LLOYD MINE
ANNUAL REPORT
YEAR 1943

6. SURFACE

a. Buildings

There was no new building construction or additions erected to existing buildings during the year. To maintain the surface buildings in good condition only very minor repairs were necessary and these were confined mainly to the shaft house where a part of the chute structure directly below the skip dump was reinforced and repaired.

An improvement for the convience of the underground employees was made in the clean clothes section of the dry house. The rows of lockers were raised and placed on benches which extend beyond the width of the lockers so that seating capacity is provided for the men when changing clothes, also the concrete floor in the clean clothes locker room was given two coats of slate gray paint, these improvements will assist in keeping this room clean and also added to its appearance. In the dry house shower room a concrete retaining wall about 15 inches in height was construced under a partition wall on one side to prevent the wash water from entering the adjoining room near the floor level, also foot railings and soap containers were installed along the wall where the showers are located.

b. Stocking Grounds

At the close of the shipping season all the ore of both grades excepting a small amount of wet ore that was placed on the pile during the latter part of the season was loaded out from the stocking grounds to the East of the Shaft. Three separate wooden stocking trestles which branch and roughly parallel each other were completely erected late in the year in this direction. Sufficient capacity is provided by the new trestles to the East of the Shaft to stock the production of both grades of ore until the opening of the shipping season in 1944.

The increased shipments of Silicious grade in 1943 from the stockpile permitted loading out a large percentage of this grade ore that had accumalated in stock over a period of years to the West of the Shaft. Next years shovel loading of Silicious grade will very likely enable cleaning up the remainder of this ore to the West of the Shaft, and before stocking trestle is erected in this direction a permanent approach which is in rotted condition will be rebuilt.

In conjunction with the shovel operations during the year the tractor bulldozer unit was employed when loading out the small remaining rills of ore prelimary to a complete clean up of a pile. Employing the bulldozer to assist the shovel opeations during the latter stage of the clean up of a pile enables faster loading and a more complete clean up of the stocking grounds.

By means of a scraper hoist operation a portion of the South end of the rock pile to the South of the Shaft was leveled off by drawing the rock into the nearby surface cave. This made it possible to extend the rock trestle further to the South and provide rock dumping capacity for a year or more.

c. Roads

Only a small amount of grading and an occasional truck load of mine rock was necessary to maintain the main road into the mine and other roads that serve the mine surface plant. In Spite of the relatively heavy traffic including the trucking of timber to the mine by local jobbers in addition to the regular employees who use their cars only a small amount of grading and filling in low spots with mine rock was necessary to maintain the main road and the parking lot area. To allay the dust during hot summer days used waste oil which was obtained free from a local service station was spread

LLOYD MINE
ANNUAL REPORT
YEAR 1943

6. SURFACE (Continued)

c. Roads (Continued)

over the surface of the road and proved very satisfactory for this purpose.

In line with the plant protection program to guard against sabotage and to prevent the entrance to the mine property of unauthorized persons a number of "Defense Area" signs were posted within a designated restricted area along every existing road into the mine property. All traffic into and out of the mine yard proper is now limited to the main road where a watchman is stationed at a gate enabling close supervision of all traffic and a better check on those entering and leaving.

To comply with the Act passed by the State Legislature for defense plant protection throughout the state a designated restricted area approximately one mile in length by a quarter of a mile in width has been outlined by the erection of a total of eighteen "Restricted Defense Area" signs, and within this area are located the entire surface plant and buildings and stocking grounds. A representative from the Michigan State Police, S. I. S. Security Section assisted in working out the plans of the restricted zone and made recommendations which were followed in putting it into effect. An area surrounding Section 6 Shaft which serves as an important connection for ventilation and the water supply tank were also included within the designated area.

7. UNDERGROUND

a. Shaft Sinking

There was no shaft sinking in 1943.

b. Development

A large development program has been underway during the entire year to keep abreast of the rapid rate at which mining is progressing to lower elevation in the orebody. The most important and major part of the development work was confined to the 8th Level where after completion of the shaft plat and storage trench excavation near the shaft early in the year drifting operations were started to the Southeast towards the orebody. As mentioned previously this development encountered the lower extension of the orebody and disclosed a favorable increase in the ore reserves. Upon reaching a point about 1550' from the shaft with the main level heading, ore was encountered at the transverse fault contact and the drift advanced about 325' in Lloyddale grade ore along the strike of the orebody and was still advancing in ore at the end of the year. Preliminary exploration has disclosed a width of only 40' to 50' to the orebody and from the additional development that will be done on this level together with some diamond drilling and explorations the actual outline will be determined in 1944.

Two raises No. 805 and No. 807 near the west end of the orebody were completed from the 8th to 7th Levels and mining at the latter elevation was underway from both raises late in the year. No. 805 raise was in ore for its entire length of approximately 160' but jasper was encountered in No. 807 raise for a considerable part of the distance. The fact that jasper was encountered in the latter raise is disappointing from a standpoint of ore reserves between the two lower levels as it definitely indicates an extension of the mass of jasper hanging within the orebody to an elevation considerably below the 7th level where its outline is well defined.

LLOYD MINE
ANNUAL REPORT
YEAR 1943

7. UNDERGROUND, Continued

b. Development, Continued

No. 804 was also put up in ore to the North from the 8th Level at the West end of the orebody to a height of 50' above the level. By means of this raise a portion of the extreme West end of the orebody adjacent to the North footwall will be developed for stoping from a transfer that will be driven on a sub level above the 8th Level. Late in the year No. 809 raise was started along the South side of the main level drift in ore and encountered jasper at a height of 40' above the level. This indicates similarily as did No. 807 raise the inclusion in the orebody of a dropper in jasper hanging that seriously reduces the lateral extent of the ore between the 8th and 7th Levels to offset to a large extent the encouraging vertical extension of the deposit to the 8th Level and below.

Drifting in rock comprised the main part of the 8th Level development under E & A cc 86 during the year. Upon completion of the Shaft plat and storage trench excavation about 1340' of rock drift was advanced to the South east to reach the orebody and the first raise connection in rock about 170' in length for ventilation purposes was made between the 8th and 7th Levels. Also 100' of tail track drift in rock to the North of the Shaft was driven after encountering the orebody. A small amount of exploration drifting in rock and ore consisted of the balance of the development work on the 8th Level.

On the 7th Level the major development consisted of driving a by-pass drift about 480' in length in the North footwall around the west end of the orebody. This drift which is entirely in the slate footwall was nearing completion at the end of the year and will replace a portion of the old main level drift that is in ore and which will soon be abandoned for traming due to the approach of mining operations to the 7th Level elevation. Near the East end of the 7th Level a short crosscut about 110' in length was driven branching to the southeast from the Main North footwall drift to provide a favorable location for a timber supply raise for the mining contracts working above this area. aAbout 90' of the crosscut was in slate and jasper and the remainder in ore.

As mining in the Easterly part of the orebody approached the 6th Level elevation additional raises were put up from the South footwall drift on the 7th Level. During the first half of the year four new raises were put up along the North side of the latter drift, two of which, No. 710 and No. 712, were extended to subs above the 6th Level and No. 718 and No. 716 to the 6th Level and one sub, below respectively. To enable development of a stope in the Silicious ore area adjacent to the North footwall No. 714 raise was also put up in ore from the South footwall drift to the 390' sub level elevation. Near the end of the new crosscut that was driven from the North footwall drift as mentioned previously No. 760' raise was put up in ore to the 415' sub-level to serve as a timber supply raise for contracts working in the Easterly part of the orebody.

LLOYD MINE
ANNUAL REPORT
YEAR 1943

7. UNDERGROUND, Continued

b. Development, Continued

A large part of the development work during the year was done on subs above the 7th level in advance of mining operation. A number of small areas were developed for stoping wherever it was practical to employ this system of mining and mill raises and small size sub-level drifts that comprised the development for stoping on various sub-levels constituted the major portion of the total footage. On the 350' sub-level about 240' of small drift in rock was driven in the footwall at the west end of the orebody for draining a large amount of water from a nearby mining area. On the 375' sub-level two short transfer drifts were driven in ore, one at the east end of the deposit, and the other about midway in the orebody as part of stope development. In the Silicious ore area adjacent to the North footwall a transfer about 180' in length was driven as part of the development for stoping a portion of this ore area above the 375' sub-level. In the east portion of the Silicious ore area a transfer drift about 170' in length was driven for stope development on the 390' sub-level. On the 415' sub-level a drift in ore that was partially driven last year along the strike of the orebody was completed to connect a series of raises near the east end, also, two short transfer drifts were driven on this elevation for stope development, one in the crotch of ore at the east end of the orebody and from the other transfer a raise for mining purposes was put up to the 6th level elevation. Some small drifting and raising in ore for exploration and stope development purposes on several additional sub-levels above the 7th level accounts for the balance of the development work between the 6th and 7th levels.

On the 6th level only a small amount of development work was done during the year and this consisted of short drift connections in ore and rock from mining areas to nearby existing drifts for traveling and ventilation purposes. On three successive sub-levels directly above the 6th level short drift connections in rock were advanced from a mining area into the North footwall to provide a connection for ventilation purposes with a main airway that extend to the 5th level.

An average of six contracts were on development work throughout the entire year, including the contracts employed on the 8th level development under H. & A. cc86. There was an average of nineteen contracts working during the year, thirteen of which were engaged in mining operations. As compared with last year there was a decrease in total development footage from 19,476' to 11,120' in 1943 due largely to less stope development. The gradual decrease in the size of the orebody as mining progresses to lower elevation has resulted in reducing the number of areas that can be developed for sub stoping. A classification of the footage is given later in the report in paragraph 7-c.

LLOYD MINE
ANNUAL REPORT
YEAR 1943

7. UNDERGROUND, Continued

c. Stoping

Mining operations during the year have been confined entirely in the Lloyd East Deposit as mining in the South Deposit was completed in 1942. The product with exception of a relatively small proportion from ore development on the 8th Level was obtained from mining areas above the 6th and 7th Levels. Mining above the 6th Level was completed late in the year and the entire porduct from slicing and stoping areas was trammed during most of the year on the 7th Level. The percentage of the product obtained from sub-level stoping operations is rapidly decreasing and the production has been dependent more upon the top slicing areas due principly to the lack of new areas that can be developed under the hanging. This situation has had a serious effect on production and will reflect itself more so on production during 1944.

At the end of the year mining in the Eaterly part of the deposit had progressed down to the 465' sub-level elevation or one sub below the 6th Level, and near the West end of the deposit mining was underway from the 8th Level raises on the 7th Level elevation. In addition to these areas mining operations were underway at the end of the year on various intermediate subs between the 6th and 7th Levels. To maintain maximun production during the year from the orebody which is deminishing in size every available area is being worked or is in the process of being developed and as many contracts as practical are employed on ore production.

The top slicing ore areas are gradually decreasing in size resulting in shorter slices that can be advanced and a more rapid date of mining successive sub-levels. As a consequence more interruptions occur to production by the contracts due to a large percentage of time spent in timbering when starting new slices and moving down to develop the next lower sub-levels. The best results from the slicing contracts has been obtained in the West portion of the orebody at the highest elevations where the ore areas are substantially larger.

Sub-Level stoping operations have been carried on in a small portion of the deposit at the extreme East end from about 30' above the 6th level to about 40' below the Level. In addition to the Lloyddale grade mined here a large quantity of Silicious grade was recovered after the stope began to cave. Late in the year an extension of this stope to the West was underway and good results were being obtained in recovery of mostly Lloyddale grade ore. During the latter part of the year the production of Silicious grade ore was dependent mainly upon one sub-level stope in the limb of ore adjacent to the North footwall. Very small amounts of Lloyddale grade ore has been encountered in this portion of the ore body and consequently the product from this stope has been mostly all Silicious grade. During the early part of the year mining by Sub-level stoping was underway at the West end of the orebody along the transverse fault. This stope which extended to a considerable height had been very productive in 1942 and was exhausted early in 1943. Upon completion of the stope slicing operations were started at the transfer drift elevation on the 375' sub-level and continued to lower elevations.

Stoping and slicing operations were carried on, on a total of fifteen sub-levels in the Lloyd East Deposit during the year. In addition to the 6th Level mining was completed on four sub-levels above this level and on the 7th level and nine sub-levels above the latter level.

LLOYD MINE
ANNUAL REPORT
YEAR 1943

7. UNDERGROUND, Continued

c. Stoping, Continued

The following is a detailed description of the mining operations on the various subs during the year.

Subs above the 6th Level - Lloyd East Deposit

515' Sub-Level

Mining operations were underway early in the year by four contracts slicing near the East end of the ore deposit. A relatively small amount of mining was done adjacent to the North footwall from No. 604 and No. 610 Raises and a small pillar was also recovered directly South of the latter raise. An area was also mined South of No. 611 raise extending to the footwall dike and mass of jasper that lies within the orebody. A very short slice along the South footwall dike South of No. 607 raise was advanced to complete the work at this elevation early in the year.

500' Sub-Level

A total of six contracts carried on slicing operations at this elevation in the ore area near the East end of the deposit. Mining was carried on from two raises No.s 706 and 710 put up to this elevation from the 7th Level and continued from the three 6th Level raises No.s 604, 606 and 610 that had served as a means of mining in this area for a number of subs above the 6th Level. In addition to the slicing contracts, No. 5 sub-level stope operation in the crotch of ore at the extreme East end of the deposit extended to this elevation above a transfer drift on the 415' sub level below. A large mass of jasper hanging lying adjacent to the South footwall dike has been encountered within the ore area here on a number of sub-levels and materially limits the ore area extensions.

490' Sub-Level.

An average of five contracts carried on slicing operations at this elevation in the same portion of the orebody as described in the preceding paragraphs No. 611 raise from the 6th level was used for mining a small ore area to the Southwest of the raise and the balance of the mining by the slicing contracts was carried on from raises put up from the 7th Level. Two raises No. 706 and No. 710 had been put up and served for mining purposes on the previous sub and two additional raises No. 702 and No. 706 were completed to this elevation to replace raises from the 6th Level that had been abandoned due to the approach of mining operations. A relatively small area at the East end of the orebody was mined by No. 5 sub-level stoping operations before mining in the adjacent slicing area had reached this elevation.

480' Sub-Level

This sub-level elevation is less than 10' above the 6th level and the major part of the ore above the floor of this sub to the preceding sub-level was mined from the 6th level elevation. However, three contracts carried on operations at this elevation and completed mining a small area located about midway in the orebody from No. 711, No. 715 and No. 717 raises. Only a small amount of mining was carried on to the North of these raises, most of the operations being confined to the South to the footwall dike.

LLOYD MINE
ANNUAL REPORT
YEAR 1943

7. UNDERGROUND, Continued

c. Stoping, Continued

6th Level

During the year an average of eleven contracts carried on slicing operations at this elevation in a large portion of the total ore area from the No. 700 series and No. 710 series of raises from the 7th Level. The old 6th Level drifts and cross-cuts that are in ore were encountered in the mining operations but no appreciable trouble was experienced in advancing slices adjacent to them, as in most cases the drifts were crushed when mining was underway directly above. At the extreme East end of the deposit a relatively small area was mined by No. 5 stoping operations that were carried on above a transfer on the 415' sub level early in the year. Good recovery of the ore in the narrow crotch formed by the converging of the North and South footwalls was made by this stoping operation. In addition to the large amount of Lloyddale grade recovered, some Silicious ore was also recovered when caving of the stope occurred.

Subs above 7th Level.
465' Sub-Level

This sub-level was the highest elevation at which mining was underway at the end of the year by five contracts that were carrying on slicing operations from No. 710 series of raises in the easterly part of the deposit. Indications were that a slight ore extension would occur at this elevation due to a decrease in size of the mass of jasper within the ore area near the South footwall. In addition to the mining by the slicing contracts, a small area was mined at the extreme East end of the deposit by No. 5 stope operations. An area approximately 300' in length by 70' in width was completely mined early in the year by three slicing contracts in the central portion of the orebody from No.s 709, 711 and 715 raises.

450' Sub-Level.

Mining was completed at this elevation in an area approximately 300' in length by 60' in width in the central portion of the ore area by five slicing contracts working from the raises No.s 709, 711, 715, 717, and 719. At the end of the year two contracts were carrying on operations at this elevation, one of which was stoping and the other slicing. A contract working from No. 718 raise was slicing along the North side of the ore area. No. 14 stope has been developed in the Silicious ore area along the North footwall side of the orebody and late in the year development for the stope was completed to this elevation, and mining was started at the East end retreating to the West. Only a small amount of Lloyddale grade ore was encountered in the development work for the stope, however a fairly large amount of Silicious grade ore can be mined. During the latter months of the year, production of this grade of ore was dependent largely on the product obtained from this one stope. A small area at the East end of the deposit was also mined at this elevation in No. 5 stope early in the year. Some additional stope development had been completed in the latter area and extension of No. 5 stope to the West was underway. Due to the narrow width of the orebody at the East end of the deposit mining by top slicing is not practical, and consequently extension of stoping operations to the West have been undertaken by No. 9 contract.

LLOYD MINE
ANNUAL REPORT
YEAR 1943

7. UNDERGROUND, Continued

c. Stoping, Continued

440' Sub-Level.

Two contracts were carrying on slicing operations on this sub-level late in the year near the central part of the orebody. Slicing was underway to the South of No. 717 raise and in a pillar to the North of No. 719 raise. Also some mining at this elevation was completed by three slicing contracts during the year from No.s 709, 711 and 715 raises in an area near the center of the orebody approximately 250' in length and averaging about 50' in width. A marked reduction in the size of the latter area occurred at this elevation as compared with the sub-level above. Due to the pitch of the South footwall and irregularities in the jasper hanging along the North side, the width of the ore area was reduced materially. An area approximately 120' in length by 35' in width was mined at this elevation at the East end of the orebody by the mining operation in No. 5 stope and also the No. 9 stope extension. A small ore area in the Silicious deposit along the North footwall was mined by operations in No. 14 stope.

425' Sub-Level.

Four contracts were carrying on operations at this elevation at the end of the year, three of which were slicing in the central portion of the main orebody along the South footwall side and the other was the operations in No. 14 stope. There were indications that a further reduction in the slicing ore area occurs at this elevation as compared with the sub-level above. The length of slices have gradually become shorter on successive sub-levels, reducing the efficiency and production of the contracts mining here. However, some development drifting at a lower elevation in this area indicates a slight increase in the width of the ore in the Northsouth direction. Some hindrance to mining has been caused by the large amount of water that enters this area from the South footwall side particularly during the early summer months after the spring run off. Three separate stoping operations have been underway at this elevation during the year. No. 14 stope along the North footwall side of the orebody was started at the East end of the Silicious ore area and has been retreating to the West. During the early months of the year stoping operations were underway in both No. 11 and No. 8 stopes at the extreme West end of the deposit. Small areas extending both stopes to the jasper hanging limits consisted of the mining at this elevation. At the East end of the orebody an area approximately 70' in length by 40' in width was mined by the operations of No. 5 stope. Some stope development consisting of small ore drifting and raising was completed at the end of the year to the West of the original No. 5 stope. By means of this development No. 9 stoping operations were started here, extending the stope to the West and by the end of the year the original stope had been increased in size to about 115' in length by 40' in width.

415' Sub-Level.

