96,396 | 227,339 tons |
| Number of days operated | 257 | 256 | 257 days |
| Average Daily Production | 509,51 | 376.55 | 884.59 tons |
| Average Number of men working | | | 116 men |
| Tons per Man - Per Miner | | | 14.948 tons |
| Tons per Man - Total Underground | | | 10.050 tons |
| Tons per Man - Total Mine | | | 7,798 tons |
| <u>Average Rates Per Day</u> | | | |
| Surface | | | \$13.39 |
| Underground | | | 17.35 |
| Contract Miners | | | 19.13 |
| Total Mine | | | 18.46 |
| Amount Paid for Labor | | | \$562,972.92 |
| Labor Cost per Ton | | | \$2.476 |

6. SURFACE

A. Building & Repairs

Minor maintenance and repairs to buildings were warried on throughout the year. At 9:40 P.M. on January 17th, the combination warming house and repair barn on the end of the trestle burned down. No damage was done to the shaft. A new shack was built to replace the burned one.

A new oil burner and heating improvements were installed to replace the old heating unit in the main heating system. The old heating system was very dangerous and inefficient.

b. Roads

A bid was let to the Ryan Construction Co. of Hibbing to construct a bridge across the Oliver Iron Mining Division approach. The bridge was started in October and finished in January of 1953. The bridge will eliminate the maintenance of the present road over the M.A. Hanna Company dumps. The majority of the cost of the bridge is to be paid by the M. A Hanna Company.

7. UNDERGROUND MINING

a. Shaft

Minor maintenance and repairs to the shaft were carried on throughout the year.

b. Development

In November a winze was started at 704 S, 993 W. This winze will be used to develop the ore below the present bottom level. A new Pomona 1000 gallon pump was installed. The winze, 10 ft. by 5 ft., double compartment, is down 52 feet. Water is running in at a rate of 350 gallons per minute at this depth. The winze will be sunk 80 feet and a level will be cut at 60 feet from the present bottom level.

c. Mining

Mining was carried forward during the year with an average of $6\frac{1}{2}$ gangs employed. Of these six and one-half gangs, two and one half mined by caving, two by slicing, one by drifting and one by repairing and starting winze. The height of slices varied from six feet to thirteen feet, and varied in width from ten feet to twelve feet. In the sub-level caving places, blocks approximately twenty-eight feet high and twenty-five feet wide were caved. Pillars were mined back in an orderly manner on the various sub-levels.

Most of the mining during the year was done on the present bottom level. Timbering, mining and hauling is costly and slow due to the water and lack of storage room. A lot of timbering had to be done to deepen the drifts in shape because the cave being directly above these drifts.

The M. A. Hanna Co. operated intermittently, mining both direct and wash ore from the Agnew-South Agnew line under cross-mining agreement. A total of 104,093 tons of direct ore and concentrates were produced.

d. Timber, Explosives, etc.

The supply of timber was ample and of good quality. Elm has been substituted fully for tamarack in all caving places. Elm is cheaper than tamarack and is just as good as tamarack in pillars that are mined out in short periods of time.

| | |
|--|-----------|
| Lineal feet of timber used per ton of ore | .637 |
| Cost per ton for timber | .129 |
| Cost per ton for lagging, poles and boards | .084 |
| Cost per ton for wire | .002 |
| Pounds of explosives per ton | .562 lbs. |
| Cost per ton for explosives | .114 |

e. Pumping & Drainage

The pumping problems at this property, except during severe rainstorms and spring break-ups, have been relatively easy. With the sinking of the winze, the pumping will be increased. This development work will be much lower than any of the neighboring properties, therefore we will do the pumping to lower the entire water table.

8. BENEFICIATION

| | | |
|-------------------------|-------------|-------------|
| Crude ore through plant | <u>Tons</u> | <u>Iron</u> |
| Concentrates Produced | 50,377 | 52.60 |
| Screen Rejects* | 34,984 | 55.69 |
| | 6,272 | 35.06 |

| | |
|----------------|-------------------|
| * to dump #2 | 4960 tons |
| to dump #5 | 496 tons |
| Misc. to roads | 816 tons |
| | <u>6,272 tons</u> |

9. MAINTENANCE & REPAIR

Continuous maintenance and repair was carried forward throughout the year as the need arose.

10. COST OF PRODUCTIONa. Comparative Cost Statement

| <u>Product</u> | 1952 <u>Budget</u> | 1952 <u>Cost Per Ton</u> | 1951 <u>Cost Per Ton</u> |
|---|----------------------------|-----------------------------|-----------------------------|
| Direct Ore | Original Est. 175,000 tons | | |
| | Revised Est. 58,000 | 129,815 | 273,476 |
| Stockpile Overrun | | 564 | 3,190 |
| | Total Product | 130,379 | 276,666 |
| So. Agnew Boundry Ore | | 104,093 | 54,094 |
| | Grand Total | 234,472 | 331,606 |
| Average Daily Output | | 509.51 | 937.85 |
| Tons Per Man Per Day | | 9.090 | 9.925 |
| Days Operated | | 257 | 295 |
| <u>Costs</u> | | | |
| Total Underground Costs | 2.435 | 2.587 | 2.000 |
| Total Surface Costs | .249 | .139 | .217 |
| Total General Mine Expense | .642 | .540 | .356 |
| Cost of Production | 3.326 | 3.266 | 2.573 |
| Depreciation, Plant & Equip. Development | | .051 | .047 |
| Depreciation - Movable Equipment | | .004 | .003 |
| Taxes - Ad Valorem | | .060 | .005 |
| Taxes - Occupational | | .004 | .047 |
| Taxes - Royalty | | .085 | .006 |
| Total Depreciation & Taxes | | .196 | .064 |
| Loading and Shipping Costs | | .101 | .172 |
| Total Cost at Mine | | 3.563 | .039 |
| Administrative Expense | | .050 | 2.784 |
| Misc. Expense & Income | | .001 | .050 |
| Total CCI CO Production Cost | | 3.614 | .028 |
| So. Agnew ore by Contract | | 2.555 | 2.862 |
| Grand Total | | 3.144 | 2.152 |
| | | | 2.744 |

b. Cost Comments

Total underground costs were \$.152 higher than the budget and \$.587 higher than 1951 costs.

Total surface costs were \$.110 lower than the budget and \$.078 lower than 1951 costs.

Total general Mine Expense was \$102 lower than the budget and \$.184 higher than the 1951 costs.

Cost of production for 1952 was \$.060 lower than the budget and \$.693 higher than the 1951 costs.

Most of the mining done during 1952 was on the bottom level with a low mining height. These conditions raised the costs in mining, timbering and haulage, and also lowered the average tons per man.

11. EXPLORATION & FUTURE EXPLORATION

No extensive program of exploration was carried on during the year. Several shallow test pits and test holes with augers were put down to test bottoms for operations. No drilling is contemplated for 1953.

12. TAXES

| | <u>1952</u> | <u>1951</u> | <u>Increase</u> | <u>Decrease</u> |
|-------------------------------------|-------------|-------------|-----------------|-----------------|
| Agnew Mine | \$7,408.11 | \$12,096.92 | | \$4,688.81 |
| Personal Property | 505.60 | 873.30 | | 367.70 |
| Total | \$7,913.71 | \$12,970.22 | | \$5,056.51 |
| <u>Average Tax Rate (Mills)</u> | 93.99 | 98.89 | | 5.00 |

There was a reduction in the reserve tonnage by the amount of 1952 shipments. The personal property tax was less than in 1951 due to the fact that there was less ore left in stockpile in 1952.