The work on this elevation during the year consisted mainly of the development work that has been previously described under development. At the end of the year one contract was carrying on slicing operations in a small area near the central part of the orebody Northeast from No. 707 raise. A relatively small amount of mining will be done here by this contract as the extent of the ore is confined to the narrow limits between

LLOYD MINE
ANNUAL REPORT
YEAR 1943

7. UNDERGROUND, Continued

c. Stoping, Continued

415' Sub-Level, Continued

the South footwall and the jasper hanging and mining to the East of this area is still underway at higher elevations

A small area of Silicious ore was mined in No. 14 stope adjacent to the North footwall. To the West of the development for No. 14 stope along the North footwall, a small amount of exploration drifting in jasper was done from two mill raises that extended to this elevation. A small amount of mining was done at this elevation as part of No. 11 stope development at the extreme West end of the orebody. A small area was mined under a roll in the jasper hanging and was the top elevation to which the ore extended at this point.

The major portion of the development at this elevation consisted of advancing about 350' of drift in ore to connect the series of 7th Level raises in the Easterly part of the orebody. This drift serves as a means of handling timber and supplies and also serves as a ventilation connection. A short transfer was driven North from No. 712 raise and a raise for mining purposes put up to sub-levels above from the end of the drift. A short connection in rock wqs advanced Northwest from No. 702 raise and a single compartment raise put up to the 490' sub-level from the end of the drift to provide a ventilation connection to subs above the 6th Level early in the year. A transfer drift in ore was driven to the Northeast from No. 706 raise for a distance of 110' and mill raises put up to develop No. 5 stope at the extreme East end of the orebody. Some development for No. 9 stope which is an extension of No. 5 stope was also carried on from this elevation during the later part of the year.

390' Sub-Level.

The work on this elevation during the year was confined entirely to stoping, and stope development. Mining in No. 8 and also No. 11 stopes at the extreme West end of the deposit was completed down to this elevation, exhausting both stopes early in the year. Both of these stopes had originally extended to approximately the 6th Level elevation, and mining at the beginning of 1943 had been completed at the higher elevations and early in the year was confined entirely to the lower sub-levels. The ore areas of both stopes joined at this elevation and work during the latter stages of the stope mining was confined to one stope. Good recovery of Lloyddale ore was obtained during the active life of both areas and when operations were completed to a short distance above the transfer drift the loss in production from these areas was keenly felt.

As part of No. 14 stope development, a transfer drift 170' in length was driven Northeast from No. 714 raise in the Silicious ore area adjacent to the North footwall. Two short test drifts to the North and South of the transfer were also advanced to determine the width of the ore. A number of mill raises were put up along the North side of the drift and each of the raises was advanced to a height about 60' above the transfer as part of the additional development of the stope operation here. All of the development and exploration on this elevation was in Lloyddale grade ore and Silicious grade ore was encountered in the mill raises and connecting drifts above the transfer. During the latter stages of the stoping operations here it will be possible to recovera large percentage of the Lloyddale grade ore that exists at the lower elevation. Late in the year No. 9 stope, which is continuation of No. 5 stope at the extreme East end of the deposit was being developed and an area approximately 30' in diameter was mined at this elevation.

LLOYD MINE
ANNUAL REPORT
YEAR 1943

7. UNDERGROUND, CONTINUED

c. Stoping, Continued

375' Sub-Level

Operations on this elevation were divided between mining and developing. At the extreme West end of the Deposit No. 8 contract after completing the stope operations above the transfer drift at this elevation recovered the remaining pillars to the North of No. 741 and No. 742 raises by the slicing method. In addition to the Lloyddale grade that was recovered from the remaining pillars, a large amount of Silicious grade was obtained after the back caved in the stope directly above. An area about 160' in length by 50' in width was mined by slicing operations from No. 720 and No. 703 raises in the Westerly part of the orebody. Some development for sub-level stoping was also done at this elevation in the Silicious ore area adjacent to the North footwall. A transfer drift 180' in length in jasper and Silicious ore was advanced to the Northeast of No. 723 raise and short test drifts driven South of the raise and also to the North of the transfer drift for exploration purposes. Jasper and Lean ore was encountered in both drifts. Two mill raises were put up to the 6th Level elevation from the North side of the transfer in Silicious ore and Jasper. The development work here indicates that a narrow ore area along the North footwall that was mined from the 6th Level pinches out a short distance above the Level as no extension of the ore area wqs disclosed below the 6th Level with exception of a small amount of Silicious grade ore.

As part of the No. 9 stope development at the extreme East end of the deposit, a transfer drift 90' in length was driven in ore to the Northeast of No. 706 raise. Five mill raises along the North side of the transfer were subsequently put up and intermediate sub-level connections made between the mills to comprise the development for No. 9 stoping operation above this elevation as described in preceding paragraphs. A total of 13 relatively short horizontal Diamond Drill Holes were drilled to the North and South of this intermediate sub-level elevation. The high speed Gopher Drill was used for this exploration drilling and a detailed description of this work is given under Explorations and Future Explorations.

360' Sub-Level.

Operations on this sub-level were confined to slicing in two separate areas in the westerly half of the orebody along the South footwall side. Two contracts completed mining a relatively small area from No. 742 and No. 732 raises respectively at the West end of the orebody adjacent to the South footwall dike. Two other contracts mined the available ore from No. 720 and No. 703 raises between the south footwall dike and the jasper hanging.

350' Sub-Level.

During the year three contracts completed slicing operations in separate areas in the Westerly half of the orebody. An area to the East and West of No. 720 raise was mined along the South footwall and late in December mining was completed here and the contract moved down to develop a mining area on the 7th level elevation directly below. Another contract also completed slicing operations from No. 732 raise at this elevation during December and then moved down to develop the next lower sub-level.

LLOYD MINE
ANNUAL REPORT
YEAR 1943

7. UNDERGROUND, CONTINUED

c. Stoping, Continued

350' Sub-Level, Continued

Slicing operations were completed late in the year in a small area radiating about No. 742 raise at the extreme east end of the ore deposit. Jasper was encountered along the East side of the mining here and prevented the area from being joined with the adjacent workings from No. 732 raise. Early in the year about 240' of rock drifting was done to the Southeast of No. 750 raise to connect with No. 742 raise and a raise put up to the 6th level elevation. A large amount of water on the 6th Level elevation was drained by means of the raise down to this elevation and prevented from entering the No. 11 stope workings when work in the latter stope was underway early in the year.

7th Level

By the end of the year mining operations had reached this elevation in a slicing area in the West half of the orebody. Two raises from the 8th Level had been completed to this elevation to enable mining to continue without interruption before the 7th Level raises had been abandoned for mining. Slicing operations were started in December in the area between No. 720 and No. 730 cross-cuts near the South footwall from No. 805 and 807 raises. The balance of the work on the 7th Level consisted of development work that has been previously mentioned. A new rock footwall by-pass drift was nearing completion around the west end of the orebody late in the year. Also a short crosscut was completed about the middle of the year near the East end of the 7th Level from the North footwall drift. From the end of this cross-cut No. 760 raise was put up to the 415' sub-level to serve as a timber supply raise for mining contracts working in this portion of the orebody. Four additional raises for mining purposes were put up along the North side of the South footwall drift in the East half of the ore area. Two of the latter raises were extended to subs above the 6th Level and the other two to lower elevations. Upon completion of the first rock ventilation raise from the 8th to 7th Levels about 10' of rock drift connection was made from the raise to the main level haulage drift in the footwall rock to the West of the orebody. Some exploration Diamond Drilling was done on the 7th Level elevation during the year and a discription of this work is given under Explorations and Furture Explorations.

Subs above the 8th Level
235' Sub-Level.

Upon completion of No. 804 raise to this elevation work was started late in the year driving a transfer drift to the Northwest. This work is in connection with sub-level stope development in the West end of the orebody along the North footwall side. The orebody pinches out at the intersection of the transverse fault and the North footwall at the West end and at the intersection the ore is known to extend to a short distance above the 7th level. No. 805 raise, which has been completed to the 7th Level elevation was cut out at this elevation also and short drift advanced to the West. Late in December work was underway driving a short connection North to No. 804 raise for traveling and ventilation purposes.

LLOYD MINE
ANNUAL REPORT
YEAR 1943

7. UNDERGROUND, Continued

c. Stoping, Continued

8th Level.

The work on the 8th Level during the year was confined entirely to development and some preliminary exploration which has previously been described under development.

d. Timbering

The reduced proportion of ore produced by sub-level stope operations and the increased proportion produced by the slicing areas as compared with the previous year accounts for the increase in the amount of timber used. Substantial increases in the price of timber poles and lagging were put into effect during the year and the combination of these two factors accounts for the large increase in the cost per ton for these supplies. Less cribbing timber and small size stull timber was used but this was more than offset by the increased amount of large size stull timber used. Extra large size timber was required for the ore drifting on the 8th Level and also for the repair program in the 7th Level footwall drift and on several intermediate sub-level drifts where heavy crushing condition have been experienced during the year. Due to expansion of slicing operations a large amount of 9½' poles have been used, mainly for covering down the floors in completed slices to provide a good covering for subsequent sub-levels. An important factor favoring the use of large size timber in the slices is the fact that the frequency of breakdowns caused by settling of the timber mat or heavy falls of ground is lessened and the occurance of serious interuption to production are reduced.

The supply of suitable tamarack cribbing timber is rapidly being depleted and as a result hardwood is substituted in raises where resistance to rotting is not of utmost importance. Due to the heavy raising program that will be underway on the 8th Level during the coming year a large amount of cribbing timber will be required and hardwood will be substituted for tamarack to an increased extent.

The following is comparative timber statement of 1943 and 1942.

LLOYD MINE
ANNUAL REPORT
YEAR 1943

7. UNDERGROUND, Continued

d. Timbering, Continued

Statement showing timber used for 1943

	Lineal Feet	Avg. Price Per Foot	Amount 1943	Amount 1942
6" to 8" Cribbing Timber	81,798	.051	4,185.66	4,171.88
8" to 10" Stull "	51,757	.102	5,305.08	5,560.47
10" to 12" " "	62,726	.1255	7,687.27	4,722.11
12" to 14" " "	35,747	.1537	5,492.67	1,409.10
Total Timber 1943	232,028	.0977	22,670.68	15,522.14
Total Timber 1942	222,745	.070		
	Per 100 Feet			
7' Lagging	1,193,729	1.029	12,283.81	11,054.43
9½' Poles	539,869	1.78	9,614.74	6,792.36
Wire Fencing	4,125	6.33	261.00	259.02
Total Poles & Fencing	543.994	1.82	9,875.74	7,051.38
Total Lagging, Poles and Fencing 1943	1,737,723	1.275	22,159.55	
Total Lagging, Poles and Fencing 1942	1,644,314	1.10		18,105.81
Product - Tons			494,042	368,036
Feet of Timber per Ton of Ore			.470	.392
" " Lagging " " "			2.416	2.160
" " " " Foot of Timber			5.146	5.509
Cost per Ton for Timber			.0459	.0273
" " " " Lagging			.0249	.0195
" " " " Poles and Fencing			.0200	.0124
Cost per Ton all Timber			.0907	.0592
Equivalent Stull Timber to Board Measure			486,840	364,095
Feet of Board Measure per Ton of Ore			.985	.641

Cost of Timber, Lagging, Poles, Fencing	Year	Cost per Ton	Amount
	1943	.0907	44,830.23
	1942	.0592	33,627.95
	1941	.0523	29,187.91
	1940	.0605	28,851.64
	1939	.0626	19,899.00

LLOYD MINE
ANNUAL REPORT
YEAR 1943

7. UNDERGROUND, Continued

e. Drifting and Raising

Similarily as during the previous year sub-level stope development constitutes the major portion of the total footage in spite of the fact that there was a large decrease in development for this purpose during the year. Development on the 8th Level under E. & A. cc86 also accounts for a large proportion of the footage of drifting and raising during 1943. On intermediate sub-levels between the 6th and 7th Levels development decreased materially due to the large amount of this work that was completed in this area in 1942. There was 5153' less of total development footage of all classifications in 1943 as compared with the previous year.

	Drifting			Raising			Grand
Year	Ore	Rock	Total	Ore	Rock	Total	Total
1943	5793'	3518'	9311'	4091'	921'	5012'	14323'
1942	10579'	761'	11340'	7667'	469'	8136'	19476'

The following table shows a comparison of the footage of full size drift and raise development after eliminating the small drifting and raising which was done for sub-level stope development.

	Drifting			Raising			Grand
Year	Ore	Rock	Total	Ore	Rock	Total	Total
1943	1509'	3004'	4513'	1141'	454'	1595'	6108'
1942	3814	621	4435	1807	290	2097	6532

The following is a classification of the total rock development under E. & A. cc86.

	Drift in Rock	Raise in Rock	Total
8th Level	2341'	245'	2586'
7th Level	488	-	488
Total	2829	245	3074

f. Explosives, Drilling and Blasting

The cost per ton for all explosives used decreased slightly as compared with the previous year. This was due in part to considerably less development work in 1943 for sub-level stoping operations. Also an increased proportion of the product as compared with the previous year was Silicious grade, a large amount of which was recovered during the latter stages of each stoping operation. As the areas suitable to sub-level stope system of mining decrease, a slight upward trend in the explosive costs per ton is anticipated unless a decided change to softer and easier breaking ground occurs as mining progresses in depth.

Gelamite powder has been used exclusively throughout the year in both the mining and development work. Gelamite No. 1 was used in all the stoping and slicing areas and relatively small amounts of 60% and 80% Gelamite used in several instances when drifting and raising in hard rock. The use of "Master Fuse Lighters" for blasting in raises has been continued with satisfactory results in preference to blasting electrically.

LLOYD MINE
ANNUAL REPORT
YEAR 1943

7. UNDERGROUND, Continued

f. Explosives, Drilling and Blasting, Continued

The explosives statements are shown under the following headings:

BREAKING ORE	Quantity Lbs	Average Price		Amount 1943	Amount 1942
Gelamite Powder #1	192,398	11.47	C	22,125,78	29,224.06
60% Gelamite	1,329	7.89	C	104.83	
80% Gelamite	502	11.50	C	57.75	
Total Powder	194,229	11.48		22,288.36	29,224.06
Fuse - Feet	710,691	5.15	M	3,660.95	4,382.90
No. 6 Blasting Caps	102,469	12.37	M	1,267.77	1,460.68
Tamping Bags	6,000	2.15	M	12,91	33.03
Fuse Lighters	17,375	6.79	M	118.04	153.44
Fuse Cartridges	3,375	20.68	M	62.56	100.69
Total Fuse Caps, etc.				5,122.23	6,130.74
Total Exp. Breaking Ore				27,410.59	35,354.80
Product - Tons				494,042	568,036
Lbs. Powder per ton of Ore				.393	.447
Cost per ton for Powder				.045	.051
Cost per ton for Fuse Caps, etc.				.010	.011
Cost per ton for all Explosives				.055	.062
DEVELOPMENT IN ROCK *					
Gelamite Powder #1	5,913	11.50	C	680.00	500.83
Fuse - Feet	14,607	5.16	M	75.30	82.66
No. 6 Blasting Caps.	2,101	12.26	M	25.76	28.06
Fuse Lighters	800	6.75	M	5.40	3.03
Total Fuse, Caps, etc.				106.46	113.75
Total All Explosives				786.46	614.58
Rock Drifting - Feet				1,064'	701'
Cost per Foot for Powder				.639	.714
Cost per Foot for Fuse, Caps, etc.				.100	.162
Cost per Foot for all Explosives				.739	.876
Grand Total Exp. used in Mine				28,197.05	35,969.38
Cost per ton All Explosives Used				.057	.063
Average Price per Lb. for Powder				.1148	.115

* Exclusive of work chargeable to Explorations, ventilations and E. & A.s

LLOYD MINE
ANNUAL REPORT
YEAR 1943

7. UNDERGROUND, CONTINUED

g. Ventilation

Satisfactory ventilation conditions in the mine have been maintained throughout the year by means of the fan on the 4th level at Section 6 shaft. The fan was operated 24 hours a day during the entire year exhausting the air up Section 6 shaft during the summer months and reversed to exhaust through the Lloyd Shaft during the major portion of the winter months. This procedure prevents ice formation in the hoisting shaft during the freezing weather. Also the practice of reversing the direction of the fan for short intervals on nearly each shift to remove the smoke after blasting to alternately upcast and downcast through both shafts prevents ice formation in Section 6 Shaft. Late in the year the fan was delivering about 18,000c.f.m. as compared with an average of approximately 20,000 c.f.m. in 1942. The reduction in volume is the result of steadily increasing resistance to the flow of air throughout the mine due to extension of the working areas to lower elevations and consequently increasing the pressure against which the fan operates.

At times during the year it was necessary to ventilate by means of booster fans and vent tubing isolated or dead end areas where work was underway. Also when advancing the 8th Level heading ventilation to the breast was maintained by means of a booster fan and sections of 14" spiral pipe that were extended from the shaft as the work progressed.

Several new connections for ventilation purposes were driven during the year as permanent airways in rock and also short temporary connection in ore and rock from the mining sub-levels to nearby airways. No. 801 raise was the first raise completed from the 8th to 7th levels in the footwall to the West of the orebody to serve as a permanent ventilation connection. No. 805 and 807 raises were completed to the 7th level late in the year for mining purposes and also serve as ventilation connections. As the 8th level heading is advanced to the East a number of mining raises will be put up and these will provide additional airways between the two lower levels until mining reaches an elevation below the 7th Level. On the 415' sub-Level above the 7th Level an ore drift was driven to connect the No. 710 series of raises in the East half of the orebody and in addition to a timber supply and travel way drift this has been an important intermediate sub-level airway for adjacent mining areas. During the latter part of the year heavy crushing conditions were making it extremely difficult to maintain the drift due to the approach of mining operations. A short drift was driven Northwest of No. 702 raise and from the end of the drift a rock raise put up to the 515' sub-level to hole to an existing ventilation raise that extends to the 5th level. Short connections have been driven to the raise from an adjacent mining area on successive sub-levels to maintain good ventilation in the contracts working here. Due to the approach of mining to the 7th Level elevation No. 701 raise which is in the ore area and has served as an airway will be involved in caving caused by mining in 1944, therefore early in the coming year it will be necessary to put up another permanent rock raise to the West of the orebody from the 7th to 6th levels.

LLOYD MINE
ANNUAL REPORT
YEAR 1943

8. COST OF OPERATING

a. Comparative Mining Costs

	1943	1942	Increase	Decrease
Product Tons	494,042	568,036		73,994
Underground Costs	1.556	1.324	.232	
Surface Costs	.178	.167	.011	
General Mine Expense	.336	.234	.102	
Cost of Production	2.070	1.725	.345	
Depreciation	.126	.042	.084	
Taxes	.065	.069		.004
Loading and Shipping	.079	.058	.021	
Total Cost at Mine	2.340	1.894	.446	
Budget Estimated at Mine	2.204	1.988	.216	
No. of Shifts & Hours	47-1-8 Hr. 4-2-8 Hr. 255-3-8 Hr.	3-1-8 Hr. 51-2-8 Hr. 255-3-8 Hr.		
Total 8 Hr. Operating shifs	306	309		3
Average Daily Product	1,816	1,959		143

LLOYD MINE
ANNUAL REPORT
YEAR 1943

8. COST OF OPERATING (CONTINUED)

b. Detailed Cost Comparison

	1943 Amount	1943 Per Ton	1942 Amount	1942 Per Ton
1. Exploring in Mine	15,413.33	.031	25,282.31	.045
2. Development in Rock	8,619.00	.018	7,533.12	.013
3. Development in Ore	66,623.67	.135	105,973.33	.186
4. Stoping	285,246.93	.577	246,273.89	.434
5. Timbering	210,075.92	.425	185,054.77	.326
7. Tramming	82,166.25	.166	81,843.06	.144
8. Ventilation	5,504.32	.011	3,376.20	.006
9. Pumping	12,082.38	.025	11,110.11	.020
10. Compressors & Air Pipes	26,801.56	.054	26,809.01	.047
11. Back Filling			119.55	
12. Underground Supt.	21,803.07	.044	20,435.26	.036
14. Maint. Comp & Power Drills	1,686.63	.003	1,280.26	.002
15. Scrapers & Mich. Loaders	12,773.69	.026	17,764.36	.031
16. Electric Tram Equipment	19,061.41	.039	18,028.72	.032
17. Pumping Machinery	975.69	.002	1,233.34	.002
Total Undg. Costs	768,833.85	1.556	752,117.29	1.324
18. Hoisting	31,184.81	.063	31,620.99	.056
19. Stocking Ore	14,843.66	.030	16,986.65	.030
20. Screening, Crushing at Mine	536.12	.001	1,455.74	.003
21. Dry House	10,290.68	.021	9,630.96	.017
22. General Surface Expense	16,300.73	.033	14,973.49	.026
23. Maint. Hoisting Equipt.	9,096.45	.018	7,349.70	.013
24. Shaft	2,560.66	.005	4,458.52	.008
25. Top Tram Equipment	1,424.89	.003	3,348.84	.006
26. Docks, Trestles & Pockets	1,377.62	.003	3,559.22	.006
27. Mine Buildings	370.36	.001	1,328.86	.002
Total Surface Costs	87,985.98	.178	94,713.07	.167
Vacation Expense	13,513.84	.027	13,718.67	.024
28. Insurance	4,335.42	.009	4,074.00	.007
29. Mining Engineering	3,299.30	.007	3,225.63	.006
30. Mech. & Elect. Engr.	1,399.58	.003	1,639.57	.003
31. Analysis & Grading	16,780.82	.034	19,403.35	.034
32. Personal Injury	30,918.08	.062	14,327.56	.025
33. Safety Dept.	2,257.83	.005	1,580.65	.003
34. Telep. & Safety Devices	3,086.96	.006	2,553.31	.005
35. Local & Gen. Welfare	6,617.67	.013	7,320.77	.013
36. Spec Exp Pension & Allow.	28,946.08	.059	11,864.31	.021
37. Ishpeming Office	19,050.68	.039	16,447.65	.029
38. Social Security	16,326.60	.033	17,286.08	.030
39. Mine Office	19,335.19	.039	19,511.52	.034
Total Gen Mine Exp.	165,868.05	.336	132,933.07	.234
Cost of Production	1,033,687.88	2.070	979,763.43	1.725
40. Taxes	32,133.05	.065	39,236.21	.069
Total Cost	1,054,820.93	2.135	1,018,999.64	1.794
Budget Estimated Cost		2.204		1.988

LLOYD MINE
ANNUAL REPORT
YEAR 1943

8. Cost of Operating, Continued

b. Detailed Cost Comparison

	1943		1942	
	Amount	Per Ton	Amount	Per Ton
41. General Supplies	17,563.30	.036	31,678.81	.056
42. Iron and Steel	7,717.31	.016	10,150.27	.018
43. Oils & Greases	1,753.46	.003	2,311.64	.004
44. Machinery Supplies	10,052.28	.020	20,319.61	.036
45. Explosives	28,703.97	.058	36,038.76	.063
46. Lumber & Timber	49,065.60	.099	41,906.63	.074
47. Fuel	2,537.02	.005	2,221.20	.004
48. Electirc Power	49,440.07	.100	51,211.44	.090
49. Sundries	36,522.49	.074	15,935.40	.027
50. Other Mines & Accts.	710.34	.001	314.58	
Total Supplies	202,645.16	.410	211,459.18	.372

The following is an explanation of the comparative costs for accounts that show significant variations. The increases over last year in many accounts is due to the general wage increase of five and one-half cents per hour that was put into effect April 1st, 1943 and retroactive to July 13,1942.

1. Exploring in Mine

The decrease is due to less exploration diamond drilling with the deep hole drill in an attempt to discover additional reserves. A large number of holes were drilled for exploration purposes but most of the drilling was done with the small Hi-Speed Gopher drill unit employing only one man.

3. Development in Rock

Increase due to large rock drifting and raising development program.

4. Development in Ore

Decrease due to smaller ore development program for sub-level stope operations.

5. Stoping

The large increase in expenditures for this account is due mainly to the general wage increase. Also less production was obtained from sub-level stoping and from the development program. The following is a detail of the stoping account excluding the product obtained from ore development.

LLOYD MINE
ANNUAL REPORT
YEAR 1943

8. COST OF OPERATING, Continued

b. Detailed Cost Comparison, Continued

	1943		1942	
	Amount	Per Ton	Amount	Per Ton
General Supplies	7,431.07	.017	9,783.58	.021
Iron and Steel	1,799.41	.004	3,790.38	.008
Oil & Grease	256.43	.001	348.23	.001
Machinery Supplies	372.90	.001	5,011.92	.011
Explosives	20,546.80	.046	23,016.37	.049
Timber & Lumber	1.42	.000	6.18	.000
Electric Power	4,407.71	.010	4,224.69	.009
Sundries	8,262.38	.018	3,608.15	.008
Expense Accounts	1,324.08	.003	668.23	.001
Total Supplies	44,402.20	.100	50,457.71	.108
Payroll Labor	227,048.00	.506	187,282.40	.400
Cliffs Shaft Labor	23.84	.000	87.84	.000
General Shops Labor	1,210.84	.003	1,538.85	.003
Shops, Labor etc.	12,562.05	.027	6,907.09	.015
Total Labor	240,844.73	.536	195,816.18	.418
Grand Total	285,246.93	.636	246,273.89	.526
Production Tons Stoped	448,346		468,543	
Avg. Miners Rate for Stoping	8.70		8.48	
Avg. Tons per Man Stoping	19.66		23.80	

6. Timbering

Large increase due to more timber used on account of expansion of slicing operations also substantial increases made in cost of these supplies and wages.

8. Ventilation

Increase due to more rock ventilation connections driven during the year.

9. Pumping

The increase in pumping cost was due to an increase in the total amount of underground water pumped and the general wage increase. Also as development of the 8th Level progressed a centrifugal pump was installed on the 8th Level to pump the water to the 7th Level where combined with the 7th and 6th Level water the total is diverted to the Morris Mine. In spite of a small increase in the Lloyd Mine water pumped at the Morris Mine a decrease in the proportion of the Lloyd cost of the pumping occured. This was due to a decrease in percentage of Lloyd Mine water to the total Morris water from 14% in 1942 to 10.13% in 1943. The following is a table of comparison showing the amount of water pumped by the Inland Steel Company and the proportion charged to the Lloyd Mine during the past five years.

LLOYD MINE
ANNUAL REPORT
YEAR 1943

8. COST OF OPERATING, Continued

b. Detailed Cost Comparison, Continued

9. Pumping, Continued

	Total Inland Steel Co.			C.C.I.Co. Prop.		
Year	Amount	Percent	Avg. Gals Per Minute	Amount	Percent	Avg. Gals. Per Minute
1943	$64,159.88	89.87	932.	$ 6,577.81	10.13	104.9
1942	42,644.22	86.00	847.1	7,013.13	14.00	101.00
1941	60,245.97	93.22	898.4	4,225.55	6.78	66.0
1940	70,978.13	90.13	1,155.4	7,769.69	9.87	125.1
1939	44,044.09	81.90	787.7	10,518.71	18.10	174.22

The following table shows a distribution of the total Lloyd Mine water pumped.

	Average Gallons per Minute	
	1943	1942
Second Level Water Supply	32.5	17.1
Fifth Level Water Supply	91.4	59.4
Seventh Level to Morris Mine	104.9	101.
Total	228.8	177.5

The large increase in the total underground water is due to extension of the mine workings and more water entering the mine through the surface cave. Also a heavy spring run off and heavy rainfall accounts for the increase in mine water. The second Level water supply was nearly doubled as compared with the previous year, but, due to larger demand this supply was augmented frequently during the year by diverting the water from No. 8 surface well at the Morris Mine to the water supply tank for the location.

15. Scrapers & Mechanical Loaders

Decrease due to less purchases of this equipment during the year and smaller maintenance costs.

16. Electric Tram Equipment

Increase due to more repairs and purchase of parts for maintenance of this equipment.

20. Screening, Crushing at Mine

Decrease due to very little repairs required for maintenance of crushing plant adjacent to shaft house.

21. Dry House

Increased due to improvements made in clean clothes locker room and general wage increase.

22. General Surface Expense

Increase due to general wage increase.

LLOYD MINE
ANNUAL REPORT
YEAR 1943

8. COST OF OPERATING, Continued

b. Detailed Cost Comparison, Continued

23. Maintenance Hoisting Equipment

Increase due mainly to replacing broken pinion gear shaft during Labor Day weekend Sept. 5th and 6th.

24. Shaft

Decrease due to less repairs required.

25. Top Tram Equipment

Decrease due to smaller product stocked and less maintenance of this equipment.

26. Docks, Trestles and Pockets

Decrease due to less trestle construction.

27. Mine Buildings

Decrease due to no new construction and very small amount of maintenance required.

40. Taxes

Decrease due to reduced valuation as result of diminishing reserves.

9. EXPLORATIONS AND FUTURE EXPLORATIONS

A diamond drilling program has been continued throughout the major portion of the year. With exception of encountering several insignificant runs of ore the results of this program have been very disappointing as no appreciable extensions to the known orebody or increase in reserves have been disclosed. Drilling with the Deep Hole unit was continued on the 7th Level near the West boundary across a known geological trough structure to the Southeast. Four additional inclined holes were drilled in this area one of which, Hole No. 149 encountered 74' of high sulphur ore at a vertical depth from 220' to 270' below the 8th Level. In the balance of the drilling only insignificant runs of lean ore were encountered. Late in September the drilling program with the Deep hole unit was stopped due to the failure of disclosing ore of importance in the geological trough structure in this area.

The Gopher Drill unit was employed mainly in drilling a number of relatively short holes above the 7th Level in the Lloyd East Deposit to more completely outline the known ore and explore for ore extension. Also some drilling was done to the South of the Diabase dike that defines the South footwall of the orebody but no ore of consequence was encountered. Drilling will be continued with the Gopher drill during 1944 from the 8th Level to explore the area to the South of Diabase dike and also to outline more completely any extension of the known orebody.

The large amount of drilling that has been done during the past several years has about exhaused the possibility of discovering any ore of importance in the area surrounding and adjacent to the present Lloyd East Deposit. A favorable vertical extension of the orebody has been disclosed by the development on the 8th Level but the lateral extent of the ore is confined to relatively narrow limits. The limits of the vertical extent of the orebody will be more thoroughly explored during the coming year.

LLOYD MINE
ANNUAL REPORT
YEAR 1943

9. EXPLORATIONS AND FUTURE EXPLORATIONS

The following is a comparison of the costs and the footage drilled during the year.

	Feet	Cost per Foot	Total
Deep Hole Drill	2267'	$4.89	11,071.40
Gopher Drill	1493'	2.91	4,341.93
Total	3760'	4.10	15,412.33

The following is a log of Diamond Drilling in 1943

Hole No. 137
7th Level Dip - 62°

Depth	Material
0' - 50'	Slate, Tr. Sl. and Jas
50' - 95'	S. O. J.
95' - 105'	Lean Ore
105' - 289'	S. O. J.
289' - 347'	Slate
347' - 657'	Slate (Drilled in 1943)

Completed at 657'

Hole No. 147
7th Level Dip - 56° - 45°

Depth	Material
0' - 15'	Slate
15' - 23'	Tr. Sl. and Jas.
23' - 100'	Lean S. O.
100' - 110'	S. O. J.
110' - 115'	Lean S. O.
115' - 120'	S. O. J.
120' - 125'	Lean S. O.
125' - 255'	S. O. J.
255' - 258'	Dike
258' - 260'	S. O. J.
260' - 280'	2nd Class ore
280' - 399'	Slate
399' - 420'	Tr. Sl. & Jas.
420' - 460'	S. O. J.
460' - 502'	Ore
502' - 534'	Hi-Sul Ore
534' - 559'	Diabase Dike
559' - 646'	S. O. J.
646' - 660'	Lean S. O.
660' - 662'	Hard Blue Jas.
662' - 672'	S. O. J.

Completed at 672'

Hole No. 154
7th Level Dip ∠ 2° to ∠ 9°

Depth	Material
0' - 5'	Slate
5' - 26'	Tr. Sl. and Jasper
26' - 64'	Lean S. O.
64' - 136'	S. O. J.
136' - 181'	2nd Class S. O.
181' - 200'	Lean S. O.
200' - 203'	Ferr. Dike
203' - 318'	S. O. J.
318' - 322'	Dike
322' - 530'	S. O. J.
530' - 535'	Lean S. O.
535' - 549'	S. O. J.
549' - 562'	Diabase Dike

Completed at 562'

Hole No. 157
7th Level Dip ∠ 6°

Depth	Material
0' - 4'	Slate
4' - 24'	Tr. Sl. and Jasper
24' - 35'	S. O. J.
35' - 46'	Lean S. O.
46' - 81'	S. O. Lean
81' - 145'	S. O. J.
145' - 154'	Lean S. O.
154' - 586'	S.O. J.
586' - 601'	2nd Class S. O.
601' - 615'	S. O. J.
615' - 672'	H. B. Jasper
672' - 710'	Diabase Dike
710' - 723'	S. O. J.

Completed at 723'

LLOYD MINE
ANNUAL REPORT
YEAR 1943

9. EXPLORATIONS AND FUTURE EXPLORATIONS

The following is a log of the drilling with the Gopher Drill.

Hole No. 140
515' Sub-Level Dip 0°

Depth	Material
0' - 5'	Lean S. O.
5' - 15'	S. O. J.
15' - 20'	Lean S. O.
20' - 24'	2nd Class S. O.
24' - 45'	S. O. J.
45' - 50'	2nd Class S. O.
50' - 71'	S. O. J.

Completed at 71'

Hole No. 141
7th Level Dip -45°

Depth	Material
0' - 40'	Slate
40' - 85'	Diabase Dike
72' - 250'	Slate

Completed at 250'

Hole No. 142
375' Sub-Level Dip 0°

Depth	Material
0' - 30'	S. O. J.
30' - 35'	Lean S. O.
35' - 40'	2nd Class S. O.
40' - 45'	Lean S. O.
45' - 65'	2nd Class S. O.
65' - 75'	Lean S. O.
75' - 90'	S. O. J.
90' - 95'	Tr. Sl. & Jas.
95' - 103'	Slate

Completed at 103'

Hole No. 143
375' Sub-Level Dip 0°

Depth	Material
0' - 32'	1st Class Bess. S. O.
32' - 58'	Diabase Dike
58' - 102'	Blue Jasper
102' - 147'	S. O. J.

Completed at 147'

Hole No. 144
375' Sub-Level Dip 0°

Depth	Material
0' - 65'	1st Class S. O.
65' - 70'	Tr. Sl. & Jasper
70' - 90'	Slate

Completed at 90'

Hole No. 145
375' Sub-Level Dip 0°

Depth	Material
0' - 50'	1st Class S. O.
50' - 60'	2nd Class S. O.
60' - 65'	S. O. J.
65' - 70'	2nd Class Soft Ore
70' - 78'	Tr. Jasper & Slate
78' - 85'	Slate

Hole No. 146
375' Sub-Level Dip 0°

Depth	Material
0' - 39'	1st Class S. O.
39' - 45'	Lean S. O.
45' - 65'	Tr. Jasper & Slate

Completed at 65'

Hole No. 147
375' Sub-Level Dip 0°

Depth	Material
0' - 18'	1st Class S. O.
15' - 33'	Diabase Dike
33' - 69½'	S. O. J.

Completed at 69½'

LLOYD MINE
ANNUAL REPORT
YEAR 1943

9. EXPLORATIONS AND FUTURE EXPLORATIONS

Hole No. 148
375' Sub-Level Dip 0°

Depth	Material
0' - 40'	1st Class S. O.
40' - 45'	Tr. Jasper & Slate
45' - 72'	Slate

Completed at 72'

Hole No. 150
375' Sub-Level Dip 0°

Depth	Material
0' - 15'	1st Class S. O.
15' - 17'	Dike
17' - 22'	1st Class S. O.
22' - 45'	S. O. J.
45' - 58'	Diabase Dike

Completed at 58'

Hole No. 151
375' Sub-Level Dip 0°

Depth	Material
0' - 47'	1st Class S. O.
47' - 50'	2nd Class S. O.
50' - 52'	Tr. Sl. & Jasper
52' - 63½	Slate

Completed at 63½'

Hole No. 152
375' Sub-Level Dip 0°

Depth	Material
0' - 5'	S. O. J.
5' - 10'	2nd Class S. O.
10' - 19'	S. O. J.
19' - 45'	Diabase Dike
45' - 60'	S. O. J.

Completed at 60'

Hole No. 153
375' Sub-Level Dip 0°

Depth	Material
0' - 7'	1st Class Ore
7' - 13'	Dike
13' - 46'	1st Class S. O.
46' - 66'	Slate

Completed at 66'

Hole No. 155
375' Sub-Level Dip 0°

Depth	Material
0' - 5'	1st Class S. O.
5' - 10'	Lean S. O.
10' - 32'	S. O. Jasper
32' - 37'	Lean S. O.
37' - 65'	Diabase Dike
65' - 96'	2nd Class S. O.
96' - 104'	S. O. Jasper

Completed at 104'

Hole No. 156
375' Sub-Level Dip 0°

Depth	Material
0' - 5'	1st Class S. O.
5' - 10'	Lean S. O.
10' - 33'	S. O. J.
33' - 38'	Diabase Dike
38' - 75'	S. O. J.
75' - 82'	2nd Class S. O.
82' - 87'	Lean S. O.
87' - 92'	S. O. J.
92' - 112'	Lean S. O.
112' - 117'	S. O. J.
117' - 132'	Lean S. O.
132' - 133'	S. O. J.
133' - 153'	Slate

Completed at 153'

Hole No. 158
375' Sub-Level Dip 0°

Depth	Material
0' - 19'	S. O. J.
19' - 44'	Diabase Dike
44' - 46'	Slate & Mixed ore
46' - 59'	Slate

Completed at 59'

LLOYD MINE
ANNUAL REPORT
YEAR 1943

10. TAXES

The following figures show the taxes paid in Ishpeming Twosnhip for the past two years on the Lloyd Mine, on lots in West Ishpeming, and on property in the North Lake Location.