13. ACCIDENTS & PERSONAL INJURY

- (1) Name Anton Erjavic
Date of Injury June 2, 1952
Cause While Erjavic was in the act of unloading timber, he sprained his right shoulder.
Nature of Injury Bruise and probably sprain of right shoulder and arm. X-ray negative for fracture.
Time Lost 19 days
Compensation: \$101.33
- (2) Name Lyle Bloom
Date of Injury August 19, 1952
Cause About a wheel-barrow of dirt fell from the back and a small chunk or slab of dirt hit him injured on right leg above ankle.
Nature of Injury Compound fracture of the lower 1/3 of the right tibia and fibula.
Time Lost 114 days in 1952. Returned to work 2/11/53.
Compensation \$736.00
- (3) Name William Lehto
Date of Injury May 12, 1952
Cause Lehto was pulling out cable from tugger when a small piece of cable strand entered the little finger of his left hand.
Nature of Injury Infection. Removed fibrous tissue and two sutures inserted.
Time Lost 8 days
Compensation \$42.67
- (4) Name John Simanovich
Date of Injury December 8, 1952
Cause Injured was standing on a ladder while blowing out blast holes. The blow-pipe stuck in a hole and he gave it a hard jerk to release it. While doing so, he lost his balance and fell from the ladder about 3 feet. His left leg got twisted in the ladder rungs, resulting in a fracture of a bone in his foot and dislocation of great toe.
Nature of Injury Dislocation of left great toe and fracture of first metatarsal distal end.
Time Lost 19 days in 1952. Not returned to work as of 2/12/53
Compensation \$224.00 as of 2/6/53

14. PROPOSED NEW CONSTRUCTION

15. EQUIPMENT RECEIVED &
PROPOSED NEW EQUIPMENT

The following equipment was purchased and put into use in 1952

- 1 Fairbanks-Morse deep well turbine pump
 - 1 (used) Fairbanks-Morse 600 GPM Pump
 - 1 (used) blower
 - 1 Sump Pump
- Installed Petro Oil Burner and reconditioned old furnace to be paid in 1953.

Proposed new Equipment

- 2 15 HP fans
- 2 Jackhammers

ALWORTH LAND RESERVE
ANNUAL REPORT
YEAR-1952

1. GENERAL

Development operations at the Alworth Mine were carried forward from the first of the year to March 3rd on a 3-shift, 6-day a week basis. Starting on March 3rd, operations were carried forward on a 2shift, 6-day a week basis. The Alworth underground was put on a production schedule during the month of March, and the development schedule was revised to a production schedule back to January 1, 1952. Starting on November 24th all operations were started on a 2-shift, 5-day per week basis. In addition to time lost on holidays, 46 regular working days were lost due to the strike from June 3rd through July 26th.

Ore was placed in stockpile from January 3rd to April 7th. Loading of direct ore into cars from the pocket started on April 7th and continued until November 25th, at which time stockpiling was resumed for the balance of the year. The direct ore stockpile was loaded out as cars were available from April 7th to May 9th.

The Pickands Mather Co. completed filling the pond, above the 6th sub-level, with rock and waste material. The Pickands Mather Co. stockpiled rock and lean ore intermittently during the winter months on area NW-SW 12,57-21.

2. PRODUCTION, SHIPMENTS & INVENTORIES

| | | |
|----------------------|-------------------|--------------|
| a. <u>Production</u> | | <u>Tons</u> |
| | Alworth - CCI Co. | 96,286 |
| | " - P.M. | <u>3,172</u> |
| | Total . . . | 99,458 |

| | | | |
|---------------------|-------------------|--|--------------|
| b. <u>Shipments</u> | | | <u>Tons</u> |
| | Alworth - CCI Co. | | 96,921 |
| | " - P.M. | | <u>3,172</u> |
| | Total | | 90,093 |

| | | |
|----------------------------|-------------------|--------|
| c. <u>Ore in Stockpile</u> | Alworth - CCI Co. | 11,502 |
|----------------------------|-------------------|--------|

3. ANALYSIS

| | | | | | | | | | |
|----------------------------------|-------------------|-------------|-------------|-------------|-------------|------------|-------------|---------------|--------------------|
| a. <u>Analysis of Production</u> | | <u>Tons</u> | <u>Iron</u> | <u>Phos</u> | <u>Sil.</u> | <u>Mn.</u> | <u>Alu.</u> | <u>Moist.</u> | <u>Iron Nat'l.</u> |
| | Alworth - CCI Co. | 96,286 | 55.29 | .062 | 10.87 | 1.08 | 2.06 | 15.63 | 46.65 |
| | Alworth - P.M. | 3,172 | 51.74 | .110 | 21.26 | .92 | 2.79 | 15.65 | 43.64 |

| | | | | | | | | | |
|---------------------------------|-------------------|--------|-------|------|-------|------|------|-------|-------|
| b. <u>Analysis of Shipments</u> | | | | | | | | | |
| | Alworth - CCI Co. | 96,921 | 54.94 | .061 | 11.32 | 1.07 | 2.04 | 15.43 | 46.46 |
| | " - P.M. | 3,172 | 51.74 | .110 | 21.26 | .92 | 2.79 | 15.65 | 43.64 |

| | | | | | | | | | |
|--|-------------------|--------|-------|------|------|------|------|-------|-------|
| c. <u>Analysis of Ore in Stockpile</u> | Alworth - CCI Co. | 11,502 | 57.41 | .075 | 8.21 | 1.06 | 2.22 | 16.90 | 47.71 |
|--|-------------------|--------|-------|------|------|------|------|-------|-------|

| | | | | | | | | | | |
|--|-----------------|-------------|-------------|-------------|------------|-------------|-------------|-------------|---------------|-------------|
| d. <u>Complete Analysis of Shipments</u> | | <u>Iron</u> | <u>Phos</u> | <u>Sil.</u> | <u>Mn.</u> | <u>Alu.</u> | <u>Lime</u> | <u>Mag.</u> | <u>Sulph.</u> | <u>Loss</u> |
| | Alworth-CCI Co. | 54.94 | .061 | 11.32 | 1.07 | 2.04 | .34 | .20 | .010 | 5.86 |

4. ESTIMATE OF ORE RESERVES

(Continued on next page)

4. ESTIMATE OF ORE RESERVESA. Ore Reserve Factors

| | <u>Cu.Ft. Per Ton</u> | <u>Rock Deduction</u> | <u>Recovery</u> |
|--------------------|-----------------------|-----------------------|-----------------|
| Merch | 14 | 0 | 100% |
| Sil. Merch | 14 | 10% | 100% |
| Wash | 14 | 0 | 61% |
| Lean Wash | 14 | 0 | 46% |
| Low Grade Wash | 14 | 0 | 60% |
| Lean, Low Gr. Wash | 14 | 0 | 50% |
| Retreat | 14 | 0 | 40% |

b. Estimate of Ore Reserves

| | <u>Reserve</u> | <u>Mined</u> | <u>Bal. After</u> | <u>Changed by</u> | <u>12-31-52</u> |
|-------------------|-----------------|--------------|-------------------|-------------------|-----------------|
| | <u>12-31-51</u> | <u>1952</u> | <u>Mining</u> | <u>Re-Est.</u> | <u>Reserve</u> |
| O.P. Merch | - | 3,172 | | +188,213 | 185,041 |
| U.G. Merch | 1,698,191 | 96,286 | 1,598,733 | -213,850 | 1,388,055 |
| O.P. Wash Concts. | - | - | - | +62,488 | 62,488 |
| U.G. Wash Concts. | - | - | - | +33,082 | 33,082 |
| O.P. Ret. Concts. | - | - | - | +22,449 | 22,449 |
| Total | 1,698,191 | 99,458 | 1,598,733 | +92,383 | 1,691,115 |

5. LABOR & WAGESa. Comments

The labor supply was ample throughout the year. The number of gangs were increased from three to ten and one-half gangs. As mining places were worked out in the Agnew, the men were transferred to the Alworth. Local labor relations continued satisfactory. From March 1st a general increase of \$.125 per hour was granted. On July 26, 1952, the Job Classification program went into effect. Under this program the base pay (or Job Class 1) was set at \$1.435 per hour, and the increment between job classes at \$.045.

b. Statement of Labor & WagesProduction

| | |
|------------------------------------|--------------|
| Direct Ore | 96,396 |
| Number of days operated | 256 |
| Average daily production | 376.55 |
| Average number of men working | 116 men |
| Tons per man - per miner | 14.948 |
| Tons per man - Total underground | 10.050 |
| Tons per man - total mine | 7.798 |
| Average Rate per Day - Surface | \$13.39 |
| Average Rate per day - Underground | 17.35 |
| Contract Miners | 19.13 |
| Total Mine | 18.46 |
| Amount paid for labor | \$562,972.92 |
| Labor Cost per Ton | \$2.476 |

6. SURFACEa. Buildings & Repairs

The Agnew and Alworth are using the same buildings

b. Roads & Transmission Lines

The Minnesota Power & Light Co. changed power lines leading to the Agnew-Alworth, so that system would be away from the underground caving areas.