		1943		1942	
Lloyd & Section 6	Valuation		taxes	Valuation	Taxes
SW¼ of NW¼ of Sec. 6, 47-27)					
N½ of SW¼ of Sec. 6, 47-27)					
N½ of SE¼ of Sec. 6, 47-27)		890,000	13,790.91	1,350,000	27,569.03
Personal, Stkpe, Supp. & Equip.		660,000	10,226.96	550,000	11,231.83
Total by St. Tax Comm.		1,550,000	24,017.87	1,900,000	38,800.86
Collection fees .			240.18		388.00
Total Taxes			24,258.05		39,188.86
CCICo. Misc. Lands					
S½ of NE¼ of Sec. 6, 47-27		320	4.96	320	6.54
SE¼ of NE¼ of Sec. 6, 47-27)	Exc.	350	5.42	350	7.15
S½ of SW¼ of Sec. 6, 47-27)	R.	700	10.85	700	14.30
SW¼ of SE¼ of Sec. 6, 47-27)	of	350	5.42	350	7.15
SE¼ of SE¼ of Sec. 6, 47-27)	Way	575	8.91	575	11.74
Total		2,295	35.56	2,295	46.88
Collection fees			.36		.47
Total CCICo. Misc. Lands			35.92		47.35
Total Lloyd		1,552,295	24,293.97	1,902,295	39,236.21
Taxes Lot B. 2 West Ishp.		50	.78	50	.62
North Lake Dwellings					
Houses on Sec. 6, 47-27		4,500	69.73	4,500	91.90
Collection fees			.70		.92
Total Dwellings ..			70.43		92.82
Total Ishp. Twp.		1,556,845	24,365.18	1,906,825	39,329.65
Rate			1.54954		2.04215

The decrease in taxes was due to a substantial reduction in the valuation and also in the tax rate. The increase in personal property, ore in stock, supplies and equipment was more than offset by the reduced valuation due to diminishing ore reserves. Due to over assessment by inclusion of the School Debt tax in 1943 a total of $7,861.65 was refunded in Lloyd taxes and this accounts for the difference in the amount of taxes as shown in Cost comparison and the table above.

	1943	1942	1941	1940	1939
Taxes per ton produced	.049	.069	.082	.099	.143
Taxes per ton shipped	.043	.067	.099	.093	.095

LLOYD MINE
ANNUAL REPORT
YEAR 1943

11. ACCIDENTS AND PERSONAL INJURY

The accident frequency and severity rate in 1943 was considerably worse than in the previous year. There were ten compensable accidents as compared with six in 1942 including one regretable fatality in 1943 the details of which have been discussed in previous independent reports. Continued efforts are made to promote safely by encouraging the employees to become safety minded and strict supervision to enforce the safety rules and regulations. Due to reducing the operating schedule early in the year from seventeen shifts to sixteen shifts per week the total man days was reduced from 94,722 in 1942 to 92,895 in 1943. The number of man days lost on account of accidents was 6740 (one fatality 6000 days) as compared with 780 in 1942.

The following table shows a comparison of the accident frequency and severity rates for the past two years.

Year	Frequency Rate	Severity Rate
1943	14.80	9.071
1942	6.30	8.24

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

The compensable accidents are listed in detail as follows.

Accident No. 821, January 9, 1943, Bernard Nelson - Miner
Struck by fall of ground while placing blocking above timber set. Bruised right leg below knee - Time lost - 12 days.

Accident No. 822, January 20, 1943, Clifford Nelson - Miner
Struck by chunk as he was standing under new raise that was being put up from a sub-level. Laceration upper lip and contusion on left side - Time lost - 7 days.

Accident No. 823, March 16, 1943, Richard Williams - C/A Miner
While hoisting timber under a raise a motor train came into the drift and collided with a nearby timber truck knocking him down and pinning his right leg under the truck of timber. Compound fracture of right leg below knee - Time lost - 212 days.

Accident No. 824, March 21, 1943, Theodore Klinghammer - C/A Miner
While hoisting timber on a sub-level he was squeezed against a timber set by the piece of timber that was being pulled with the scraper hoist. Contusion of left side of chest - Lost time - 347 days.

Accident No. 828, May 1, 1943, Werner Kallatsa, C/A Miner
While standing a post for a set of timber he slipped and the piece of timber fell on his right foot. Incomplete fracture of first metatarsal right foot. Lost time - 36 days.

LLOYD MINE
ANNUAL REPORT
YEAR 1943

11. ACCIDENTS AND PERSONAL INJURY, CONTINUED

Accident No. 829, May 28, 1943, John Carlson, Sub Boss
While unloading a truck of timber his thumb was squeezed between the end of a timber and the truck. Laceration of left thumb, which later became infected.- Lost time - 74 days.

Accident No. 830, June 12, 1943, Paul Jarvi - Motorman
Attempted to move the motor while standing on the side of the drift and he was squeezed between moving locomotive and timber set. Fractured pelvis and internal injuries. Lost time - 198 days.

Accident No. 831, August 10, 1943, Sam Beltrame - C/A Miner
While assisting in putting up a timber set stumbled and fell against a pole. Fracture of 11 rib on right side - Lost time - 27 days.

Fatality, Accident No. 832, September 3, 1943, Peter Lehto - Miner
This man was fatally injured by a fall of a large mass of ground from the breast while working in the main level ore drift on the 8th level.

Accident No. 833, December 10, 1943, Joseph Zoppetti - Miner
While picking down a pile of ore he slipped and fell against a stage pole. Bruised side. - Lost time - 33 days.

12. NEW CONSTRUCTION AND PROPOSED NEW CONSTRUCTION

With exception of erecting the wood stocking trestles to the East of the shaft after the stockpiles were loaded out there was no new construction in 1943. Several bents of rock trestle were also erected to the South of the shaft as an extension to the old trestle.

Minor repairs were made to several surface buildings and some improvements made in the clean clothes locker room in the dry house. The rows of lockers were raised and placed on benches that also provide seating capacity for the convenience of the underground employees.

Early in 1944 some construction on the 8th Level shaft plat will be undertaken. This work will consist of placing a covering largely of timber construction over a major part of the storage trench excavation that will be used as a sump. This will permit laying a double track on the cage road side for handling timber trucks and also a double track on the pocket side for switching the tram cars.

13. EQUIPMENT AND PROPOSED EQUIPMENT

The following is a list of the more important items of new equipment that were added to the inventory in 1943:

Item	Number of Items	Cost
TM6 Coppers Ventair Blowers	3	1,238.08
No. 627 Bucket - Eimco	1	106.39
R-48 Stoper	1	365.80
25H.P. Slusher Motor	1	730.80
30 MM3D - I R. Hoist	1	1,583.25
Type DA -50 - SP Circ. Breaker	1	167.00
Model D. Lilly Controllers	2	957.78

LLOYD MINE
ANNUAL REPORT
YEAR 1943

13. EQUIPMENT AND PROPOSED EQUIPMENT, CONTINUED

Item	Number of Items	Cost
Type H.P.F. A. C. Welder	1	425.00
M. S. A. Air Mover	1	45.49
A4NNOJ Hoist - I - R	1	603.00
10 Ton Duff Norton Jacks	2	45.18
Model B Wood Borer	1	181.56
Model F. G. Coffing Hoist	2	97.05
U-60 Port. Elec. Grinder	1	100.79
NC 20 D Auger Drills	4	761.75
RB 12 Jackhammer	2	400.87

During 1944 it is very likely that additional pumping capacity will be required on the 8th Level. A centrifugal pump is presently being used to pump the 8th level water but as mining progresses to lower elevation and development on this level is extended an increase in the amount of water will necessarily require a larger pumping plant.

14. MAINTENANCE AND REPAIRS

a. The increase in maintenance expense in most cases was due to the general wage increase. Repairs and maintenance of timbered drifts and raises on the main levels and sub-level drifts that serve as airways and important connection was as in previous years the largest item of expense. To prevent interruption to tramming operations during the operating shifts when making extensive repairs in the haulage ways a repair program during the Saturday afternoon shifts was maintained during the entire year.

Shaft repairs were not as extensive as during the previous year. To maintain the shaft in good condition occassional worn out runners were replaced and hardwood wearing strips renewed along the sides of the runners in both skip roads. The continued practice of week end and mid-week inspections of the shaft is of material advantage in the maintenance of the shaft.

b. Location

There was only a very slight difference in the expense of location maintenance in 1943 as compared with the previous year as indicated in the following table:

	Labor	Supplies	Total
Water		2,413.27	2,413.27
Cleaning	1,706.75	7.70	1,714.45
Water Mains	36.07	200.65	236.72
Ice Rink	67.89	1.21	69.10
Total	1,810.71	2,622.83	4,433.54

Year - 1942	4,439.13
1941	6,261.66
1940	4,720.39
1939	5,044.89
1938	5,272.04

LLOYD MINE
ANNUAL REPORT
YEAR 1943

14. MAINTENANCE AND REPAIRS, CONTINUED

2. Rented Buildings

The maintenance expenses on rented buildings increased as compared with last year. The expenditure was confined entirely to the former Assistant Managers residence which was renovated before occupancy by the Superintendent of the Mather Mine. Two additional location dwellings were sold during the year leaving two houses in addition to the residence the Manager vacated as owned by the Company at the end of the year. Ownership by the company is also maintained on the store building which is rented to J. B. Casper at $50.00 per month.

The total expenditures on rented buildings during the past five years is as follows:

Year -	1943	$ 737.91
	1942	360.90
	1941	1,145.53
	1940	4,323.23
	1939	8,498.58

The North Lake Club house required very little maintenance similarily as during the previous year due to extensive repairs made in 1941. There was a material decrease in the operating deficit as compared with 1942 as shown in the following table:

	Proportion of Operating Deficit		
Year	Lloyd Mine	Inland Steel Co.	Total
1943	$ 2,500.43	$ 960.00	$ 3,460.43
1942	3,067.64	960.00	4,027.64

15. POWER

There were no delays to hoisting in 1943 due to lack of electric power. There was a decrease in the K. W. H. and cost of power in approximate proportion to the decrease in production and operations. The rate for power remained the same as in the previous years . The following is a five year comparison of power consumption and costs.

Year	Total K. W. H.	Cost	Rate
1943	3,633,600	50,699.76	.0139
1942	3,751,200	52,200.96	.0139
1941	3,631,200	50,289.84	.0138
1940	2,516,400	36,282.72	.01442
1939	1,788,000	29,983.20	.01677

16. WATER SUPPLY

Due to the increased demand for water particularly during the summer months it has been necessary very frequently to augment the second level water supply with water pumped from the Morris Mine No. 8 well. The chlorinating machine at the well and also on the Lloyd Mine second level have been giving continued dependable service.

LLOYD MINE
ANNUAL REPORT
YEAR 1944

17. CONDITION OF PREMISES

The premises has been maintained in good condition throughout the year. During the summer months the lawn was mowed regularly and watered as needed. The shrubbery and flowers surrounding the lawn has been maintained in the usual attractive appearance. Frequently during hot summer days waste oil was spread over the surface of the main road into the mine and in the parking lot area to allay the dust. During the winter months the roads and parking area were opened for traffic after each snowfall by means of the tractor bulldozer unit.

18. NATIONALITY OF EMPLOYEES

	American Born	Foreign Born	Total	Per Cent
Finnish	91	34	125	41
French	52	3	55	18
English	24	4	28	9
Swedish	19	4	23	7
Italian	25	28	53	17
Scotch	2		2	1
Norwegian	8		8	3
Austrian	3	1	4	1
Irish	7		7	2
German	3		3	1
Jugo-Slavian	1		1	
Belgian	1		1	
Czecho-Slovian	1		1	
	237	74	311	100

The ratio of American born to Foreign born remained practically the same as reported for last year. The American Nationality which showed eleven percent last year was eliminated an distributed according to descent of Nationality.

MATHER MINE

ANNUAL REPORT

YEAR 1943

1. GENERAL:

The beginning of the third year in the program of opening the Mather Mine marked the transition from surface plant construction and shaft sinking to underground development. Shaft sinking was completed at a depth of 2352' on January 12, after which a small sump was put down an additional 5' in the cage compartment. The opening of the plats, trenches, and pockets was immediately started on the 1600 and 1750' Levels. The skip pit excavation on the 2350' Level was also started at that time and completed early in February. January also marked the completion of most of the work in the Headframe and on the permanent steel trestles to the east.

The perfect safety record established during the previous year was broken in January, when a rather serious lost time accident occurred on surface. This was very disappointing to both employees and management, since it could have been avoided.

The preparation of the plats, pockets, and trenches was continued until the middle of May, when full-scale drifting on both levels was started and continued throughout the remainder of the year, with the exception of a period of two months when it was necessary to stop the drift on the 1600' Level and use the crew to excavate the pumphouse and sump on the 1750' Level.

Ore was encountered in the first crosscut on the 1750' Level in September, and a very small tonnage was hoisted. This tonnage was limited, due to its extremely high sulphur content. In addition to this small production, the high grade Standard Ore, which had been recovered from shaft sinking operations in the previous year, was loaded from stockpile and shipped.

An extensive underground exploration program, which was carried on throughout the latter portion of the year, was very disappointing in that most of the ore encountered was far too high in sulphur to have any commercial importance. By the year's end, a new level at the 2050 elevation had been started, and plans had been completed for another at 2200. There are large known reserves of commercial ore available to these two new levels. Surface exploration in Section 2 was completed early in the year and continued to the east and west in Sections 1 and 3 with considerable success.

Effective the first of February, the working schedule was reduced from 5-2/3 days per week to 5-1/3, and in June, by means of a consent election, the employees at this property chose the CIO as their sole bargaining agent by a vote of 40 - 35.

MATHER MINE
ANNUAL REPORT
YEAR 1943

2. PRODUCTION, SHIPMENTS & INVENTORIES:

a. Production by Grades:

Mather	1,008	Tons
Mather Special	789	"
Total	1,797	"
Rock	81,240	"

The first ore actually produced at this property was obtained during shaft sinking operations in August and September of 1942. This ore, which is the 1,008 tons of Mather Grade listed in the table above, was loaded from stockpile in September of this year and taken into the production figures for that month. The production of Mather Special Grade, which is a high sulphur product, was very limited in tonnage, due to the fact that the sulphur content was too high.

b. Shipments:

Grade of Ore	Pocket Tons	Stockpile Tons	Total Tons
Mather	1,008	-	1,008
Mather Special	789	-	789
Total	1,797	-	1,797

As explained above, the 1,008 tons of Mather Grade was actually shipped from stockpile.

c. Stockpile Inventories:

Mather	-
Mather Special	-
Total	-

d. Division of Product by Levels:

1600' Level	-	Tons
1750' Level	789	"
1900' Level*	1,008	"
Total	1,797	"

*During Shaft Sinking

e. Production by Months:

Month	Mather	Mather Special	Total	Rock
January	-	-	-	1,260
February	-	-	-	2,070
March	-	-	-	7,332
April	-	-	-	2,052
May	-	-	-	7,212
June	-	-	-	10,334
July	-	-	-	7,500
August	-	-	-	5,760
September	1,008	755	1,763	7,830
October	-	34	34	9,540
November	-	-	-	9,550
December	-	-	-	10,800
Total	1,008	789	1,797	81,240

MATHER MINE
ANNUAL REPORT
YEAR 1943

2. PRODUCTION, SHIPMENTS & INVENTORIES: (Continued)

f. Ore Statement:

	Mather	Mather Special	Total	Total Last Year
On Hand Jan. 1, 1943	-	-	-	-
Output for Year	1,008	789	1,797	-
Transferred	-	-	-	-
Total	1,008	789	1,797	-
Shipments	1,008	789	1,797	-
Balance on Hand	-	-	-	-
Increase in Output			1,797	-
Decrease in Ore on Hand			-	-

1943 - 3-8 hr. shifts, 5-2/3 days per week, Jan. 1st. to 31st, 1943
3-8 hr. shifts, 5-1/3 days per week, Feb. 1st. to Dec. 31st, 1943

1942 - 3-8 hr. shifts, 5-2/3 days per week, Jan. 1st. to Dec. 31st, 1942

1941 - 1-8 hr. shift, 6 days per week, Jan. 1st. to Jan. 12th, 1941
2-8 hr. shifts, 5 days per week, Jan. 13th to Jan. 28th, 1941
3-8 hr. shifts, 5-2/3 days per week, Jan. 29th to Dec. 31st, 1941

g. Delays:

The only delay of any importance from any source occurred on the 16th of April during a test of the fire protection booster pumps, when an abnormally large volume of water was pulled through the old wooden mains of the City's water system. As a result, a large amount of sediment entered the cooling water system of the large motor generator set, causing a stoppage of the flow. Due to the fact that the protective thermo relays were not completely installed, the failure of the cooling water was not noticed until the two main bearings were overheated to the extent that the lower portions were badly damaged. These bearings were sent to the repair shop of the General Electric Company in Milwaukee, received back at the mine by the 30th of the month, and the set was back in service by the 3rd of May. From a standpoint of operations, there was no real delay, since it was possible to operate the cage hoist with the small set and proceed with the work of concreting the pockets and trenches and installing the pocket doors and operating cylinders.

h. Delays from lack of Current:

None

3. ANALYSIS:

a. Average Mine Analysis on Output:
In the report for 1942, the analysis of the ore encountered in the shaft was listed as follows: 64.07 Fe, .125 Phos., 3.54 Sil., and .017 Sul., which with some expected dilution was estimated at 62.90 Fe, .144 Phos. 3.90 Sil., and .016 Sul. in the stockpile.

MATHER MINE
ANNUAL REPORT
YEAR 1943

3. ANALYSIS:
(Continued)

a. Average Mine Analysis on Output (Continued)

When actually loaded out and shipped, the recoverable ore totaled 1,008 tons with the following complete analysis, which is undoubtedly indicative of what can be expected in this particular horizon, which ran from a depth of 1890' to 1920' below the collar of the shaft.

	Iron	Phos.	Silica	Mang.	Alum.	Lime	Mag.	Sulph.	Loss
Mather	61.90	.161	5.88	.07	2.58	.65	.88	.020	1.24

The Mather Special ore, all of which was obtained from the first crosscut on the 1750' Level, was extremely high in sulphur and rather low in iron, due to seams of interbedded slates in the ore and to a small amount of dilution from the rock previously handled in the Headframe and pockets. The average analysis on output was:

	Iron	Phos.	Silica	Sulphur
Mather Special	56.25	.201	7.41	.825

The complete analysis of the accumulated powders was as follows:-

	Iron	Phos.	Silica	Mang.	Alum.	Lime	Mag.	Sulph.	Loss
Mather Special	56.30	.208	7.36	.12	3.99	2.23	.73	.948	2.10

b. Average Analysis on Straight Cargoes:

There were no straight cargoes shipped during 1943.

c. High Sulphur Ore:

The extremely disappointing results of the 1943 underground exploration, both by crosscutting and diamond drilling, indicates the presence of a large area in the vicinity of the 1750' Level in which the sulphur is far too high to permit any extensive mining. The single crosscut, which was driven through a portion of this ore, encountered material ranging from .200% to 2.000% and higher, with an average only slightly below 1.000%. Drilling to the south of this crosscut and from the crosscut to the east indicated little, if any, change in the sulphur content. Inclined holes below the level seemed to indicate a diminution in the sulphur content, although still too high for any extensive mining. There are numerous theories regarding the occurrence of injurious percentages of sulphur in this range, one of which is that the concentrations occur in horizontal zones, above and below which the ore is of Standard Grade. Due to the possibility that all or most of the reserves available to the 1750' Level would be abnormally high in sulphur, it was decided to proceed immediately with the opening of two lower levels, the 2050 and the 2200, where known deposits of commercial grade ore exist. The 1750' Level will be continued far enough to the east to permit further exploration and development. There is still a very good possibility that Standard Ore will be found available to this level and on or above the 1600' Level which, in any event, will be completed for a ventilation and second outlet connection to the Cambria-Jackson property.