7. UNDERGROUND

(Continued on next page)

7. UNDERGROUND

a. Ventilating shafts

A combined escape-way and ventilating shaft, which was started in 1951, was completed in January of 1952.

b. Development

The main line drift was driven to 2430 East. Drifts were driven North to develop area for mining. Drifts were driven South both to explore the South limits and to open up areas for mining. Raises and test pits were developed as needed to check the height of ore for future mining.

b. Mining

Mining was carried forward during the year with an average of seven and one-half gangs. Of these seven and one-half gangs, two mined by slicing, five by drifting and one-half repairing and timbering. The height of slices varied by six feet to sixteen feet and varied in width from ten feet to twelve feet.

The main belt line drift was driven East to the mining limits. Drifts were driven North for mining and South for mining and exploratory information. After the necessary drifts were driven, slicing was started. The general procedure was to take out two slices parallel and adjacent before blasting down. After the slices were blasted down and the back would arch up, the water would break through. During November and December water broke in from the back in two different contracts working on the South side of the mine. The water completely filled three South drifts to the caps, and 350 feet of main line drift was filled with four feet of water. All gangs were moved West of 1550 E. New drifts were started to the North between 700 E and 1200 E. The working places are extremely wet and the structure of ore is such that it holds the moisture. Plans are being laid out to drift South of the main haulage drift between 700 E. and 1300 E to tap the water from the South side. One contract is slicing at 1500 E. and 650 S. to tap that area. All indications point to another big flash of water at this point. Mining will be slow and costly throughout these areas.

Plans are being formulated to strip and mine by open pit methods all ore East of 1550 E.

d. Timber, explosives, etc.

The supply of timber was ample and of good quality. In all of the drifting work, tamarack was used. In all of the slicing work jackpine was used.

| | |
|--|-----------|
| Lineal feet of timber used per ton of ore | 1.201 |
| Cost per ton of timber | .225 |
| Cost per ton for lagging, poles and boards | .239 |
| Cost per ton for wire | .005 |
| Pounds of explosives per ton | .734 lbs. |
| Cost per ton for explosives | .149 |

e. Pumping & Drainage

Small, individual sumps were made in all working places where natural drainage would not take the water to the large gathering sump. From the small sumps the water was pumped to the large gathering sump. After the large breakin of water from the South side, extra pumps were installed to pump water both to the Agnew pump station and through an escape way into the Scranton Pit.

8. BENEFICIATION

None

9. MAINTENANCE & REPAIRS

A continuous program of maintenance and repair was carried forward throughout the year as the need arose.

10. COST OF PRODUCTIONa. Comparative Cost Statement

| <u>Product</u> | 100,000 | 1952 Budget (Original) | 1952 Cost Per Ton |
|-------------------------------------|---------|------------------------------|----------------------|
| Direct Ore | 52,000 | (Revised) | 96,176 |
| S. P. Overrun | | | 110 |
| | | Total | 96,286 |
| Average Daily Output | | | 376.55 |
| Tons Per Man Per Day | | | 6.542 |
| Days Operated | | | 256 |
| <u>Costs</u> | | | |
| Total U.G. Costs | | 2.537 | 3.455 |
| Total Surface Costs | | .276 | .233 |
| Total Gen'l Mine Expense | | .690 | .463 |
| Cost of Production | | 3.503 | 4.151 |
| Depreciation, Plant & Equipment | | | - |
| Development | | | .014 |
| Depreciation, Movable Equipment | | | - |
| Taxes - AdValorem | | | .172 |
| Taxes - Occupational | | | .006 |
| Taxes - Royalty | | | .064 |
| Total Depreciation, Royalty & Taxes | | | .256 |
| Loading & Shipping Cost | | | .057 |
| Total Cost at Mine | | | 4.464 |
| Administrative Expense | | | - |
| Misc. Expense & Income | | | .050 |
| Total CCI Co. Production Cost | | | \$4.514 |

b. Cost Comments

Total underground costs were \$.918 higher than the budget. Total Surface costs were \$.043 lower than the budget. Total General Mine Expense was \$.227 lower than the budget. Cost of production was \$.648 higher than the budget. The underground costs were high due to the extremely wet conditions which slowed production and hampered the transferring of the ore from the working place to stockpile or railroad cars. The wet gravel back caused the drifts to be heavy and all the main drifts had to be lined with two extra sets for every five feet. During the latter part of the year gangs were moved back from the East side of the mine to West of 1550 E. The moving of gangs and restarting of gangs raised the costs.

11. EXPLORATION & FUTURE EXPLORATION

Raises and test pits were put in as needed to check the height of ore for future mining. Drifts were driven to the South to outline the South limits.

Drifts will be started West of 1550 E to outline the South limits; raises and test pits will be put in to check the height of ore in this area.

No drilling was done during 1952 and none is contemplated for 1953.

12. TAXES

(Continued on next page)

12. TAXES

| | <u>1952</u> | <u>1951</u> | <u>Increase</u> | <u>Decrease</u> |
|-----------------------|---------------|---------------|-----------------|-----------------|
| Alworth Reserve | \$17,321.45 | \$13,158.29 | \$4,163.16 | |
| Personal Property | <u>232.22</u> | <u>232.22</u> | <u>232.22</u> | |
| Total | \$17,544.67 | \$13,158.29 | \$4,386.38 | |
| Ave. Tax Rate (Mills) | 131.69 | 128.44 | 3.25 | |

A new reserve estimate submitted to the Tax Commission resulted in a change of classification from a reserve status to a mine status. This, together with an increase in the reserve tonnage, resulted in higher ad valorem taxes.

A small tonnage of ore remaining in stockpile after May 1st and the addition of a small amount of underground equipment accounts for the personal property tax.

13. ACCIDENTS & PERSONAL INJURY

Listed under Agnew report

14. PROPOSED NEW CONSTRUCTION

None

15. EQUIPMENT RECEIVED & PROPOSED
NEW EQUIPMENT

The following was purchased and put into use in 1951:

- 1 - RB 12 Jackhammer
- 1 - L29 Pickhammer
- 1 - BF 212 Joy Double drum Tugger
- 400 ft. 24" conveying system.

Proposed New Equipment - None

The following is a copy of a report received from the Hoyt Mining Company covering the operations at the Alworth property during 1952:

HOYT MINING COMPANY-SCRANTON MINE

Alworth Lease
Annual Report Showing Tonnages of Ore, Paint Rock, Lean Material
and Cubic Yards of Stripping Removed During Calendar Year 1952.

(a) Cubic Yards of surface stripping and other waste materials removed and placed on stripping dumps.

| | | |
|--|------------------|--------------------|
| | Year 1952 | <u>Cubic Yards</u> |
| | To Dec. 31, 1952 | None |
| | | 124,507 |

(b) Paint rock, taconite or other lean material and wash ore removed and stockpiled with analysis of each:

| | | | | | | |
|------------------|---------------------------------------|--|--------------|---------------|--------------|----------------|
| | <u>Stocked on NW-NW Sec. 12-57-21</u> | | | | | |
| | <u>Tons</u> | <u>Iron</u> | <u>Phos.</u> | <u>Silica</u> | <u>Mang.</u> | <u>Alumina</u> |
| | | <u>Lean Ore Stockpile No. 20</u> | | | | |
| Year 1952 | 3474 | 45.12 | .052 | 30.06 | .22 | 1.98 |
| To Dec. 31, 1952 | 25850 | 44.85 | .080 | 29.59 | .56 | 1.83 |
| | | <u>Taconite - Base for Lean Ore Stockpile No. 22</u> | | | | |
| Year 1952 | None | | | | | |
| To Dec. 31, 1952 | 65034 | 32.35 | .050 | 47.38 | .35 | 1.48 |
| | | <u>Taconite Stockpile No. 22</u> | | | | |
| Year 1952 | 201384 | 32.26 | .035 | 45.71 | .47 | 1.98 |
| To Dec. 31, 1952 | 201384 | 32.26 | .035 | 45.71 | .47 | 1.98 |
| | | <u>Total Taconite Stockpile No. 22</u> | | | | |
| Year 1952 | 201384 | 32.26 | .035 | 45.71 | .47 | 1.98 |
| To Dec. 31, 1952 | 266418 | 32.28 | .039 | 46.12 | .44 | 1.86 |

(c) Gross Tons Crude Ore Mined & Concentrated

| | |
|-------------|------|
| Year 1952 | None |
| To 12/31/52 | None |

(d) Gross tons of concentrates produced from crude ore and shipped with analysis including alumina content.

| | |
|-------------|------|
| Year 1952 | None |
| To 12/31/52 | None |

(e) Gross tons of iron ore mined and shipped direct without concentration with the average analysis including the alumina content.

| | | | | | | | |
|-------------|-------------|-------------|-------------|---------------|--------------|-------------|---------------|
| | <u>Tons</u> | <u>Iron</u> | <u>Phos</u> | <u>Silica</u> | <u>Mang.</u> | <u>Alu.</u> | <u>Moist.</u> |
| Year 1952 | 3171.96 | 51.74 | .093 | 17.93 | .78 | 2.35 | 15.65 |
| To 12/31/52 | 15993.09 | 51.86 | .089 | 17.84 | .79 | 2.24 | 15.58 |

1/16/53

GILBERT BONDS
 COTTON FIBRE
 USA

CANISTEO MINE
ANNUAL REPORT
YEAR-1952

1. GENERAL

Mining conditions were generally good throughout the year. Except for a period of freezing weather near the end of the ore season, the weather was favorable for both ore and stripping operations.

The winter stripping and repair programs that were underway at the close of the 1951 season continued into 1952. The truck stripping program, which was on a twenty-one shift per week basis, was continued until January 21, when all pit operations were shut down. On April 21, truck stripping operations were again resumed on a 3-shift, 5-day week basis. This schedule remained in effect until the beginning of ore season on May 5. During the ore season, truck stripping was carried on intermittently on the third shift.

The repair work on Washing Plant and pit equipment was carried on until the beginning of ore season, being conducted on a five day per week schedule. Repairs to and remodeling of Stripping Conveyor equipment, were also underway during this period.

The 1952 ore season began on May 5, on a two-shift, six day week schedule. Operations were interrupted from June 2, until July 26, by the nation-wide steel strike, with full scale production being again resumed July 28. In order to make up for production lost during the strike, ore was produced on the third shift at intermittent intervals during the remainder of the ore season. Ore operations were shut down on October 24th with total production of 1,510,816 tons of grodd crude ore, which included 81,702 tons of screen rock, having been produced from three separate leases in the pit.

The plant operated on the same schedule as the pit, receiving a total of 1,429,114 tons of crude ore, which produced 743,024 tons of concentrates, for an average of 3,231 tons of concentrates per shift.

Conveyor-dragline stripping was started May 2nd on a three-shift, six-day week basis and with the exception of the strike interval, this schedule was continued until November 1st, when this operation was closed down. A total of 703,563 cu. yds. of surface overburden was removed for an average of 2,100 yards per shift.

At the close of the ore season on October 24, pit operations were immediately diverted to truck stripping on a twenty shift per week basis, which continued until December 14, when all pit operations were shut down. A total of 740,301 cu. yds. were removed by truck stripping for an average of 2,714 yards per shift.

Repairs to plant and pit equipment were again resumed on a five-day week basis at the close of stripping operations.

Work was started on the construction of a fine ore plant on November 17.

There was no exploratory drilling done during the year.

2. PRODUCTION,
SHIPMENTS &
INVENTORIES

A. Production by Grades

| | <u>Tons</u> |
|-----------------------|----------------|
| Snyder Wash Crude | 65,164 |
| Snyder Retreat Crude | 336,421 |
| Bovey Wash Crude | 29,942 |
| Bovey Retreat Crude | 210,345 |
| Hemmens wash crude | 80,515 |
| Hemmens Retreat Crude | <u>706,727</u> |

Total Crude 1,429,114

2. PRODUCTION

SHIPMENTS & INVENTORIES (Cont'd)

| | | <u>Tons</u> | | | | | |
|--|------------------------------|--------------------|-------------------|-------------------|---------------------|---------------------|--------------|
| a. <u>Production by Grades (Cont'd)</u> | | | | | | | |
| | Snyder Bess.Wash Concts. | 6,616 | | | | | |
| | Snyder N.B. Wash Concts. | 35,477 | | | | | |
| | Snyder Bess.Ret.Concts. | 30,440 | | | | | |
| | Snyder N.B. Ret.Concts. | 164,483 | | | | | |
| | Bovey Bess.Wash Concts. | 3,775 | | | | | |
| | Bovey N.B. Wash Concts. | 14,834 | | | | | |
| | Bovey Bess.Ret.Concts. | 14,829 | | | | | |
| | Bovey N.B. Ret. Concts. | 101,984 | | | | | |
| | Hemmens Bess.Wash Concts. | 17,957 | | | | | |
| | Hemmens N.B. Wash Concts. | 23,434 | | | | | |
| | Hemmens Bess.Ret.Concts. | 100,196 | | | | | |
| | Hemmens N.B. Ret.Concts. | 228,999 | | | | | |
| | Total Concentrates | 743,024 | | | | | |
| b. <u>Shipments by Grades</u> | | | | | | | |
| | Snyder Bess.Wash Concts. | 7,233 | | | | | |
| | Snyder N.B. Wash Concts. | 56,350 | | | | | |
| | Snyder Bess. Ret. Concts. | 31,043 | | | | | |
| Snyder | N.B. Ret. Concts. | 181,522 | | | | | |
| | Bovey Bess. Wash Concts. | 4,020 | | | | | |
| | Bovey N.B. Wash Concts. | 22,978 | | | | | |
| | Bovey Bess.Ret.Concts. | 15,099 | | | | | |
| | Bovey N.B. Ret. Concts. | 105,670 | | | | | |
| | Hemmens Bess.Wash Concts. | 18,115 | | | | | |
| | Hemmens N.B. Wash Concts. | 27,955 | | | | | |
| | Hemmens Bess. Ret. Concts. | 101,272 | | | | | |
| | Hemmens N.B. Ret. Concts. | 254,490 | | | | | |
| | Total Shipments | 825,737 | | | | | |
| c. <u>Stockpile Inventory</u> | | | | | | | |
| | Snyder Wash Concts. | 1,391 | | | | | |
| | Snyder Ret. Concts. | 5,086 | | | | | |
| | Bovey Wash Concts. | 807 | | | | | |
| | Bovey Ret. Concts. | 6,222 | | | | | |
| | Hemmens Wash Concts. | 1,279 | | | | | |
| | Hemmens Ret. Concts. | 13,972 | | | | | |
| | Total | 28,757 | | | | | |
| d. <u>Production by Months - Crude Ore</u> | | | | | | | |
| <u>Month</u> | <u>Snyder Wash</u> | <u>Snyder Ret.</u> | <u>Bovey Wash</u> | <u>Bovey Ret.</u> | <u>Hemmens Wash</u> | <u>Hemmens Ret.</u> | <u>Total</u> |
| May | | 30,795 | 6,185 | 52,535 | 26,782 | 160,031 | 276,328 |
| June | 2,508 | 11,598 | | | | | 14,106 |
| July | 13,084 | 29,274 | | | | 9,573 | 51,931 |
| August | 4,992 | 115,015 | 6,450 | 66,273 | 39,915 | 164,048 | 396,693 |
| September | 19,361 | 79,373 | 9,783 | 66,945 | 14,818 | 189,502 | 378,782 |
| Oct. | 25,219 | 70,366 | 7,524 | 24,592 | | 193,573 | 311,274 |
| | 65,164 | 336,421 | 29,942 | 210,345 | 80,515 | 706,727 | 1,429,114 |
| e. <u>Production by months - Concentrates</u> | | | | | | | |
| May | 947 | 18,096 | 4,720 | 31,740 | 14,927 | 71,955 | 142,385 |
| June | 1,383 | 5,203 | | | | 84 | 6,670 |
| July | 8,059 | 17,063 | | | | 4,629 | 29,751 |
| August | 3,076 | 70,377 | 3,390 | 34,511 | 19,715 | 73,910 | 204,979 |
| September | 12,648 | 45,190 | 6,082 | 33,798 | 6,749 | 92,970 | 197,437 |
| October | 15,980 | 38,994 | 4,417 | 16,764 | | 85,647 | 161,802 |
| Total | 42,093 | 194,923 | 18,609 | 116,813 | 41,391 | 329,195 | 743,024 |