MATHER MINE
ANNUAL REPORT
YEAR 1943

4. ESTIMATE AND ANALYSIS OF ORE RESERVES:

There has been no estimate of the Mather Mine reserves since 1939, when the Geological Department calculated some 7,000,000 tons developed by surface drilling in the south half of the northeast quarter of Section 2. The limits since that time have been extended to the southeast by Holes 44 and 45, and to the north by Holes 49 and 50, and to the west by the ore encountered in the shaft. There is now a good reason to suspect that the northerly extention, as shown by Hole 49, may be quite high in sulphur, and the underground exploration indicates that a considerable amount of the ore lying west of the center line of the section may also be quite high in sulphur. It is useless to attempt with the known information to make an engineering estimate of the reserves available to the Mather Shaft, since there is not sufficient information to correlate the surface drilling with the little underground work that has been done. It suffices to say, however, that the potential reserves available are undoubtedly the greatest for any shaft on the Marquette Range, with favorable drilling in Section 1 to the east indicating a continuation of the ore in that direction.

5. LABOR AND WAGES:

a. Comments

The mine force was gradually increased throughout the year from an average of 82 men in January to 144 in December, an increase of 62 men or 75.6%. This increase was necessitated by increased activity and the need for more men on the underground development crews and a larger surface crew to handle waste rock and timber. In addition, a number of surface construction jobs were continued throughout the greater portion of the year. The labor turnover was not great, considering the times and amounted to 38 men. A much larger number of deferments were granted, due to changes in the draft procedure and the reclassification of men formerly in 3-A. These totaled 58 for 1943, as compared with 14 the previous year. Had it not been for skilled men transferred to this property from the Negaunee Mine, the shortage of miners would have been extremely acute. Employment in this district virtually "scraped the bottom of the barrel", and even common surface labor was extremely scarce, although the "work or fight" ruling of the Draft Board had some good effect during the latter months of the year.

The contract with the independent Marquette Range Industrial Union, which expired on December 12, 1942, was not renewed due largely to a lack of interest on the part of the men, very few of whom were interested in any type of union organization. The pressure from other properties throughout the district, all of whom had signed contracts with the CIO, finally became great enough to necessitate an election which was held on June 23rd, the union winning by a vote of 40 to 35, with several employees not voting. There is no doubt that this outcome was the result of continued pressure on the part of paid organizers, and did not indicate any particular dissatisfaction on the part of the men.

MATHER MINE
ANNUAL REPORT
YEAR 1943

5. LABOR AND WAGES:
(Continued) a. Comments: (Continued)

This statement is amply supported by the fact that since the election and the signing of the contract, there has been no meeting between the Grievance Committee and the Management and no grievances - formal or otherwise.

There were two important changes in employment and earnings during 1943, the first of which was a decrease in the working schedule from 5-2/3 days per week (17 operating shifts) to 5-1/3 days per week (16 operating shifts), with most of the necessary cleanup and repair work being done on Saturday afternoon instead of Saturday night and Sunday. The second major change was a general increase in wages of 5½¢ per hour retroactive to July 13, 1942, which was announced on March 19, 1943. This had the effect of keeping the average monthly earnings of the company account employees almost stationary as compared with the previous year, although the average work month was 25 days in 1942 and 23 days in 1943. Payment of rate and one-half for work done in excess of eight hours per day or forty hours per week was continued, as were the provisions for holidays and double time - in accordance with the President's executive order No. 9240. The daily company account rate of $8.00, applicable to shaft sinking, was increased by 5½¢ per hour to $8.44. There was very little occasion to use this rate, since most of the company account work was done on the plats and levels with the standard company account rate of $6.92 applying. The set contract price for Main Level drifting, with six men on a crew, three shifts per day, was $11.00 per foot for untimbered rock drift and $13.00 per foot when timbering was necessary. The contract miners' earnings with these rates varied considerably from a low of $9.12 per day to a high of $14.52, exclusive of overtime. Earnings in excess of $14.00 per day were attained only twice during the year, once by each crew for a single two week period.

MATHER MINE
ANNUAL REPORT
YEAR 1943

5. LABOR AND WAGES:
(Continued)

b. Comparative Statement of Wages:

	1943	1942
Number of Shifts & Hours:	48 1 8-hr.	8 1 8-hr.
	5 2 8-hr.	53 2 8-hr.
	255 3 8-hr.	252 3 8-hr.
Equiv. to	274 1/3 3-8 hr.	290 3 8-hr.
Average No. of Men Working:		
Surface	48-1/4	44-3/4
Underground	59-1/2	39-1/2
Total	107-3/4	84-1/4
Average Wages per Day:		
Surface	7.28	6.71
Underground	9.81	11.37
Total	8.50	8.72
Wages per Mo. of 23 Days:		
Surface	167.44	167.75 (25 days)
Underground	225.63	284.25 "
Total	195.50	218.00 "
Total No. of Days:		
Surface	17,574-1/2	15,336
Underground	16,406	11,594-1/4
Total	33,980-1/2	26,930-1/4
Amount for Labor:		
Surface	128,098.26	102,957.42
Underground	160,997.52	131,896.23
Total	289,095.78	234,853.65

6. SURFACE:

a. Buildings:

With the exception of a number of additions to the clothes racks, benches, and locker bases in the drys to accommodate the increasing working force, very little work was done in the mine buildings during 1943. A small amount of maintenance work was necessary to keep the premises in first-class condition, and minor changes were made as indicated. The need of an adequate storage building became apparent as the activity in the shop wing increased, and plans and estimates will be submitted early in 1944 for such a building.

A large amount of work was done in the Headframe and on the permanent trestle east of the shaft. This included the laying of the permanent Fir decking, the installation of chute stoppers, cylinders, trolley rails, and heating devices, and the completion of the Larry Car repair shed. Most of this work had been completed by late Fall or early Winter. The only major new construction jobs were the building of a portion of the concrete timber tunnel west of the shaft about half its proposed length and the installation and erection of a new cooling pond system along the south wall of the Engine House.

MATHER MINE
ANNUAL REPORT
YEAR 1943

6. SURFACE:
(Continued)

b. Stockpiles:

The small amount of ore obtained in shaft sinking operations during 1942 was stocked by means of the tractor and wagon in a pile beyond the end of the south permanent stocking trestle. This ore was loaded out by means of the clam and shipped in order to permit the grading of a small stocking area south of the south trestle and north of the temporary track leading into the Engine House. Eventually, this track will be removed to permit the grading of the second large stocking area adjacent to the south trestle. The area thus prepared is planned for the stocking of any high sulphur ore produced prior to the shipping season in 1944. The grading of the main stocking ground east of the end of the north trestle was sufficiently completed to permit the stocking of any amount of Standard Grade Ore which may be produced this year. In both areas wood slabs were laid to mark the floor of the stocking ground and to guide the shovel operator when loading. At the close of the year there was no ore in either of these areas.

c. Landscaping, Roads, and Parking Area:

The major work of landscaping the premises with lawns, flowers, and shrubbery, was practically completed during 1942. Throughout the summer months of 1943, this work was continued to the point where the premises west of the main building had become a rather famous show place in the district. The main lawn in front of the office and along the west side of the dry building progressed beautifully, and the flowers and shrubs grew exceedingly well, in spite of the fact that this work had been done only the year before. Most of the new work during 1943 was done along the south side of the Engine House, where a rock retaining wall was constructed and the flower and shrubbery beds were enlarged. There was also a large retaining wall started along the south bank of the west pocket track, but this was still uncompleted at the end of the year. One large landscaping job remaining is the treatment of the area between the east and west wings of the main buildings, where the final course of action has not yet been decided.

A large portion of the work of grading the parking area south of the Engine House was completed, utilizing unsized underground rock as a base and crushed underground rock for the last foot or so below grade. This work will be continued, as well as the placing of a top dressing on the mine roads, after which it is planned to pave both the parking area and the roads with some type of a bituminous or asphalt dressing. This will serve to reduce the dust nuisance and maintenance costs.

MATHER MINE
ANNUAL REPORT
YEAR 1943

6. SURFACE:
(Continued)

c. Landscaping, Roads, and Parking Area: (Continued)
Nothing further has been done about a new road connecting the premises with the main highway to the north to replace the one cut off by the pocket tracks and west timber tunnel. The old road is still available to trucks delivering timber to the north side of the tunnel, and the need for a through connection for automobile traffic has not yet been acutely felt. It has been decided that nothing further be done, at least until after the war when the necessity for restrictions on the general public visiting the property will be lessened.

d. Tracks:
In May the L. S. & I. section crew graded and ballasted the mine track on either side of the Headframe, completing the track under the north pocket. The track under the south pocket was left uncompleted to permit the use of the tractor and wagon for hauling underground rock for grading purposes. Later in the year the same crew removed the temporary track which served the cement storage shed on the east side of the shaft. It was necessary to remove this track and the shed in order to properly accomplish the grading of the area east of the shop building and the stock pile grounds. The other spur track, which was designed for use between the two large stock piles, was left in place. At the end of the year there was still a small amount of track work to be done, including the completion of the timber yard track along the south side of the west timber yard, and the laying of the permanent loading tracks in the stocking area.

e. Timber Tunnel:
There was no extention of the lower timber tunnel, which was completed to a point 60' northeast of the shaft during 1942. Plans for 1944 call for a continuation of this project. A considerable portion of the work on the initial 350' of the upper or west timber tunnel had been completed during 1942, with the exception of the portion north of the shaft where considerable blasting was necessary in ledge rock. The pouring of the concrete in this area was completed in the Summer of 1943, after which the galvanized roof was installed and the side openings equipped with hinged doors. During several of the Summer months the tunnel was used extensively, due to the necessity of timbering portions of both Main Level drifts. During the latter months there was very little need for timber, since more favorable material had been encountered underground. At the end of the year a fairly adequate stock of all types and sizes of timber was on hand and framed, ready for use. Plans for 1944 include an extention of this tunnel to the west and the completion of the track for spotting cars.

MATHER MINE
ANNUAL REPORT
YEAR 1943

6. SURFACE:
(Continued)

f. Pipe Line:

The 18" surface discharge line connecting the property with the culvert under Second Street froze during February in the stretch across the swamp, where it was impractical to completely cover it. The freezing was due to a long spell of extremely cold weather and to the fact that the amount of drainage was slight, permitting the ice to build up. As a temporary expedient the pipe was broken short of the frozen area and the mine drainage permitted to seep into the swamp. After the Spring thaw the pipe was reconnected without any damage having occurred. The main pump, with a capacity of 350 gallons per minute, was in use by early Fall, and it is probable that the large, intermittent flow of comparatively warm water will keep the ice scoured out of the pipe and prevent further trouble.

7. UNDERGROUND:

a. Shaft Sinking:

The initial shaft sinking program was completed at a depth of 2352' on January 12th., after which a small skip pit sump was put down an additional 5' in the cage compartment. The excavation of the skip pit was then started with one crew and the opening of the plats on the 1600' and 1750' Levels was started with two others. The installation of the steel was completed by the placing of nine additional sets, including the one on the shaft floor at 2352'. The seven upper sets were concreted in the usual way with the set at 2345' left open on the east side for the cleanout drift. The floor set was reinforced by concrete west of the ladderway-skip divider to form a seal for the skip compartment and a base for the counterweight pipe. The skip compartments were then reinforced and braced to provide a storage space 20' high where skip spillage is accumulated. As a matter of record, the final figures for the shaft sinking operation have been tabulated, showing the small amount of work done during January 1943, the work during 1941 and 1942, and the totals.

		No. Days Worked	Footage	No. Cuts Blasted	No. Steel Sets Installed	No. Sets Concreted	Cu. Yds Concrete	Cu. Yds Hoisted	Advance 24-hr. Day
Prior to Ap.	1941	26	107	11	13	10	388	1724	
From April	1941	232	928	145	130	58	627	22368	
Year	1942	310	1285	251	184	158	1075	32854	
January	1943	10	32	6	9	9	64	1344	
Grand Total		578	2352	413	336	235	2154	58290	
								523 - 24-hr. days	4.5

In addition to the skip pit excavation at 2352, small level openings were made at 150' intervals from 1450 to 2200, except at 2050 where conditions were unsuitable.

MATHER MINE
ANNUAL REPORT
YEAR 1943

7. UNDERGROUND:
(Continued)

a. Shaft Sinking: (Continued)

After the installation of the running rails in both skip pit compartments to a depth of 2347', gauging by the engineering department showed a maximum variation of only one-quarter of an inch, which made it unnecessary to do any adjusting before running the skips through the shaft.

The completion of the concrete ventilation seal between the skip compartments and the ladder and cage compartments was delayed until warmer weather, and finally completed in April. The installation of main air lines and discharge column was completed during the summer, with only one major job remaining - the installation of the permanent cage runners, which is planned for the Summer of 1944.

b. Development:

The small amount of development work done on and above the two main levels will be discussed under 7-e. - Drifting and Raising.

c. Stoping:

There were no actual stoping operations during the year, the small amount of ore being obtained from the first crosscut on the 1750' Level.

d. Timbering:

In addition to timbering substantial portions of both plats, it was necessary to timber considerable distances on both levels in the main footwall drifts and crosscuts. Every crosscut turnout required timber, as did most of the car switching turnouts. In addition, the ventilation connection between the 1750 and the 1600' Levels was cribbed for the first twenty-five feet and timbered at the top due to bad ground. In all, the equivalent of 1220' of Main Level drift was timbered, exclusive of the plats but including drifts, turnouts, and crosscuts. The major portion of this footage (989') was on the 1750' Level with the remainder (231') on the 1600'. The average additional cost per foot for timbering on both levels was $6.43 per foot, including the additional excavation required, the placing of the timber by the drifting crews, and the framing on surface.

The table on the following page records the amount and sizes of timber used, the average cost including unloading and handling, and the total cost of the material for the year for all operations, including the shaft, plats, pockets, Main Drifts and Crosscuts, and raises.

MATHER MINE
ANNUAL REPORT
YEAR 1943

7. UNDERGROUND:
(Continued)

d. Timbering: (Continued)

Statement of Timber Used:

	LINEAL FEET	AVG. PRICE PER FOOT	AMOUNT 1943	
5'-4" Cribbing (Tamarack)	1,237'	.05929	73.34	
8" to 10" Stull Timber	1,764'	.0915	161.41	
10" to 12" "	2,529'	.133084	336.57	
12" to 14" "	1,845'	.177686	327.83	
14" to 16" "	135'	.22075	29.80	
Total	7,510'	.123695		928.95
		PER 100'		
7' Lagging (Cedar)	124,267'	1.08	1,342.08	
20' Tamarack Poles	1,320'	2.75	36.30	
9½' Tamarack Poles	44,595'	2.455	1,094.81	
Total	170,182	1.45326		2,473.19
Grand Total				$ 3,402.14

The total amounts used in the drifts and crosscuts on the Main Levels and the amounts per foot of timbered drift are listed below:-

Amount and Cost of Timber for 1220' of Timbered Drift:

	QUANTITY LINEAL FT.	AMOUNT	AMOUNT PER FT. TBRD. DRIFT	LINEAL FT. PER FOOT OF DRIFT
7' Lagging	87,302'	$942.86	.773	71.6
9½' Tam. Poles	31,114'	763.85	.626	25.5
Stull Timber	6,370'	811.36	.665	5.2
Total	124,786'	$2518.07	2.064	102.3

The above table accounts for most of the timber used during the year. The greater proportion of the remainder, totaling slightly more than $700.00, was used in supporting the two plats.

The actual cost of the material required for timbering an opening in no way reflects the total additional cost due to the necessity for timbering. Progress is always slower, which increases overhead cost, the amount of excavation is greater which increases drilling, blasting, and loading costs, and the timbered opening always requires maintenance. Due to these factors, every effort was made during the year to keep the Main Level drifts in ground sufficiently hard to stand without support, even though this required changing the course of the drifts a number of times.

MATHER MINE
ANNUAL REPORT
YEAR 1943

7. UNDERGROUND: (Continued)

e. Drifting and Raising

The combined total of all of the miscellaneous drifting and raising during the year, including the excavating of the plats, pockets, etc., the pumphouse and sump, and all other work is 8632'. The work on the plats and in the pumphouse, sump, pockets, trenches, and skip pit has been reduced to cubic yards of excavation for the purposes of this report and subtracted from the total footage of other drifting and raising, leaving a total of 5853' of full size Main Level drifting and crosscutting beyond the plats and 445' of combined raising and small drifting, a total of 6298'. In addition to this, the miscellaneous excavation accomplished totals 6377 cubic yards of rock in place, exclusive of the shaft sinking and the small sump in the skip pit. A division of this work by levels is shown in the following table.

Excavation Plats,
Pockets, Trenches, etc.:

	Excavation
1600' Level	2068 Cu. Yds.
1750' Level	2249 " "
Pumphouse & Sump (1750') Level	1703 " "
Plat 2050' Level	144 " "
Skip Pit 2350' Level	213 " "
	6377 " "

Main Level Drifting
And Crosscutting:

	Naked	Timbered	Total
1600' Level	2381'	231'	2612'
1750' Level	2252'	989'*	3241'
	4633'	1220'**	5853'

5853'

Small Drifting
And Raising:

	6 x 7' Drift	6' Dia. Naked Raise	5 x 10' Cribbed Raise
On 1600' Level	168'	-	-
Above 1750' Level	47'	205'***	25'
	215'	205	25'

445'

Grand Total 6298'

*64' in High Sulphur Ore
**Including 172' driven without Timber - Later Stripped and Timbered
***29' in High Sulphur Ore

In addition to the above, the total for the year includes the small amount of work in the shaft which consisted of 32' of full size shaft sinking and 5' the size of the cage compartment for a skip pit sump.

MATHER MINE
ANNUAL REPORT
YEAR 1943

7. UNDERGROUND: (Continued)

f. Explosives, Drilling and Blasting:

Generally speaking, the material encountered on the plats at the 1600, 1750, and 2050' Levels, while difficult to support, was not particularly easy to drill and blast. The jasper which was encountered on both of the upper levels was quite difficult to drill and required heavy charges to insure proper breaking. The blocky nature of the material and its tendency to come loose in large pieces made it necessary to support most of the openings, particularly when the width exceeded eight or nine feet. Shortly after leaving the plats, the Main Drifts on both levels entered footwall slate which, at times, was fairly hard and at other times was quite soft, often requiring support. Whenever possible, the drifts were turned out of the softer material and into material hard enough to stand without support.

Drilling was done with three and one-half inch drifters equipped with automatic feed and automatic backheads, some of which were purchased from the Ingersoll-Rand Company and some from the Cleveland Rock Drill Company. These machines, four of which were used in each heading, were mounted on Cleveland "Jumbo" Mine Rigs which were easily moved in and out of the headings. One and one-quarter inch round lug steel was used, and an average of twenty-eight to thirty holes was required for six to six and one-half foot cuts. Type 1 jackbits were used with this steel instead of the convential Type 2, since the ground was not particularly hard on bit gauge, and greater drilling speeds were attained by using the smaller bits. Normal bit usage per round varied from 85 to 100, and the average drilling time was approximately one hour and a half.

Blasting was done electrically, using 110 Volt AC current, with a special blasting switch designed at the mine and approved by the electrical department. This switch eliminates all known hazards connected with electrical detonation.