3. ANALYSIS

a. Analysis of Crude Ore

| | Tons | Iron | Phos | Silica |
|--------------------|-----------|-------|------|--------|
| Snyder Wash Crude | 65,164 | 47.72 | .053 | 26.74 |
| Snyder Ret. Crude | 336,421 | 44.68 | .049 | 30.92 |
| Bovey Wash Crude | 29,942 | 42.96 | .051 | 32.51 |
| Bovey Ret. Crude | 210,345 | 43.66 | .083 | 30.62 |
| Hemmens Wash Crude | 80,515 | 39.51 | .039 | 38.16 |
| Hemmens Ret. Crude | 706,727 | 39.60 | .037 | 37.62 |
| Total | 1,429,114 | 41.83 | .048 | 34.44 |

b. Tonnage & Analysis of Concentrates Produced

| | Tons | Iron | Phos | Sil. | Mang. | Alu. | Moist. |
|-------------------------|---------|-------|------|-------|-------|------|--------|
| Sny.Bess.WashConcts. | 6,616 | 56.85 | .036 | 12.34 | .31 | .49 | 8.21 |
| Sny.N.B. Wash Concts. | 35,477 | 56.81 | .062 | 12.09 | .42 | .44 | 7.58 |
| Sny.Bess.Ret.Concts. | 30,440 | 57.38 | .036 | 11.78 | .36 | .40 | 7.74 |
| Sny.N.B.Ret.Concts. | 164,483 | 57.08 | .061 | 11.69 | .43 | .38 | 7.56 |
| Bovey Bess.WashConcts. | 3,775 | 56.66 | .039 | 9.51 | .32 | .44 | 8.31 |
| Bovey N.B.Wash Concts. | 14,834 | 56.31 | .070 | 12.37 | .43 | .40 | 7.31 |
| Bovey Bess.Ret. Concts. | 14,829 | 56.33 | .038 | 12.21 | .40 | .40 | 7.85 |
| Bovey N.B. Ret. Concts. | 101,984 | 55.70 | .097 | 12.14 | .59 | .40 | 7.58 |
| Hemm. Bess.WashConct. | 17,957 | 56.04 | .027 | 11.68 | .45 | .38 | 8.63 |
| Hemm. N.B. Wash Concts. | 23,434 | 54.88 | .054 | 12.52 | 1.17 | .38 | 8.85 |
| Hemm. Bess.Ret. Concts. | 100,196 | 56.16 | .035 | 12.15 | .44 | .40 | 8.39 |
| Hemm. N.B. Ret. Concts. | 228,999 | 54.80 | .052 | 12.96 | 1.23 | .39 | 8.30 |
| Total | 743,024 | 55.94 | .057 | 12.27 | .72 | .39 | 7.99 |

c. Tonnage & Analysis of Concentrates Shipped

| | | | | | | | |
|-----------------------------|---------|-------|------|-------|-------|-----|------|
| Sny.Bess.Wash Concts. | 3,879 | 57.35 | .033 | 12.22 | .27 | .56 | 8.75 |
| Sny.N.B. Wash Concts. | 27,967 | 56.88 | .060 | 12.22 | .40 | .45 | 7.74 |
| Sny.Bess.Ret.Concts. | 20,504 | 57.99 | .034 | 11.42 | .35 | .40 | 7.89 |
| Sny.N.B. Ret. Concts. | 139,473 | 57.19 | .059 | 11.67 | .42 | .38 | 7.65 |
| Bovey Bess.Wash Concts. | 2,202 | 57.04 | .038 | 7.37 | .28 | .46 | 8.93 |
| Bovey N.B. Wash Concts. | 10,466 | 56.37 | .068 | 12.52 | .41 | .40 | 7.42 |
| Bovey Bess.Ret. Concts. | 2,673 | 56.18 | .025 | 10.87 | .53 | .37 | 9.75 |
| Bovey N.B. Ret. Concts. | 69,839 | 55.55 | .105 | 12.24 | .62 | .40 | 7.81 |
| Hemm. Bess. Wash Concts. | 15,452 | 56.04 | .025 | 11.55 | .46 | .38 | 8.82 |
| Hemm. N.B. Wash Concts. | 17,016 | 54.37 | .038 | 12.77 | 1.43 | .37 | 9.43 |
| Hemm. Bess. Ret. Concts. | 72,904 | 56.17 | .033 | 12.02 | .47 | .40 | 8.75 |
| Hemm. N.B. Ret.Concts. | 162,348 | 54.18 | .046 | 13.37 | 1.953 | .39 | 8.80 |
| Can. S.P. Bess. 1951 | 2,959 | 56.42 | .040 | 12.49 | .37 | .41 | 7.38 |
| Can. S.P. N.B. | 108,511 | 55.81 | .081 | 11.66 | .59 | .51 | 7.52 |
| Can. Concts. (overrun) 1951 | 9,209 | 55.19 | .092 | 12.31 | .40 | .45 | 6.87 |
| Can. Concts. Bess. 1952 | 56,199 | 56.14 | .040 | 12.51 | .37 | .40 | 7.43 |
| Can. Concts. N.B. 1952 | 104,132 | 56.45 | .071 | 11.75 | .48 | .41 | 6.92 |
| Total | 825,735 | 55.92 | .060 | 12.22 | .70 | .41 | 7.93 |

d. Mine Analysis of Ore in Stockpile

| | | | | | | | |
|-------------------|--------|-------|------|-------|-----|-----|------|
| Stockpile Balance | 28,757 | 56.20 | .056 | 12.26 | .60 | .41 | 7.71 |
|-------------------|--------|-------|------|-------|-----|-----|------|

e. Complete Analysis of Season's Shipments

| | Iron | Phos | Sil. | Mang. | Alu. | Lime | Mag. | Sulph. | Loss |
|-------------------------|-------|------|-------|-------|------|------|------|--------|------|
| Sny.Bess.Concts. | 57.35 | .033 | 12.22 | .27 | .56 | .26 | .18 | .011 | 4.31 |
| Sny. N.B. Concts. | 56.88 | .060 | 12.22 | .40 | .45 | .27 | .18 | .010 | 4.83 |
| Sny.Bess.Ret.Concts. | 57.99 | .034 | 11.42 | .35 | .40 | .27 | .18 | .010 | 4.23 |
| Sny. N.B. Ret.Concts. | 57.19 | .059 | 11.67 | .42 | .38 | .26 | .17 | .010 | 5.00 |
| Bovey Bess. Concts. | 57.04 | .038 | 12.26 | .28 | .46 | .27 | .18 | .011 | 4.77 |
| Bovey N.B. Concts. | 56.37 | .068 | 12.52 | .41 | .40 | .27 | .18 | .011 | 5.28 |
| Bovey Bess.Ret.Concts. | 57.18 | .025 | 10.87 | .53 | .37 | .25 | .17 | .011 | 5.57 |
| Bovey N.B. Ret. Concts. | 55.55 | .105 | 12.24 | .62 | .40 | .26 | .19 | .011 | 6.34 |

e. Complete Analysis of Season's Shipments (Continued)

| | <u>Iron</u> | <u>Phos</u> | <u>Sil.</u> | <u>Mang.</u> | <u>Alu.</u> | <u>Lime</u> | <u>Mag.</u> | <u>Sulph.</u> | <u>Loss</u> |
|--------------------------|-------------|-------------|-------------|--------------|-------------|-------------|-------------|---------------|-------------|
| Hemm. Bess. Concts. | 56.04 | .025 | 11.55 | .46 | .38 | .27 | .18 | .010 | 6.77 |
| Hemm. N.B. Concts. | 54.37 | .038 | 12.77 | 1.43 | .37 | .27 | .19 | .011 | 6.51 |
| Hemm. Bess. Ret. Concts. | 56.17 | .033 | 12.02 | .47 | .40 | .26 | .18 | .011 | 6.07 |
| Hemm. N.B. Ret. Concts. | 54.18 | .046 | 13.37 | 1.53 | .39 | .26 | .19 | .011 | 6.01 |
| Can. Bess. Concts. | 56.15 | .040 | 12.49 | .37 | .41 | .26 | .17 | .010 | 5.75 |
| Can. N.B. Concts. | 55.81 | .081 | 11.66 | .59 | .51 | .26 | .18 | .010 | 6.55 |

4. ESTIMATE OF ORE RESERVESA. Developed Ore - Factors Used

| | <u>Cu.Ft.</u> <u>Per Ton</u> | <u>Rock Deduction</u> | <u>Per Cent</u> <u>Recovery</u> |
|------------------------------|---------------------------------|-----------------------|------------------------------------|
| Wash Concts. | 14 | 0 | 60.66 |
| Lean Wash Concts. | 14 | 0 | 46.54 |
| Low Grade Wash Concts. | 14 | 0 | 58.62 |
| Lean, Low Grade Wash Concts. | 14 | 0 | 48.81 |
| Retreat Concts. | 14 | 0 | 37.50 |

b. Ore Reserves as of 12-31-52

| <u>Lease</u> | <u>Reserve</u> <u>12-31-51</u> | <u>Mined</u> <u>1952</u> | <u>Bal. After</u> <u>Mining</u> | <u>Changed</u> <u>By Re-Est.</u> | <u>Reserve</u> <u>12-31-52</u> |
|-----------------|-----------------------------------|-----------------------------|------------------------------------|-------------------------------------|-----------------------------------|
| Bovey | 1,997,057 | 135,423 | 1,861,634 | - | 1,861,634 |
| Hemmens | 3,212,209 | 370,585 | 2,841,624 | - | 2,841,624 |
| Snyder | 1,697,895 | 237,016 | 1,460,879 | - | 1,460,879 |
| Total Canisteco | 6,907,161 | 743,024 | 6,164,137 | - | 6,164,137 |

c. Estimated Analyses of Reserves

| | <u>Tons</u> | <u>Iron</u> | <u>Phos</u> | <u>Sil.</u> | <u>Mang.</u> | <u>Alu.</u> |
|---------------------|-------------|-------------|-------------|-------------|--------------|-------------|
| <u>Bovey</u> | | | | | | |
| Bess. Wash Conct. | 421,379 | 57.66 | .030 | 10.16 | .42 | .43 |
| N.B. Wash Concts. | 940,113 | 57.00 | .078 | 10.28 | .77 | .51 |
| Bess. Ret. Conct. | 129,211 | 54.57 | .031 | 11.89 | - | - |
| N.B. Ret. Concts. | 370,931 | 55.07 | .082 | 11.49 | - | - |
| Total Bovey | 1,861,634 | 56.60 | .065 | 10.61 | .66 | .49 |
| <u>Hemmens</u> | | | | | | |
| Bess. Wash Concts. | 1,134,286 | 57.91 | .032 | 10.06 | .29 | .50 |
| N.B. Wash Concts. | 1,079,977 | 57.12 | .072 | 10.08 | .38 | .51 |
| Bess. Ret. Concts. | 212,675 | 55.74 | .030 | 11.47 | - | - |
| N.B. Ret. Concts. | 414,686 | 55.74 | .061 | 11.47 | - | - |
| Total Hemmens | 2,841,624 | 57.13 | .051 | 10.38 | .33 | .50 |
| <u>Snyder</u> | | | | | | |
| Bess. Wash Concts. | 704,151 | 60.43 | .038 | 9.46 | .17 | .32 |
| N.B. Wash Concts. | 728,141 | 60.71 | .060 | 7.91 | .20 | .35 |
| Bess. Ret. Concts. | 28,587 | 57.32 | .030 | 10.87 | - | - |
| N.B. Ret. Concts. | - | - | - | - | - | - |
| Total Snyder | 1,460,879 | 60.51 | .049 | 8.72 | .19 | .34 |
| Bess. Wash Concts. | 2,259,816 | 58.65 | .033 | 9.89 | .28 | .43 |
| N.B. Wash Concts. | 2,748,231 | 58.03 | .071 | 9.57 | .47 | .47 |
| Total Wash Concts. | 5,008,047 | 58.31 | .054 | 9.71 | .38 | .45 |
| Bess. Ret. Concts. | 370,473 | 55.45 | .030 | 11.57 | - | - |
| N.B. Ret. Concts. | 785,617 | 55.42 | .071 | 11.48 | - | - |
| Total Ret. Concts. | 1,156,090 | 55.43 | .058 | 11.51 | - | - |
| Total Bess. Concts. | 2,630,289 | 58.20 | .033 | 10.13 | .28 | .43 |
| Total N.B. Concts. | 3,533,848 | 57.45 | .071 | 9.99 | .47 | .47 |
| TOTAL CANISTECO | 6,164,137 | 57.77 | .055 | 10.05 | .38 | .45 |

5. LABOR & WAGES

a. Comments

Except for the nation-wide steel strike, labor relations during the year were generally good. The labor supply was adequate.

b. Comparative Statement of Production & Wages

| | |
|--------------------------------------|--------------|
| Production ----- | 743,024 tons |
| Number of days operated ----- | 101 days |
| Number of Shifts Operated ----- | 230 shifts |
| Average Daily Product ----- | 7,357 tons |
| Average product per shift ----- | 3,231 tons |
| Average number of men employed ----- | 129 men |
| Product per Man per Day ----- | 45.95 tons |
| Average wages per day ----- | 19.05 tons |
| Total amount paid per labor ----- | \$312,395.89 |
| Labor Cost per Ton ----- | \$0.423 |

6. GENERAL SURFACE

a. Buildings & Repairs

Construction of the new carpenter shop, which was started in the latter part of 1951, was completed in February of 1952. Remodeling of the shop building was started in May, and continued at intermittent intervals throughout the year, with completion contemplated for February of 1953. Most of the remodeling consisted of the installation of new concrete floors, new overhead doors, additional crane capacity, improved lighting facilities, new roofing, and other general repairs. In connection with the shop revision, a new 10' x 20' all steel oil house is being constructed with completion scheduled for January, 1953.

b. Roads, Transmission Lines, Etc.

There was no new road construction during 1952. The moving of the 22,000 volt sub-station into the pit, which was started in November of 1951, was completed in February.

The construction of a 22,000 volt power line and sub-station to serve the new fine ore plant was started in November. From this sub-station, a new 2,200 volt power line is being constructed to serve the additional facilities required for mining the tailings basin. This work continues into 1953.

c. Miscellaneous General Construction

Construction of the fine ore plant was started in November and all concrete, with the exception of the floor, has been poured. Installation of tailings lines and fresh water lines is underway. Construction of sump boxes and other miscellaneous items was started in December and steel for the construction of the building is scheduled to be shipped February 1, 1953. The plant is expected to be in operation at the beginning of the 1953 season.

The construction of dykes for a new tailings basin was deferred until 1953. The existing dykes were raised in December, thus making the present tailings basin adequate for another year's operation.