MATHER MINE
ANNUAL REPORT
YEAR 1943

7. UNDERGROUND:
(Continued)

f. Explosives, Drilling and Blasting: (Continued)
The following table shows all of the blasting supplies used during the year:

Statement of Explosives Used:

	Quantity	Average Price	Amount 1943	Amount 1942
Gelamite No. 1	3,750#	$11.50 CWT	431.25	-
60% Gelatin Extra	26,200	11.50	3,013.00	500.25
80% Gelatin Extra	103,195	13.9992	14,446.47	5,756.52
90% Gelatin Extra	600	16.50	99.00	3,646.50
Total Powder	133,745#	$13.450 CWT	$17,989.72	$ 9,903.27
Electric Blasting Caps	38,905	12.877 C	5,009.80	2,156.12
No. 6 Blasting Caps	1,328	1.2205	16.21	-
No. 14 Duplex Lead Wire	33,250'	17.7744 M	591.00	220.50
No. 14 Tinned Wire	-	-	-	107.80
No. 20 Connecting Wire	24#	55.00 CW	13.20	12.10
Tamp. Paper Shells	13,000	6.00 M	78.00	-
#1 Powder Bags	11	1.386 Ea.	15.25	5.40
#2 Powder Bags	12	3.45	41.40	-
Blasting Fuse	10,500'	5.143 M	54.00	-
Total Caps, Wire, Fuse, etc.			5,818.86	2,501.92
Grand Total Explosives and Blasting Supplies:			$23,808.58	$12,405.19

The two main operations on which powder was used were the excavation of the plats, pockets, and trenches on the 1600 and 1750' Levels and the Main Level drifting and crosscutting on those levels. The first of the following tables shows the amount of blasting supplies used on the plats, the pounds of powder per cubic yard, and the cost per cubic yard for blasting supplies. The second table shows the amount of explosives used in driving 5853' of Main Level drifts and crosscuts, the pounds of powder per foot, and the cost per foot for explosives.

Explosives Used in Excavating 4317 Cubic Yards of Rock - Plats, Pockets, and Trenches 1600 and 1750' Levels:

	Quantity	Amount	Pounds of Powder Per Cubic Yard	Cost Per Cubic Yard
60% Gelatine Extra	10,820#			
80% Gelatine Extra	6,968			
Total	17,788#	$2,219.81	4.12	.514
Misc. Blast. Supp.		836.68	-	.194
Grand Total		$3,056.49	4.12	.708

MATHER MINE
ANNUAL REPORT
YEAR 1943

7. UNDERGROUND:
(Continued)

f. Explosives, Drilling and Blasting: (Continued)

Explosives Used in Driving 5853' of Main Level Drifts and Cross-cuts 1600 and 1750' Levels:

	Quantity	Amount	Pounds of Powder Per Foot of Drift	Cost Per Foot
Gelamite #1	3,750#			
60% Gelatine Extra	13,605			
80% Gelatine Extra	86,858			
Total	104,213#	$14,155.52	17.8	2.42
Misc. Blast. Supp.		4,382.03	-	.75
Grand Total		$18,537.55	17.8	3.17

g. Loading and Tramming:
Loading during the initial stages of opening the two plats was accomplished by means of temporary scraper slides and small cars until the temporary loading pockets had been constructed on the east side of the shaft, after which the broken material from the trenches and plats was scraped directly into the skips. As soon as the trenches and measuring pockets had been completed and the plats sufficiently stripped, the new eight and one-half ton Conway Model 125 loading machines were put into use, one on each level. These machines loaded into ninety cubic foot lowhead side-dump cars with a hydraulic cylinder dump on the 1600' Level, and a Granby Type "Camel Back" dump on the 1750. The machines handled the loading very satisfactorily, and normally loaded the six-ton car in less than two minutes. The average six and one-half foot cut, including switching time, was loaded out in an hour to an hour and one-half, which was slightly less than the average drilling time with the four machine Cleveland "Jumbo" Mine Rig. The switching of empty cars to the loader at the face was accomplished by means of short turnouts, using a one rail switch. These turnouts were put in at intervals ranging from 250 to 400', an attempt being made to place them in ground which would stand without support. Tramming was done with two General Electric battery locomotives on each level. These machines, which have a nominal rated weight of four tons, in addition to the batteries which weigh two tons, have a top speed with full load of approximately four miles per hour. This was satisfactory throughout the year, although the need for higher speeds was being felt as the drifts progressed to greater distances from the shaft. The broken rock was dumped into the trenches and then scraped into measuring pockets, each of which holds a full skip. A few minor changes in the construction of the trenches and pockets are indicated for subsequent levels in order to facilitate the problem of cleaning them out when changing from rock to ore. In addition, it is planned to install two trenches on those levels where a large volume of production is expected.

7. UNDERGROUND:
(Continued)

g. Loading and Tramming: (Continued)

By the latter part of the year the Granby Type cars, some of which were purchased from the C. S. Card Iron Works of Denver, Colorado, and the Pressed Steel Car Company, Inc. of Pittsburgh, Pennsylvania, had proved much more satisfactory than the cars dumped by means of hydraulic cylinders. Plans were being made to convert the latter type to Granby Type by the installation of dump rollers and brackets and a few minor changes, the work being done by the Lake Shore Engineering Company of Marquette. A "Camel Back" dumper designed to fit these cars had also been purchased and was ready for installation.

h. Ventilation:

The shaft ventilation system, which has been thoroughly discussed in previous reports, was utilized very successfully to ventilate the headings on both levels. A 25 H.P. Sturtevant fan was used on each level, exhausting into the sealed skip compartment through 16" spiral welded pipe attached to the back of the drift. The suction end of this pipe was kept within one hundred feet of the heading at all times, and the fan location moved farther from the shaft when necessary. The fresh air entered the drifts from the downcast cage compartment, and all dust and smoke was exhausted through the pipe. Auxiliary ventilation was accomplished from the end of the pipe to the breast by means of smaller fans and collapsable ventube. Generally speaking, the smoke and dust from a blast was entirely removed within fifteen minutes without any of the smoke being seen in the Main Level drifts.

In the latter part of the year, a ventilation connection was completed between the two levels at a distance of approximately 1400' from the shaft and the ventilation system was changed somewhat to avoid the necessity of purchasing excessive amounts of the 16" pipe. The only difference in the latter months was the removal of a considerable portion of the pipe on the 1600' Level between the fan and the shaft and the building of an air door on the same level, sealing off the cage compartment. The fresh air was then forced down to the 1750, along the drift and up the raise to the 1600, where it was carried into the heading and exhausted at a point approximately 1000' from the shaft. For a short period of time, after each blast, this portion of the drift was filled with smoke, which was very rapidly exhausted into the skip compartment. Another slight change was made in replacing the auxiliary fans and ventube with Lamb Air-Movers purchased from the Mine Safety Appliance Company. These inexpensive pieces of equipment worked even more satisfactorily than the fans and are not subject to damage due to blasting.

MATHER MINE
ANNUAL REPORT
YEAR 1943

7. UNDERGROUND:
(Continued)

h. Ventilation: (Continued)

Frequent periodic inspections were made of ventilation conditions by the Safety Department, and at no time were dust concentrations in the working headings sufficiently heavy to cause any concern regarding the health of the workmen.

i. Detail of Underground Operations:
1600' Level:

The work of opening the plat, excavating the storage trench, and building the loading pockets required approximately four months from the middle of January, when shaft sinking was completed, to the middle of May when full scale drifting operations were started. Work was begun in a small drift driven north from the cage compartment, from which a second drift was driven through the permanent plat pillar to the east, and then south to the east side of the skip compartments where temporary loading pockets were installed. As soon as this had been completed, all of the excavated material was scraped into these pockets and loaded directly into the skips. The portion of the plat opposite the cage compartment was stripped to some 16' in width, for a distance of approximately 80' to permit the installation of double tracks for the handling of timber, supplies, and empty trucks. At a point 125' north of the shaft, a full size drift was driven to the west a distance of 25' to accommodate an underground lunch room. From this point the drift was continued to the northeast and joined with the Main Drift north of the storage trench. On the east side of the plat pillar, which was left approximately 12' wide, the plat was stripped to a total width of approximately 20' for a distance of 110' to permit the installation of the main line dumping track east of the trench and the dumping apparatus east of the track. The trench, which is approximately 87' long including both measuring pockets, was excavated to a depth of 8' below the plat floor, with a width of 7' and a capacity of 300 tons. A slight downgrade was carried in the trench to keep water and mud from running into the pockets, and the bottom and sides were lined with concrete and faced with 60# rails to prevent wear. The concreting of the trench and pockets required 113 cubic yards. Before full scale drifting operations were begun, a tail track was driven to the south of the trench a distance of 80' from the center of the shaft. In the early part of the year the loading pockets were filled by means of a comparatively small 20 H.P. scraper hoist and a 42" scraper, and the cars were dumped by means of a hydraulic cylinder. Later, the scraper hoist was replaced with a much larger piece of equipment rated at 25 H.P., and actually capable of 40 H.P., and the scraper was enlarged to 54" in width. The dumping arrangement was changed to utilize a Granby Type "Camel Back" dump which had proved very satisfactory on the 1750' Level.

MATHER MINE
ANNUAL REPORT
YEAR 1943

7. UNDERGROUND:
(Continued)

i. Detail of Underground Operations: (Continued)
1600' Level:

The Main Level Drift was continued due north some 80' beyond the plat and then turned slightly to the east for an additional 350', after which it was turned to a course of approximately N40°E, on which course it was continued for 700'. The first crosscut was turned off to the south some 1200' from the shaft and stopped after sufficient room had been attained for servicing the loader and switching cars. At a point approximately 100' beyond this crosscut the Main Drift was turned to its final course of N78°E toward the Cambria-Jackson Mine. By the end of the year 2612' of drift had been completed beyond the end of the plat, and the heading was 50' east of the 12,600 coordinate line. For the most part, drifting conditions were quite favorable, although it was necessary to timber 231' of drift, including the crosscut and switching turnouts. No drifting was done on this level from the twenty-ninth of June until the thirtieth of August, due to the amount of water encountered and the small capacity of the temporary pumping plant. During this two month period the crew was engaged in excavating the pumphouse on the 1750' Level.

The rate of progress on this level showed an almost constant improvement throughout the year, the daily advance for three shifts varying from 20' to a high for a two week period of 28.3. The advance for a single day frequently exceeded 35' and occasionally 40'.

The only connection between this level and the 1750' Level below was completed late in December by means of a small drift from the end of the crosscut to a single compartment ventilation raise above the lower level. This small drift connection was driven in such a way that it could be easily stripped and used as a mining crosscut in the event that mineable reserves are found to the south. During the last week of the year the drift was driven approximately 15' south of the raise to accommodate the small diamond drill machine. It is intended to explore the area immediately to the south to determine whether or not there are mineable reserves in this vicinity. A second exploratory project was also being started at the end of December. This was an exploration raise on the south side of the drift at the 13,200 west coordinate which will be put up to explore for concentration above the level. It is probable that ore will be found in both of these areas, and there is a very good possibility that at least a portion of it will be high grade ore of low sulphur content.

MATHER MINE
ANNUAL REPORT
YEAR 1943

7. UNDERGROUND:
(Continued)

i. Detail of Underground Operations: (Continued)
1750' Level:

The preparation of the plat, trench, and pockets on this level was so nearly identical to the work on the 1600' Level above that further description is unnecessary. The only difference was the drift to the west which was driven approximately 60' from the plat, instead of 25' for the purpose of excavating the sump. The Main Drift was turned off to the northeast at approximately the same point as the level above, and an attempt was made to turn off parallel to the footwall at a point 270' from the shaft. The material encountered in this attempt was very soft and heavy and required timbering immediately. After continuing along this course for a distance of 70', the heading was stopped and drifting resumed on the original course for an additional 110', after which it was turned off on course N81°E, approximately parallel to the footwall contact. This new location proved quite satisfactory for some distance, but it was soon necessary to resume timbering.

During July and August the crew from the level above was engaged in excavating the pumphouse and sump west of the plat on this level. The sump was driven due south from the previously mentioned east-west drift, leaving a pillar of 30' between it and the plat. The entrance to the pumphouse was driven west from the tail track drift at a point 35' south of the shaft, leaving a substantial pillar. The pumphouse proper was finally enlarged to 60' long by 20' wide by 22' high at the peak of the center arch, after considerable difficulty due to the very blocky nature of the ground which required support at all times, and constant supervision to avoid injury to the workmen. The final support of the pumphouse opening was accomplished by utilizing some of the steel left over from the shaft to form a gable-type enclosure sealed with reinforced concrete. The finished job was substantial and permanent and completely safe, although much more expensive than the original cost estimate.

The main sump, which was enlarged to a final width of 14', was connected with the pumphouse at a point 45' west of the shaft and excavated to a total capacity of approximately 140,000 gallons. The suction sump, which was excavated beneath the north portion of the pumphouse floor, is 30' long by 7' wide by 16' deep and is separated from the main sump by a concrete dam through which the flow is controlled by pipes and valves. The final operation of the mining crew was the driving of a small drift 25' beyond the west end of the pumphouse to permit the enlargement of the pumphouse for the installation of additional pumps, when and if they are necessary. The actual work of installing the pump and pouring the finished concrete floor was done by the underground mechanical crew after the contract miners had returned to the 1600' Level.

MATHER MINE
ANNUAL REPORT
YEAR 1943

7. UNDERGROUND:
(Continued)

i. Detail of Underground Operations: (Continued)
1750' Level: (Continued)

The first crosscut was turned off to the south in the same horizontal location as the one on the 1600' Level above and continued to a point 100' south of the drift, where it was stopped and the Main Drift continued. Two other crosscuts were turned off parallel to the first one at 250' centers. These latter two were driven a few feet beyond the "point of tangency" and stopped, pending information from diamond drilling in the first crosscut. Diamond drill Hole Number 1 encountered high sulphur ore at a distance of 73' from the collar and continued in it a distance of approximately 23', where the hole was stopped and the driving of the crosscut was resumed. As has been previously explained, a considerable quantity of ore was encountered in this crosscut; all of a very high sulphur content. A single compartment test raise was put up on the east side of this crosscut to a height of 29' above the level elevation through extremely high sulphur ore and stopped in seams of slate. No drilling was done from the second crosscut, and the single hole from the end of the third also disclosed a considerable amount of ore with a slightly lower sulphur content, but still too high for Standard Grade Mining. The ventilation raise was put up from the east side of the first crosscut at a point 35' south of the Main Drift - a distance of 35' full size, double cribbed. From this point it was turned off to the north and continued without cribbing to the elevation of the 1600' Level, where the connection was completed in December.

After the turning off of the third crosscut, the Main Drift was continued through very poor ground to the 13,070 coordinate, where it was turned off to the northeast in an attempt to find better material which would stand without timbering. This was successful and after drifting approximately 300', the course was again turned more or less parallel to the footwall contact. At the end of the year drifting and crosscutting on this level totaled 3241', of which 989' were supported with timber. The progress on this level was outstanding at times when the material required no timber and was very unsatisfactory at other times, due largely to the necessity for support. The average daily progress varied from a low of 16.9' to a high of 30.0 for a two week pay period, and the record progress for a single day was set at 45'. At the end of the year it was planned to continue the drift a few hundred feet to the east and the turnoff to the southeast where the area will be explored by diamond drilling before additional work is done. A second ventilation raise is planned at approximately 12,200 west to permit the handling of a satisfactory volume of air.

MATHER MINE
ANNUAL REPORT
YEAR 1943

7. UNDERGROUND:
(Continued)

i. Detail of Underground Operations: (Continued)
1750' Level: (Continued)

After the completion of the excavation and the major portion of the concreting, the work of erecting the pump was continued by the mechanical crew throughout the greater portion of the remainder of the year. The first of the two main pumps was finally put into use by the tenth of November, with a considerable amount of work remaining to complete the installation of the second. At the end of the year there also remained the work of completing the finished floor and concreting the wall at the east end.

2050' Level:

Due to the presence of high sulphur ore in the vicinity of the 1750' Level and the probability that the capacity of the 1600' Level would not be great enough to handle the desired production of ore, it was decided to proceed without delay in the opening of two additional levels - the 2050 and the 2200. The opening of a level at the 1900 elevation was deferred for the present, pending further investigation of the sulphur concentrations. Work on this new level was begun early in December in very unfavorable ground, which was expected from the history of the shaft sinking. The small drift was driven north of the cage compartment a distance of 45' and then turned to the east an additional 30' by the end of the year. Even this small size opening required support throughout almost its entire length, although there was indication that more favorable material would soon be encountered. The excavated material was first shoveled by hand into small cars, which were taken to the 1750' Level on the cage. After the drift was turned to the east, a small temporary scraper slide was put into use.

2350' Level:

The footwall contact on this elevation is estimated to be some 600' south of the shaft. In view of this fact, the necessary excavation for the skip pit cleanout drifts was planned on the south side of the shaft - to be later utilized as a portion of the level plat. The first drift was driven 30' south of the cage compartment and then west a distance of 18'. From this point connection was made to the north along the east side of the skip compartments. A scraper slide was erected in this latter drift to handle the spillage from the skips with small cars which are taken to the 1750' Level on the cage. During the initial operation of opening the plats on the levels above, the broken material was dropped to this elevation in the skip compartments and handled on the cage. The ground at this elevation was quite hard and required no support, since it is well back in the footwall.

MATHER MINE
ANNUAL REPORT
YEAR 1943

7. UNDERGROUND: (Continued)

i. Detail of Underground Operations: (Continued)

2350' Level: (Continued)

During the year the two operating levels were designated locally as the Second and the Third, and it was decided to designate all of the levels by number instead of by the depth below the collar as at present. For the purpose of relaying signals to the engine house, and for a number of other operating reasons, it is far better to speak of levels by number rather than elevation. In the future the levels will be known and reported as follows:-

1450' - First Level
1600' - Second "
1750' - Third "
1900' - Fourth "
2050' - Fifth "
2200' - Sixth "
2350' - Seventh "

8. COST OF OPENING, EQUIPPING, & DEVELOPING:

Master E & A NM-10, with its various subdivisions up to and including NM 29, is shown on the following pages with all of the expenditures to date. During the year a number of supplements were requested and authorized to take care of unforeseen expenditures in these items.

The original estimate, which was prepared in January 1941, anticipated a total expenditure slightly in excess of $2,600,000.00 to bring this property into an initial production stage, that is, a stage where one or more of the Main Level crosscuts would enter the ore body. This point was reached in September of 1943, with total expenditures to date of $2,561,016.45, in spite of two wage increases of approximately 17-1/2%, which were offset by stopping the shaft at 2352' instead of continuing to 2870'.

Shaft Sinking:

The total expenditure under NM-10-4, as shown on the following page, is $578,626.32, which represents the direct charges for sinking 2303' of shaft in rock. These direct charges amount to $251.25 per foot, a considerable increase over the figure reported for last year. The bulk of this was caused by the retroactive wage increase and the remainder by the completion of the shaft seal. The other two items chargeable to shaft sinking, NM-10-1 and 10-2, General Expense and Maintenance, are also increased as compared with last year, due to the increase in wages. These items amount to $45.99 and $3.66 per foot respectively, bringing the grand total to $300.90 per foot as compared with an original estimate of $248.60. In calculating these charges, only that portion of "General" and "Maintenance" chargeable to shaft sinking was used, and a credit was taken for the shaft steel which was not used. The ratio of labor to supplies changed from 53/47 to 54.5/45.5.