7. OPEN PIT

a. Stripping

Truck stripping, underway at the close of the 1951 season, was continued into 1952, being conducted on a twenty-one shift per week basis and employing four crews with operations closing down on January 21. Truck stripping was again resumed April 21 on a three-shift, five-day week basis, which schedule remained in effect until the start of ore season on May 5, after which time truck stripping was conducted intermittently on the third shift. At the close of ore season on October 24, truck

7. OPEN PIT (Continued)

a. Stripping (Continued)

stripping was again resumed on a twenty-shift per week basis, employing four crews with this schedule continuing until December 14, when all pit operations were closed down.

Truck stripping during 1952 was covered by two separate E&A's. E&A CC-472, which went into effect September 1, 1951 and continued until May 19, 1952, which program called for the removal of 700,000 cu. yds. of surface and lean ore materials at a cost of \$.435. Total of 517,592 cu. yds. were removed in 1951 and 181,219 cu. yds. in 1952, for a grand total of 698,811 cu. yds. at a cost of \$4358 per yard, which was \$.0008 over the budget. On May 20th E&A No. CC-496, covering the removal of 500,000 cu. yds. of surface and lean materials at \$.431 per yard went into effect and under this program, 561,082 cu. yds. were removed at a cost of \$.405 per yard, which was \$.026 under the budget.

Most of the material moved by truck stripping during the year came from the east side of the pit, consisting of cretaceous and other lean ore materials in the upper part of the formation, and paint rock from the lower slaty horizon. A considerable amount of surface slough and surface cleanup from the stripping conveyor operation was also removed.

The main factors contributing to the comparatively higher costs of truck stripping at the Canisteo Mine are (1) the extremely long haul and high lift (2) the necessity of sorting the different types and grades of lean ore materials, making it necessary to take shallow cuts and do a lot of additional blasting and (3) the removal of surface material has been mostly in the nature of cleanup, which is slower loading than when digging from a bank.

The conveyor-dragline stripping was started on May 2, on a three-shift, six-day week schedule and with the exception of the strike extending from June 2 to July 26, this schedule remained in effect until November 1st, when this operation was shut down.

Conveyor-dragline stripping during 1952 was covered by two separate E&A's. E&A No. CC-415, which went into effect June 22, 1951, continued until May 21, 1952. This E&A called for the removal of 900,000 cu. yds. of surface stripping at a cost of .210 per cu. yd. 415,856 yards were removed in 1951, and 46,450 yards in 1952, for a total of 462,306 yards at a cost of \$.409 per cu. yd. Charged to this E&A, however, was the cost of remodeling the stripping conveyor screening plant during the 1951 and 1952 repair program. This increased the cost per cu. yd. on the E&A from \$.2868 per cu. yd. to \$.409 per cu. yd. A new E&A, which went into effect May 22, 1952, covered the cost of removing 800,000 cu. yds. at \$.250 per cu. yd. At the end of this season's operation, 657,113 cu. yds. were moved on this E&A at a cost of .1915 per cu. yd.

The conveyor-stripping operation showed considerable improvement over the previous year after changes and additions were made to the screening plant. Very favorable weather, and the type of material handled, were all factors contributing to a more successful operation.

The following is a tabulation by leases of all stripping moved during 1952.

| Lease | Surface | Cretaceous | Paint Rock | Lean Form | Lean Ore | Total |
|---------|----------|------------|------------|-----------|----------|-----------|
| Bovey | 64,610 | - | - | 71,031 | 21,007 | 156,648 |
| Snyder | 14,232 | 27,400 | - | 7,436 | - | 49,068 |
| Hemmens | 775,807* | 46,537 | 113,785 | 183,577 | 118,442 | 1,238,148 |
| Total | 854,649 | 73,937 | 113,785 | 262,044 | 139,449 | 1,443,864 |

*703,563 cu. yds. of this is conveyor-stripping.

7. OPEN PIT (Continued)

b. Open Pit Mining

The 1952 ore season started on May 5, on a two-shift, six-day per week basis. This schedule continued through October 24, except for the period from June 2 to July 26, when operations were interrupted by the nation-wide steel strike. After the strike, the mine operated on a two and three shift schedule, alternating the third shift with the Holman-Cliffs Mine. This was done to make up for production lost during the strike.

The pit operated 230 shifts, producing a total of 1,510,816 tons of gross crude, which included 81,702 tons of screen rock. 6,569 tons of gross crude ore was mined per shift at a cost of \$.258 per ton.

The Hemmens lease produced 807,906 tons of gross crude; the Snyder lease produced 438,053 tons; and the Bovey lease produced 264,857 tons.

By use of the heavy media plant and by mixing with better grade ores from the bank, 37,273 tons of crude ore was mined from lean ore stockpiles, which is included in the above tonnages.

Most of the Hemmens ore came from the upper cherty horizon and contained layers of very low grade retreat ore that required mixing with high grade wash ore in order to make a satisfactory concentrate. The layers of high grade wash ore are diminishing as the mining progresses to the east; therefore, difficulty was experienced in making grade from the Hemmens lease during the latter part of the season.

Difficulty was also encountered in the Hemmens lease in the mining of the manganese ore which lies in the upper portion of the ore body. This ore is very spotty in the bank, and the analyses as indicated by the drilling is not dependable with the result that a considerable amount of this ore had to be stockpiled in the pit in order to make the ore below available.

A large percentage of the ore from the Snyder lease came from the west and north Snyder forties and was a good grade wash and retreat ore, used to absorb the ore mined in the pit bottom from the mid-Snyder forty. This area is being mined to bottom taconite to make space available for stockpiling screen and pit rock.

In addition to the actual mining, a total of 183,773 tons of pit rock, cleanup and other lean materials were moved during mining. Most of this material was moved on night shift, and amounted to .1216 of a ton per ton of concentrates produced. The cost of removal was \$.023 per ton of concentrates.

c. Pumping & Drainage

There was no change in the pumping setup from the previous year, with water being pumped in two stages out of the pit. Mine water not used in mining is pumped North and eventually enters Prairie River. Approximately 3,000 GP.M was pumped from the pit at a cost of \$.022 per ton of concentrates.

8. BENEFICIATION

a. Plant Operations

The washing plant operated the same schedule as the pit, starting on May 5 and shutting down October 24. Crude ore feed to the plant totalled 1,429,114 tons, which produced 743,024 tons of concentrates.

The average output of concentrates per shift was 3,231 tons at a weight recovery of 51.99 per cent.

In general the operation of the wash and heavy media plant was satisfactory. The installation of the new rock disposal feeder during the previous repair period proved to be a definite improvement.

8. BENEFICIATION (Continued)a. Plant Operation - Continued

Except for periods when only wash ore concentrates were being produced, the heavy media plant operated the same schedule as the washing plant. Operating 202 shifts, the heavy media plant received 235,889 tons of heavy media feed and produced 192,514 tons of heavy media concentrates; the remaining 43,375 tons being rejected as coarse tailings.

While 640,391 tons of retreat concentrates were produced, heavy media concentrates accounted for only 192,514 tons, or 30.04 per cent of this total. This is due to the fact that only the $\frac{1}{2}$ material can be treated in the present one unit plant. This year's operation definitely illustrates the necessity of another unit of heavy media so that a larger portion of the crude ore can be treated by this method. A second unit will allow all the $\frac{1}{8}$ " material to go to heavy media for treatment.

During the past season, a 6' x 16' Hewitt Robins Dewaterizer screen and a Nordberg 3' x 12' V type screen, were installed on an experimental basis for dewatering the classifier product. The Hewitt Robins Screen proved to be satisfactory for this job, and will be used for dewatering the classifier product at the Hill-Trumbull Mine prior to heavy media treatment of this product in the cyclone plant.

A dings type X HF 36" Magnetic Separator was also installed on an experimental basis at the Canisteo Plant. This machine proved to be very satisfactory, and is being installed in the Hawkins Heavy Media Plant, now under construction.

The concentration data for the year was as follows:

| | <u>Tons</u> | <u>Per Cent of Total Mined</u> | <u>Per Cent Iron Dried</u> | <u>Recoveries</u> | |
|---|-------------|------------------------------------|--------------------------------|-------------------|------------------|
| | | | | <u>Tonnage</u> | <u>Iron Unit</u> |
| <u>Washing Plant</u> | | | | | |
| Crude Ore & Rock Mined | 205,864 | 100.00 | 42.40 | | |
| Less: Rock Removed in Mng. | 22,395 | 10.88 | 38.07 | | |
| Crude Ore Transferred to Screening Plant | 183,469 | 89.12 | 42.93 | | |
| Less: Rock Rejects in Screening Plant | 7,848 | 3.81 | 38.15 | | |
| Crude Ore Entering Mill | 175,621 | 85.31 | 43.14 | | |
| Concentrates Produced | 102,093 | 49.59 | 56.16 | 58.13 | 75.68 |
| Tailings (by deduction) | 73,528 | 35.72 | 25.06 | | |
| <u>Retreat Plant</u> | | | | | |
| Crude Ore & Rock Mined | 1,340,329 | 100.00 | 41.34 | | |
| Less: Rock removed in Mng. | 12,982 | .97 | 35.94 | | |
| Crude Ore Transported to Screening Plant | 1,327,347 | 99.03 | 41.39 | | |
| Less: Rock rejects in Screening Plant | 73,854 | 5.51 | 37.16 | | |
| Crude Ore Entering Mill | 1,253,493 | 93.52 | 41.64 | | |
| Concentrates Produced | 640,931 | 47.82 | 55.90 | 51.13 | 68.64 |
| Heavy Density Rejects | 43,375 | 3.24 | 42.15 | | |
| Tailings (by deduction) | 569,187 | 42.46 | 25.54 | | |

During the season it was necessary to stockpile 189,088 tons of concentrates. 160,331 tons were removed, leaving a balance of 28,757 tons in stockpile on January 1, 1953.

The following is a brief classification of delays to the washing plant and retreat plant, showing the time lost and percentage of delay time as compared to total time worked.

8. BENEFICIATION (Continued)

| <u>Washing Plant</u> <u>Source of Delay</u> | <u>Hours</u> <u>Delay</u> | <u>% of Total</u> <u>Hours Worked</u> |
|--|------------------------------|--|
| Out of ore | 22.82 | 1.26 |
| Screening Plant machines | 28.09 | 1.55 |
| Washing Plant Machines | 13.49 | 0.74 |
| Electric Power | 2.58 | 0.14 |
| Pumps & pipelines | 16.25 | 0.89 |
| Conveyors | 18.99 | 1.05 |
| Concentrate Stacker | 13.73 | 0.76 |
| Railroad cars & tracks | .75 | 0.04 |
| Freezing Weather | 5.75 | 0.32 |
| Total | 122.45 hours | 6.75 per cent |

| <u>Heavy Media Plant</u> <u>Source of Delay</u> | <u>Hours</u> | <u>% of Total</u> |
|--|--------------|-------------------|
| Heavy Media plant machines | 14.42 | 0.89 |
| Electric Power | 2.50 | 0.15 |
| Pump & pipelines | 2.50 | 0.15 |
| Conveyors | .50 | 0.03 |
| Concentrates Statker | 11.33 | 0.70 |
| Adjusting Gravity | 2.00 | 0.12 |
| Charging up Plant | 21.25 | 1.32 |
| Freezing weather | 9.00 | 0.56 |
| Total | 63.50 hours | 3.92 per cent |

9. MAINTENANCE & REPAIRS

The winter repairs to washing plant and pit equipment were carried forward from the first of the year until the beginning of ore and stripping operations. At the Washing Plant, the usual repairs to plant equipment took place, including the remodeling of the rock hopper, and the installation of a 5' pan feeder. New belting was purchased for the bottom flights of the crude ore conveyor. The motors and gear reducers on these two flights were also replaced with equipment from the Holman, which were made necessary by the increased feed rate being put over these conveyors. This equipment, including the belts, has been partially installed with complete installation scheduled before the beginning of the 1953 season.

At the stripping conveyor, the remodeling of the screening plant, which included the installation of a wider feeder under the wobbler and the addition of a rock hopper, was completed.

All pit equipment, including trucks and shovels, was completely overhauled prior to the beginning of ore season.

Immediately at the end of the ore and stripping operations, the usual repairs to pit and plant equipment got underway. There were no radical changes or additions made to any of this equipment.

10. COST OF OPERATION

a. Comparative Mining Costs

| <u>Product</u> | <u>Budget</u> <u>1952</u> | <u>1952 Cost</u> <u>Per Ton</u> | <u>1951 Cost</u> <u>Per Ton</u> |
|-----------------------|---|------------------------------------|------------------------------------|
| Wash Concentrates | | 102,093 | 317,783 |
| Retreat Concentrates | | 640,931 | 606,253 |
| Total Produce | (Original Budget) - 700,000 (Revised Budget) - 520,000 | 743,024 | 924,036 |
| Per Cent Recovery | | 49.18 | 47.44 |
| Average Daily Product | | 7,356 | 6,507 |
| Tons Per Man Per Day | | 45.95 | 38.48 |
| Days Operated | | 101 days | 142 days |

10. COST OF OPERATION (Continued)a. Comparative Mining Costs

| | <u>1952 Budget</u> | <u>1952 Cost Per Ton</u> | <u>1951 Cost Per Ton</u> |
|-----------------------------------|------------------------|------------------------------|------------------------------|
| Pit Operating | .294 | .258 | .298 |
| Concentrating | .237 | .206 | .202 |
| Loading Stockpile Ore | .020 | .012 | .010 |
| Total Gen'l Mine Expense | .262 | .177 | .179 |
| Winter & Idle Expense | <u>.529</u> | <u>.495</u> | <u>.402</u> |
| Cost of Production | 1.691 | 1.413 | 1.421 |
| Depreciation - Plant & Equip. | | .063 | .071 |
| " - Motorized Equip. | | .064 | .059 |
| " - Movable Equip. | | .006 | .008 |
| Amortization - Leasehold | | .134 | .134 |
| " - Stripping | | .372 | .570 |
| Taxes - Ad Valorem | | .214 | .159 |
| "- Occupational | | .300 | .256 |
| "- Royalty | | <u>.028</u> | <u>.035</u> |
| Total Depr., Amortization & Taxes | | 1.181 | 1.292 |
| Misc. Expense & Income | | - | <u>.001</u> |
| TOTAL COST AT MINE | | <u>\$2.594</u> | <u>\$2.712</u> |

b. Detailed Cost Comparison

Crude minine costs are .036 under the budget estimate and .022 under the 1951 costs. The absence of a structural drilling program more than offset the provision for additional wage adjustments made during 1952. Increased per cent of recovery and a higher daily production per man tended to reduce the mining costs appreciably.

Concentrating costs were .031 below the budget estimate, but .004 over the 1951 costs. A slight increase in the cost of maintenance of buildings and machinery was overshadowed by the decreased cost of operating the retreat plant. This decrease of .020 against a budget of .097 was occasioned by the very large tonnage treated with the same personnel and other operating costs.

General Mine Expense costs were under the 1952 budget estimate and the 1951 costs. The very large adjustment in social security taxes in 1951 brought that year's cost to .034 under this caption. Accordingly, an estimate of .046 was arrived at for 1952, taking into consideration the additional wages to be paid. However, to date, the Cleveland office has charged off but .008 per ton for 1952. This might be adjusted when the December cost sheet is completed by the main office. All other costs under General Mine Expense were nominal.

Winter and Idle Expense is under the budget by .034 per ton, and this is caused entirely by an over-production of 43,000 tons during 1952. Approximately the same amount of money was expended during 1952 as in 1951, but the tonnage of over 900,000 tons in 1951 brought that year's cost down to .402 as against the 1952 cost of .495.

11. EXPLORATION &
FUTURE EXPLORATION

No exploratory drilling was done at the Canisteo Mine during the past year. There are two areas of interest where additional drilling will have to be done before possible pit extensions can be definitely established. The one is along the east side of the pit on the Hemmens and south Bovey forties. The other area is the possible pit extension on the north Bovey forties. In both cases, a very lean low grade concentrate is indicated.