8. COST OF OPENING, EQUIPPING, AND DEVELOPING:

	ORIGINAL EST. OF PROJECT	SUB. E&A'S AUTHORIZED NO.	SUB. E&A'S AUTHORIZED AMOUNT	SUPPLEMENTAL E&A'S AUTHORIZED NO.	SUPPLEMENTAL E&A'S AUTHORIZED AMOUNT	TOTAL E&A'S AUTHORIZED	TOTAL TO DATE	UNEXPENDED BALANCE OF AMOUNT AUTHORIZED
1. GENERAL EXPENSES:								
Insurance							6,394.58	
Engineering-Mng.,Mech., & Elec.							17,446.42	
Geological							3,708.49	
Analysis							3,473.87	
Mine Office							29,722.47	
Central Office, etc.							27,282.30	
Superintendence							33,011.46	
Legal							910.28	
Personal Injury Expense							8,851.07	
Social Security Taxes							18,327.27	
Employees Vacation Pay							14,982.90	
Policing							12,827.27	
Adjust. of Supplies Inventory							197.09	
Total	97,000.00	NM-10-13	97,000.00	NM-10-13A	125,000.00	222,000.00	177,135.47	44,864.53
2. MAINTENANCE:								
Trucks and Tractor							6,812.39	
Buildings							1,133.36	
Shop Machinery							469.81	
Boilers, Heating							292.32	
Hoisting Machinery							6,243.09	
Compressors and Air Pipes							3,139.81	
Pumps							5,233.70	
Total	9,000.00	NM-10-14	9,000.00	NM-10-14A	31,000.00	40,000.00	23,324.48	16,675.52
3. SINKING IN SAND:								
Steel Sets and Lath		NM-10- 5	1,511.00	NM-10- 5A	72.35	1,438.65	1,438.65	-
Drainage Well		NM-10-11	1,896.00	-	-	1,896.00	1,896.00	-
Sinking		)					10,772.78)	
Timbering		)					1,226.98)	
Concreting - Includes Forms		)					2,449.37)	
Installing Steel Sets		)					609.20)	
Miscellaneous Expense:		)					)	
Compressors - Incl. Rental		NM-10-15)	11,593.00	NM-10-15A	4,709.44	16,302.44	260.78)	
Hoisting		)					402.23)	
Automotive Equip., Handling		)					)	
Sand, etc.		)					287.09)	
Dry House Expense		)					294.01)	
Total	15,000.00		15,000.00		4,637.09	19,637.09	19,637.09	-
4. SINKING IN ROCK:								
Steel Sets and Lath		NM-10- 5	141,683.00	NM-10- 5A	17,853.80	159,536.80	149,185.60	10,351.20
Sinking		)					233,951.70)	
Timbering		)					4,951.04)	
Concreting & Guniting		)					45,064.94)	
Installing Steel Sets		)					46,172.09)	
Miscellaneous Expense:								
Compressors - Incl. Rental		NM-10-16)	396,317.00	NM-10-16A	43,683.00	440,000.00	16,973.32)	10,559.28
Hoisting - " "		)					33,735.68)	
Pumping		)					8,999.41)	
Automotive Equipment, Handling		)					)	
Rock, etc.		)					17,822.06)	
Dry House Expense		)					14,162.74)	
Ventilation Seal		)					7,607.74)	
Total	538,000.00		538,000.00		61,536.80	599,536.80	578,626.32	20,910.48

Continued,

8. COST OF OPENING, EQUIPPING, AND DEVELOPING: #2
(Continued)

	ORIGINAL EST. OF PROJECT	SUB. E&A'S AUTHORIZED NO.	SUB. E&A'S AUTHORIZED AMOUNT	SUPPLEMENTAL E&A'S AUTHORIZED NO.	SUPPLEMENTAL E&A'S AUTHORIZED AMOUNT	TOTAL E&A'S AUTHORIZED	TOTAL TO DATE	UNEXPENDED BALANCE OF AMOUNT AUTHORIZED
5. DRIFTING TO ORE BODY:								
Equipment							42,325.85	
Drifting - 1600' Level							84,581.11	
Drifting - 1750' Level							104,208.89	
Timbering- 1600' Level							1,805.98	
Timbering- 1750' Level							6,094.16	
Total	240,000.00	NM-10-27	240,000.00	-	-	240,000.00	239,015.99	984.01
6. PLATS AND POCKETS:								
Cutting Out - 1450' Level							94.71	
" " - 1600' Level							31,998.03	
" " - 1750' Level							32,175.11	
" " - 1900' Level							117.78	
" " - 2200' Level							97.34	
" " - 2350' Level							3,943.21	
Timbering - 1750' Level							136.62	
Pockets & Mechanical Devices:								
1600' Level							7,810.93	
1750' Level							8,962.91	
1900' Level							2,576.72	
Total	66,000.00	NM-10-28	66,000.00	NM-10-28A	22,000.00	88,000.00	87,913.36	86.64
7. ABSORBED IN 3 AND 4:								
8. PREPARING SITE:								
Building Roads and Landscaping	5,000.00	NM-10-17	5,000.00	NM-10-17A	4,500.00	9,500.00	7,092.68	2,407.32
Move Two Houses	3,458.00	NM-10- 2	3,458.00	-	4,500.00	3,458.00	3,458.00	-
Total	8,458.00		8,458.00		-	12,958.00	10,550.68	2,407.32
9. TEMPORARY EQUIPMENT:								
Rotary Dump and Cars	)						1,038.56)	
Sinking Cage	)						2,234.01)	
Shaft Pumps	15,000.00)	NM-10-18	15,000.00	-		15,000.00	4,268.52)	1,550.18
Ventilating Fans	)						545.72)	
Miscellaneous	)						5,363.01)	
Truck & Tractor	18,575.00	NM-10- 1	18,575.00			18,575.00	18,289.42	285.58
Temporary Buildings	31,130.00	NM-10- 3	31,130.00			31,130.00	26,506.28	4,623.72
Initial Shop Equipment	5,700.00	NM-10- 4	5,700.00	NM-10- 4A	32.73	5,732.73	5,732.73	-
Total	70,405.00		70,405.00		32.73	70,437.73	63,978.25	6,459.48
10. PERMANENT CONSTRUCTION & EQUIP:								
Timber Tunnel and Tracks							17,040.49	
Diesel Crane							6,791.26	
Pump House and Sump							28,542.27	
Idler Sheave Stands							3,131.28	
Total	31,000.00	NM-10-20	31,000.00	NM-10-20A	27,000.00	58,000.00	55,505.30	2,494.70
11. PERMANENT BUILDINGS:								
Head Frame:								
Structure	154,957.00	NM-10- 7	154,957.60	NM-10- 7A	1,282.23	156,239.83	156,239.83	-
Foundations and Decking	)						17,407.17	
Heating and Wiring	10,000.00)	NM-10-21	10,000.00	NM-10-21A	13,605.74	23,605.74	6,198.57	-
Docks, Trestles and Pockets:								
Rock Trestle	29,789.00	NM-10- 7	29,789.00	-	-	29,789.00	29,789.00	-
Foundations	1,979.00	NM-10-21	1,979.00	NM-10-21A	2,154.06	4,133.06	4,133.06	-
Ore Trestle No. 1	30,000.00	NM-10-21	30,000.00	NM-10-21A	11,906.87	41,906.87	41,906.87	-
Foundations	3,000.00	NM-10-21	3,000.00	NM-10-21A	5,354.33	8,354.33	7,720.43	633.90
Main Buildings:								
Main Dry Wing								
Power House Wing	)	NM-10-10		NM-10-10-A				
Shop Wing	259,275.00)	and	268,937.00	and	11,063.00	280,000.00	279,768.02	231.98
Office Wing	)	NM-10-19		NM-10-19A				
Total	489,000.00		498,662.60		45,366.23	544,028.83	543,162.95	865.88

Continued,

8. COST OF OPENING, EQUIPPING, AND DEVELOPING: #3
(Continued)

	ORIGINAL EST. OF PROJECT	SUB. E&A'S AUTHORIZED NO.	SUB. E&A'S AUTHORIZED AMOUNT	SUPPLEMENTAL E&A'S AUTHORIZED NO.	SUPPLEMENTAL E&A'S AUTHORIZED AMOUNT	TOTAL E&A'S AUTHORIZED	TOTAL TO DATE	UNEXPENDED BALANCE OF AMOUNT AUTHORIZED
12. EQUIPMENT:								
Head Frame:								
Elevator for Head Frame		NM-10-12	4,658.00	NM-10-12A	195.00	4,853.00	4,853.00	
9-12 Ft. Sheaves and Erecting ...	)						23,473.15)	
No. 14 Crusher	)						11,594.38)	
Mechanical Devices	)						14,213.65)	
Power House:	)						)	
Foundations and Erecting	)	NM-10-22	164,706.00	NM-10-22A	60,294.00	225,000.00	32,899.01)	8,781.92
Main Switchboard & Power Cables .	)						73,790.45)	
Motor Generator Set	)						4,990.48)	
Skips and Cages	)						14,210.85)	
Bell Lines and Signals	)						6,615.78)	
Counterweight	)						16,978.55)	
Wire Ropes	)						17,451.78)	
Cage Hoist, Mechanical	)	NM-10- 6	143,000.00	-	-	143,000.00	54,000.00)	-
Skip Hoist, Mechanical	)						89,000.00)	
Overhead Traveling Crane		NM-10- 9	8,500.00	NM-10- 9A	394.94	8,894.94	8,894.94	-
Cage Hoist, Electrical	)	NM-10- 8	221,783.00			221,783.00	78,461.00)	
Skip Hoist, Electrical	)						143,322.00)	-
Total	542,647.00		542,647.00		60,883.94	603,530.94	594,749.02	8,781.92
Compressor Plant:								
Two Compressors							28,108.58	
Motor and Controls							15,881.62	
Foundations							3,532.34	
Air Lines in Shaft							11,537.41	
Erecting							3,086.22	
Cooling System							3,389.08	
Total	55,000.00	NM-10-23	55,000.00	NM-10-23A	13,000.00	68,000.00	65,535.25	2,464.75
Shop Equipment							22,345.40	
Office Equipment							3,723.89	
Change House Equipment							5,185.56	
Fire Equipment							1,297.92	
Total	60,000.00	NM-10-26	60,000.00	-	-	60,000.00	32,552.77	27,447.23
Top Tram:								
3 Larry Cars							35,999.92	
Wiring and Controls							2,774.41	
Total	40,000.00	NM-10-24	40,000.00	-	-	40,000.00	38,774.33	1,225.67
Electric Haulage:								
Locomotives							37,843.57	
Cars and Timber Trucks							32,283.19	
Haulage Sets							4,839.68	
Total	90,000.00	NM-10-29	90,000.00	-	-	90,000.00	74,966.44	15,033.56
Pumping Plant:								
Pumps							10,515.00	
Motor and Control							8,246.48	
Water Column							14,703.37	
Discharge Line							11,995.54	
Erecting							5,142.57	
Total	32,000.00	NM-10-25	32,000.00	NM-10-25A	23,000.00	55,000.00	50,602.96	4,397.04
TOTAL EQUIPMENT	819,647.00		819,647.00		96,883.94	916,530.94	857,180.77	59,350.17

Continued,

8. COST OF OPENING, EQUIPPING, AND DEVELOPING: #4
(Continued)

	ORIGINAL EST. OF PROJECT	SUB. E&A'S AUTHORIZED NO.	SUB. E&A'S AUTHORIZED AMOUNT	SUPPLEMENTAL E&A'S AUTHORIZED NO.	SUPPLEMENTAL E&A'S AUTHORIZED AMOUNT	TOTAL E&A'S AUTHORIZED	TOTAL TO DATE	UNEXPENDED BALANCE OF AMOUNT AUTHORIZED
SUMMARY:								
1. General Expenses	97,000.00		97,000.00		125,000.00	222,000.00	177,135.47	44,864.53
2. Maintenance	9,000.00		9,000.00		31,000.00	40,000.00	23,324.48	16,675.52
3. Sinking in Sand	15,000.00		15,000.00		4,637.09	19,637.09	19,637.09	-
4. Sinking in Rock	538,000.00		538,000.00		61,536.80	599,536.80	578,626.32	20,910.48
5. Drifting to Ore Body	240,000.00		240,000.00		-	240,000.00	239,015.99	984.01
6. Plats and Pockets	66,000.00		66,000.00		22,000.00	88,000.00	87,913.36	86.64
7. Absorbed in 3 and 4	-		-		-	-	-	-
8. Preparing Site	8,458.00		8,458.00		4,500.00	12,958.00	10,550.68	2,407.32
9. Temporary Equipment	70,405.00		70,405.00		32.73	70,437.73	63,978.25	6,459.48
10. Permanent Construction and Equipment	31,000.00		31,000.00		27,000.00	58,000.00	55,505.30	2,494.70
11. Permanent Buildings	489,000.00		498,662.60		45,366.23	544,028.83	543,162.95	865.88
12. Equipment	819,647.00		819,647.00		96,883.94	916,530.94	857,180.77	59,350.17
TOTAL	2,383,510.00		2,393,172.60		417,956.79	2,811,129.39	2,656,030.66	155,098.73
Add: 10% for Contingencies	238,353.00		-		-	-	-	-
GRAND TOTAL	2,621,863.00		2,393,172.60		417,956.79	2,811,129.39	2,656,030.66	155,098.73

MATHER MINE
ANNUAL REPORT
YEAR 1943

8. COST OF OPENING, EQUIPPING, & DEVELOPING: (Continued)

Drifting & Raising:

The cost of Main Level drifting and crosscutting on the 1600 and 1750' Levels and raising between these levels was charged to E & A NM-10-5 until the latter part of the year, after which charges were made to E & A NM-24 which was authorized for a continuation of this work. New equipment for these operations was charged into the E & A's as it was put into service.

In all, 5853' of Main Level drifts and crosscuts were driven on the two levels beyond the plats, of which 4633' were naked and 1220' were timbered. In calculating the cost per foot of this operation, no attempt has been made to include a proportion of NM-10-1 and 2. Further, the equipment charges have been kept separate, since only a small proportion of this item is chargeable to the footage accomplished during the year. A large proportion, however, of so-called overhead costs was charged directly into the E & A, as was all miscellaneous repair and maintenance work to any of the machinery and equipment actually used in the drift. These costs have been broken down as follows: 5853' at an average cost per foot of $34.97 in the case of the naked drifts. Timbering was necessary for 1220' of this total, for which an additional cost of $6.43 per foot was charged - bringing the total cost for a timbered drift to $41.40 per foot. This charge for timbering includes: The additional excavation required, the actual cost of preparing and placing the timber, and a considerable amount of work in the timber yard. The total for naked drifting of $34.97 has been broken down into $26.81 per foot actual direct charges, and $8.16 per foot for overhead items which were charged into the account. These figures compare with an original estimated cost of $20.00 per foot and a revised estimate of $30.00 per foot in subsequent authorizations.

Small drifts and raises and double compartment cribbed raises totaled 445', of which 25' were the double size. For the purposes of computing the cost per foot, the double compartment raising was taken at double the footage, bringing the total to 470' at $9.91 per foot, including a proportion of the overhead, but exclusive of equipment. On this basis the small amount of double-cribbed raising was done at a cost of $19.82 per foot. These costs compare with estimates of $15.00 and $25.00 per foot respectively.

MATHER MINE
ANNUAL REPORT
YEAR 1943

8. COST OF OPENING, EQUIPPING, & DEVELOPING: (Continued)

Additional Authorizations and Expenditures:

In addition to the Master E & A NM-10, with its various subdivisions and supplements, six new authorizations were approved and expenditures charged to five of them as follows:

E & A NM-19:

	AMOUNT AUTHORIZED	TOTAL TO DATE	AMOUNT UNEXPENDED
Drilling Machines & Accessories	7,700.00	6,673.33	1,026.67
Scrapers & Hoists	23,800.00	18,817.53	4,982.47
Utility Hoists	3,300.00	3,270.00	30.00
Elec. Equipment for above scrapers & Hoists	4,100.00	2,950.66	1,149.34
Ventilating Fans	1,600.00	1,084.29	515.71
Social Security Taxes	-	-	-
TOTAL	40,500.00	32,795.81	7,704.19
10% for Contingencies	4,050.00	-	4,050.00
GRAND TOTAL	$44,550.00	$32,795.81	$11,754.19

This E & A was estimated for the purpose of equipping the first ten mining contracts. The expenditures to date in this account include the purchase of miscellaneous mining equipment, very little of which has as yet been put into service.

MATHER MINE
ANNUAL REPORT
YEAR 1943

8. COST OF OPENING, EQUIPPING, & DEVELOPING: (Continued)

Additional Authorizations and Expenditures: (Continued)

E & A NM-21:

This authorization was approved for underground exploration, including the cost of a new portable air driven Bortz drill. During the year a total footage of 1624' was drilled with the following cost breakdown:

	AMOUNT AUTHORIZED	TOTAL TO DATE	COST PER FT.	
Equipment:	-	3,679.01	2.270	2.270
Drilling Costs:				
Labor	-	3,064.16	1.887	
Miscellaneous Supplies*....	-	139.73	.086	
Diamond Drill Rental	-	104.00	.064	
TOTAL		3,307.89	2.037	
Overhead Expense:				
Analysis	-	408.48	.252	
Geological	-	163.86	.101	
Dia. Drill Supt.	-	19.87	.012	
Soc. Security Taxes	-	39.85	.024	
TOTAL	-	632.06	.389	2.426
GRAND TOTAL	$25,000.00	$7,618.96		$4.696
UNEXPENDED BALANCE		$17,381.04		

*Exclusive of bits.

The actual operating cost per foot from the above table is $2.426, exclusive of equipment which is still in use and bits which were not charged into the operation. The cost of these bits is estimated at $1,000.00 or $.616 per foot, bringing the total operating cost to $3.042 per foot, exclusive of equipment.

MATHER MINE
ANNUAL REPORT
YEAR 1943

8. COST OF OPENING, EQUIPPING, & DEVELOPING: (Continued)

Additional Authorizations and Expenditures: (Continued)

E & A NM-23:

This E & A was authorized in the amount of $90,420.00 to cover the expense of equipping two levels for main line trolley haulage and included the purchase of a D.C. Converter. By the end of the year none of this money had been expended, although the bulk of the equipment was on order.

E & A NM-24:

	AMOUNT AUTHORIZED	TOTAL TO DATE	AMOUNT UNEXPENDED
Equipment:	-	3,990.83	
3000' Drifting on 1600' Level - at 30.00	90,000.00	7,594.46	
5000' Drifting on 1750' Level - at 30.00	150,000.00	8,312.26	
1000' Raising between levels at 15.00	15,000.00	4,730.27	
Social Security Taxes		446.41	
TOTAL	$255,000.00	$25,074.23	$229,925.77
10% for Contingencies	25,500.00	-	25,500.00
GRAND TOTAL	$280,500.00	$25,074.23	$255,425.77

This E & A was authorized to continue the development work on the 1600 and 1750' Levels during the first six months of 1944, at which time it may be possible to charge at least a portion of this type of work to Operating. The cost per foot under this E & A was lumped with NM-10-5 and discussed previously.

MATHER MINE
ANNUAL REPORT
YEAR 1943

8. COST OF OPENING, EQUIPPING, & DEVELOPING: (Continued)

Additional Authorizations and Expenditures: (Continued)

E & A NM-26:

	AMOUNT AUTHORIZED	TOTAL TO DATE	AMOUNT UNEXPENDED
Plats, pockets, and mechanical devices	60,000.00	4,895.48	55,104.52
Main Level drifting and cross-cutting	150,000.00	-	150,000.00
Ventilation and 2nd outlet raising and drifting to 1750' .	15,000.00	-	15,000.00
Double compartment cribbed development raising	25,000.00	-	25,000.00
TOTAL	250,000.00	4,895.48	245,104.52
10% for Contingencies	25,000.00	-	25,000.00
GRAND TOTAL	$275,000.00	$4,895.48	$270,104.52

E & A NM-27:

Plats, pockets, and mechanical devices	60,000.00	2,331.00	57,669.00
Main Level drifting and cross-cutting	60,000.00	-	60,000.00
Ventilation and 2nd outlet raising and drifting	6,000.00	-	6,000.00
Double compartment cribbed development raising	5,000.00	-	5,000.00
TOTAL	131,000.00	2,331.00	128,669.00
10% for Contingencies	13,100.00	-	13,100.00
GRAND TOTAL	$144,100.00	$2,331.00	$141,769.00

These authorizations were made to cover the cost of opening, equipping, and developing the 2050 and the 2200' Levels and, in so far as possible, were estimated to cover only that work which would be completed during 1944.

MATHER MINE
ANNUAL REPORT
YEAR 1943

9. EXPLORATIONS AND FUTURE EXPLORATIONS:

The surface exploration program was continued throughout the year outlining additional reserves in and adjacent to Section 2. Drilling in Section 2 was confined to a continuation and completion of Hole Number 52 from 1635' at the first of the year to 2383' on the 27th of March. The bulk of this drilling was in jasper, with a short run of lean ore, and the bottom in footwall slate.

Drilling to the east in Section 1 was resumed in Hole Number 136 at a depth of 2163' late in April. This hole was continued to a depth of 2918' by the 31st of July, where it was stopped after nearly two months which were spent in an unsuccessful attempt to recover a lost chip bit of comparatively low value. High grade ore was encountered at 2608' and continued to the bottom, a run in excess of 200'. With the exception of the last 13', which were rather high in sulphur, this long run of ore was extremely high grade, with sulphur content well within the limits of standard grade. It is probable that the bottom of the hole is quite near the footwall. Hole Number 137 was started on the 23rd of October and continued to a depth of 957' by the end of the year through the usual sand and gravel at surface to a depth of 59' where ledge was encountered. The remainder of the hole to the end of the year was in jasper and greenstone. Hole Number 138 was started on the 1st of December and by the end of the year had reached a depth of 175' through 27' of surface material and jasper. The major purposes of the drilling in this section are to outline additional reserves and correlate the information with that already obtained in Section 2 and to develope geological structure in the area.

Surface drilling to the west in Section 3 included a number of holes which will be very useful in correlating the information obtained in Sections 1 and 2.

In the underground exploration program six drill holes were completed and a seventh was ready to start at the end of the year, in addition to a single crosscut which encountered ore. As has been previously mentioned, all of the underground exploration work was on or below the 1750' Level, and all of the reserves encountered were too high in sulphur to warrant further exploration or mining at the time. The three inclined holes from the end of the first crosscut were drilled in an attempt to determine the extent of the sulphur concentration below the level.

MATHER MINE
ANNUAL REPORT
YEAR 1943

9. EXPLORATIONS AND FUTURE EXPLORATIONS: (Continued)

This did not succeed, since all three encountered rock after a comparatively short distance had been drilled. However, a considerable diminution of the sulphur content was noticed toward the bottom of the holes below the 1750' elevation. A resume' of all of the underground drilling for the year will be found on the following page.

A continued market for sulphurous ores during the coming year will make it possible to mine a considerable tonnage of material with a sulphur content of .300 or slightly higher. This condition will make it possible to do a considerable amount of exploring in the known high sulphur area and utilize the material in the high sulphur grade. The plans for exploring during the coming year include the following: a comparatively short drill hole south of the ventilation raise on the 1600' Level, a small size exploration drift south of the ventilation raise midway between the 1600 and 1750' Levels, a comparatively long horizontal hole southeast of the east end of the 1750' Level in the vicinity of Holes 49 and 39, and a similar hole more or less parallel to this one on the 1600' Level from the end of a crosscut which will be driven for that purpose. Hole Number 49 showed a seam of ore at approximately the 1600' elevation, with an indication of some sulphur which may or may not prove too high for Standard Grade ore, but will certainly be mineable, at least in limited quantities, as a sulphurous ore. Hole Number 39 shows low sulphur ore at the elevation of the 1600' Level, but considerably to the south. Whether or not these deposits occur at the 1750' elevation, and what their sulphur content is, will be determined by the proposed exploration program.

MATHER MINE EXPLORATION
YEAR 1943

NO.	LOCATION	DIRECTION	DIP	DATE STARTED	DATE FINISHED	MATERIAL	FINISHED DEPTH
1	#1 - Crosscut 1750'	S8°E	0°	8/24/43	8/28/43	0 - 72' Slate 72 - 96' High Sulphur Ore with seams of slate	96'
2	#1 - Crosscut 1750'	S8°E S10°E	0°	10/ 2/43	11/18/43	0 - 145' Slate, jasper, lean high sulphur ore 145 - 166' Dike 166 - 200' Jasper 200 - 263' High Sulphur Ore 263 - 400' Jasper with seams of High Sulphur Ore	400'
3	#3 - Crosscut 1750'	S8°E	0°	11/12/43	11/29/43	0 - 11' Slate 11 - 27' High Sulphur Ore 27 - 155' Slate, jasper, seams of lean High Sulphur Ore 155 - 321' Lean High Sulphur Ore and jasper	321'
4	#1 - Crosscut 1750'	S8°E	-50°	11/24/43	12/ 3/43	0 - 78' High Sulphur Ore 78 - 226' Ferruginous slate and dike	226'
5	#1 - Crosscut 1750'	S8°E	-58°	12/ 3/43	12/15/43	0 - 61' High Sulphur Ore 61 - 286' Slate	286'
6	#1 - Crosscut 1750'	S8°E	-32°	12/17/43	12/30/43	0 - 89' High Sulphur Ore 89 - 295' Slate, seams of High Sulphur Ore and dike	295'
7	#1 - Crosscut 1600'	Setting up at end of year.					

MATHER MINE
ANNUAL REPORT
YEAR 1943

10. TAXES:

The real property valuation, which is established early in the year, was increased rather arbitrarily on a basis of additional capital investment instead of ore reserves, since an accurate estimate of available tonnage was not possible. The net increase was $200,000, from $1,300,000 to $1,500,000.

The total taxes paid in the City of Ishpeming by the Negaunee Mine Company are shown below, including the pipe line parcel in Section 3:

		1943		1942	
		VALUATION	TAXES	VALUATION	TAXES
Section 2, 47-27, except the N 600' of NE of NE and the Rights of way	Real	$1,400,000.	$47,589.64	$1,125,000.	$38,974.84
	Personal	100,000.	3,399.26	175,000.	6,062.75
	Total	1,500,000.	50,988.90	1,300,000.	45,037.59
	Coll. Fee		509.89		450.38
	Total	1,500,000.	51,498.79	1,300,000.	45,487.97
Mather Mine Pipe Line, parcel in Section 3, 47-27		600.	20.60	600.	20.98
	Grand Total	$1,500,600.	$51,519.39	$1,300,600.	$45,508.95

11. ACCIDENTS AND PERSONAL INJURY:

The very creditable safety record established in 1942 was broken on January 29, when Donald B. Olson, age 29, a surface laborer, suffered a compound fracture of his lower left leg, a dislocated right hip joint, along with numerous complications. The injury was sustained when Olson was attempting to replace one of the rear tire chains on the mine truck. Meanwhile, the driver hooked the pull chain of the tractor to the front of the truck and started up - not knowing Olson was under the rear wheel. This accident is particularly regrettable since a little coordination between the truck driver and Olson could easily have prevented it.

As compared with rates of 0 in 1942, the frequency rate in 1943 was 3.68 per million man hours, and the severity rate 1.655 days lost per thousand man hours, due to this one accident. This compares with the average for all of the Company's operating properties of 20.30 and 3.986. During the year the property operated 33,980½ man days or 271,844 man hours. The number of days lost by Olson has been estimated at 450. At the end of the year he was recovering but was not yet able to work.

MATHER MINE
ANNUAL REPORT
YEAR 1943

12. NEW CON. AND PROPOSED NEW CON.:

Most of the construction work during the year has been discussed under previous headings. This included the completion of the headframe, grizzlies, pockets, etc., the permanent steel trestles for the handling of rock and the stocking of ore, the west timber tunnel, the mine tracks on surface, and the pumphouse, trenches, and pockets underground. The construction program for 1944 is not nearly as extensive. The proposed work on surface includes the continuation and completion of the west timber tunnel and timber yard and a portion of the lower or east timber tunnel, estimates for which are being prepared. The only other major construction job on surface anticipated for next year is a permanent storage building east of and adjacent to the shop wing. This building is planned with separate storage rooms for each of the shop departments and will be needed in the very near future, when large quantities of operating machinery and supplies will have to be stored somewhere other than in the shop building or the warehouse. The tentative plans, which already have been drawn up, call for a building approximately 120' in length by 26' in width, to be of the same construction as the other building so as to properly blend with the surroundings. A cost estimate and a request for an authorization will be submitted early in 1944.

Proposed construction underground during the coming year will, in the main, be limited to the trenches and pockets on the 2050 and 2200' Levels which have already been estimated and authorized in E & A's NM-26 and 27.

13. EQUIPMENT AND PROPOSED EQUIPMENT:

The original estimate and authorization for equipment under NM 10-12 of $819,647.00 has been increased by supplemental authorizations to $857,180.77, with an unexpended balance at the end of the year of slightly more than $59,000.00. The major portion of this unexpended balance is in shop equipment and electric haulage, most of which will be spent during the coming year. In addition to the original equipment authorization, NM-19 and 23 were authorized, the first for $44,550.00 for the purchase of mining equipment for the first ten ore producing contracts, and the second, $90,420.00, for the purchase of underground conversion equipment, trolley locomotives, additional cars, trolley lines, etc. Practically all of the equipment under NM-19 has been received and most of the equipment under NM-23 is now on order.

MATHER MINE
ANNUAL REPORT
YEAR 1943

13. EQUIPMENT AND PROPOSED EQUIPMENT: (Continued)

During 1944 it will be necessary to purchase additional equipment for more mining contracts, additional electrical equipment for the disposition of power to these contracts, and a considerable amount of miscellaneous equipment such as chunk breakers, stopers, fans, etc. Estimates of the cost of the above items will be prepared and submitted during the year.

Among the larger pieces of equipment received and put into service were three 12-ton capacity electric top tram cars, two Conway underground loaders, thirty underground cars, two "Camel Back" car dumpers, four General Electric 4-ton battery haulage locomotives, one small battery locomotive for the timber tunnel, a number of miscellaneous underground hoists (both air and electric), and a number of drilling machines of several sizes and makes. The top tram cars, which were manufactured by the Lake Shore Engineering Company of Marquette, developed a number of mechanical difficulties, mainly with the hydraulic controls and brakes. After considerable experimenting, the parts causing the difficulty were redesigned, and the necessary changes were being made by the end of the year. There is little question that the cars will be entirely satisfactory as a result of these changes.

The Conway loaders proved to be the fastest pieces of loading equipment ever put into use in this mining range, as evidenced by drifting speeds attained underground. Unfortunately, the machines were not nearly rugged enough, and numerous delays occurred due to mechanical failures and breakdowns. After considerable study, in which the Goodman Manufacturing Company cooperated in every respect, a number of weak parts in these machines were redesigned, and the delivery of the third loader will be delayed to permit these changes to be made. By the latter part of the year a decision had been reached to try out the Model 40 Eimco loader which is similar in action but much more ruggedly built. It is probable that this new loader will cause fewer delays due to mechanical failure.

The underground cars have been discussed at some length under previous headings and at the end of the year were working satisfactorily.

The battery haulage locomotives were entirely satisfactory for the driving of the drifts, but some doubt has been raised concerning their ability to satisfactorily handle crosscut haulage in ore, due to several construction features. After a lengthy and exhaustive study, it was decided to purchase three new trolley locomotives from Westinghouse, since all of these undesirable features had been eliminated by that company. The purchase of two additional battery locomotives, already authorized under E & A NM 10-12, has been deferred until further study can be made and new proposals submitted.

MATHER MINE
ANNUAL REPORT
YEAR 1943

14. MAINTENANCE & REPAIRS:

The Maintenance and Repair Account, as shown in a previous paragraph under NM-10, was originally authorized for $9,000.00 and subsequently increased to $40,000.00 to cover the estimated expense up to the production stage. With the exception of the items listed below, all other maintenance and repair expense was charged directly to the operation and is reflected in the cost per foot.

Several of the following items were negigible, but others were extremely high as compared with the previous year. The Truck and Tractor, both of which were purchased prior to the beginning of shaft sinking, required complete overhauling due to normal and expected wear. Both of these jobs were successfully accomplished and the equipment put in first-class condition. The large maintenance charge against Hoisting Machinery was the result of the burned out main bearing in the skip hoist motor generator set, which was repaired at the General Electric Shop in Milwaukee. The maintenance charge for Compressors and Airlines was also extremely high and was occasioned by a cracked low pressure cylinder in one of the comparatively new Ingersoll-Rand compressors. This cylinder was sufficiently damaged to require replacement. Pump maintenance was practically the same as for the previous year. The following table shows Maintenance Expense for the Year 1943 and a comparison with the previous year:

	1943	1942
Truck & Tractor	$ 5566.23	$ 1246.16
Buildings	484.34	304.80
Shop Machinery	25.33	303.55
Boilers, Heating	132.79	-
Hoisting Machinery	4750.30	664.84
Compressors & Air Lines	2119.90	22.71
Pumps	2093.01	1964.91
Total Maintenance	$15171.90	$ 4506.97

The maintenance charges on the underground loaders, drill machines, cars, and car dumpers were charged directly into the E & A's for the several operations. In addition, considerable maintenance work was done on surface and charged directly to "Handling Rock" which in turn was pro rated against the underground operations.

15. POWER:

The consumption of electric power increased approximately 85% as compared with the previous year, from 1,510,830 to 2,785,000. This was due entirely to a large increase in the amount of underground rock hoisted from the two Main Level drifting operations and the excavation of the pumphouse and sump. The operation was continued using both the cage and skip hoists with the single large motor generator set.

MATHER MINE
ANNUAL REPORT
YEAR 1943

15. POWER:
(Continued)

This arrangement continues to work satisfactorily, since extreme hoisting speeds are not yet necessary. Starting in October, the operation of the large main pump also added to the total consumption of current, and the 15 minute demand increased from 325 K.W. to an average of 600. In spite of this large increase in average maximum demand, the factor was improved and the average price per K.W. hour decreased from .0155 to .0142. The following table shows the consumption and rates and a comparison with the previous year:

	CONSUMPTION K.W. HOURS	AVERAGE MAX. DEMAND	AVERAGE DEMAND FACTOR	COST OF CURRENT	AVERAGE PRICE PER K.W. HOUR
1943 -	2,785,000	600 K.W.	48%	$39,725.80	$.0142
1942 -	1,510,830	325 K.W.	47%	23,448.14	.0155

16. WATER SUPPLY:

The consumption of water furnished by the City of Ishpeming was practically double that for the previous year, due to a larger number of men using the shower rooms and the necessity for using greater quantities for underground drilling. This continued until freezing weather made it impossible to maintain a water line in the shaft. By December arrangements were made underground which obviated the necessity for supplementing the supply with city water. The table below lists the total gallons, cost, and the cost per thousand gallons for the Years 1943 and 1942:

	CONSUMPTION	COST	COST PER THOUSAND GAL.
1943 -	4,868,000	$446.64	$ .092
1942 -	2,487,000	231.36	.093

18. NATIONALITY OF EMPLOYEES:

	American Born	Per Cent	Foreign Born	Per Cent	Total	Per Cent
American	27	18.6%	-	-	27	18.6%
English	11	7.5	4	2.8%	15	10.3
Finnish	45	31.0	10	6.9	55	37.9
Canadian	4	2.8	1	.7	5	3.5
Swedish	13	8.8	3	2.2	16	11.0
Norwegian	9	6.2	-	-	9	6.2
German	2	1.4	1	.7	3	2.1
Irish	4	2.8	-	-	4	2.8
Danish	1	.7	-	-	1	.7
Italian	8	5.5	1	.7	9	6.2
French	1	.7	-	-	1	.7
Total	125	86.0%	20	14.0%	145	100.0%

MORRIS MINE

ANNUAL REPORT

YEAR 1943

1. GENERAL

The Morris Mine operated on a 2 shift, 6 day per week schedule throughout the year, establishing new high records for production and shipments in the eleven year interval since the Inland Steel Company acquired the lease. Word was received, however, that starting January 1, 1944, the working schedule was to be reduced to five days or forty hours per week. The number of men employed varied slightly, ranging from about 230 at the beginning of the year to 220 at the end.

There were no major changes or additions to the surface plant. Pumping continued from the surface wells and caves, and contrary to the trend of the past two years, there was an increase in the quantity of underground water. Development and mining progressed on and above the 8th and 9th Levels, with development on the latter improving the standard ore reserve position over that of last year.

A larger proportion of the ore hoisted resulted from the sub-level stope method of mining, and this in turn allowed an increase in the average daily product. The percentage of the product from Cleveland-Cliffs fee lands was also above that of 1942.

2. PRODUCTION SHIPMENTS & INVENTORIES

a. Production

Grade	Tons	Percent of Total
Morris Standard	328,963	75.1
Morris Silicious	108,890	24.9
Total	437,853	100.0

The total production came from leased and fee lands in the following proportions:

	Leased Lands	Fee Lands	Total Tons
Morris Standard	269,579	59,384	328,963
Morris Silicious	80,629	28,261	108,890
Total	350,208	87,645	437,853
Percent of Total	80.0%	20.0%	

These percentage figures compare with 84.6% and 15.4% respectively last year. The maximum proportion of annual tonnage from fee lands

MORRIS MINE
ANNUAL REPORT
YEAR 1943

2. PRODUCTION, SHIPMENTS & INVENTORIES (Cont.)

a. Production (Cont.)

was 48.1% in 1936, and the minimum 11.4% in 1941. A summary of the total production since the Inland Steel Company acquired the Morris Mine lease starting with 1933, or over a period of 11 years, is listed below:

	Tons	Percent
Lease ore product 1933-1943	2,506,317	74.3%
Fee ore product 1933-1943	866,574	25.7%
Total	3,372,891	100.0%

b. Shipments

The total tonnage shipped surpassed the former high established in 1940 and reached a figure of 442,199 tons. This was divided between pocket and stockpile as follows:

Grade	Pocket Tons	Stockpile Tons	Total Tons
Morris Standard	179,135	137,670	316,805
Morris Silicious	36,006	89,378	125,394
Total	215,141	227,048	442,199

A table showing the shipments from the mine for the past five years follows:

Year	Standard Ore	Silicious Ore	Total Tons
1943	316,805	125,394	442,199
1942	307,101	89,670	396,771
1941	270,211	64,052	334,263
1940	314,407	112,851	427,258
1939	332,987	57,256	390,243

Summary of Shipments

	Tons
Standard ore shipped 1933-1943	2,583,540
Silicious ore shipped 1933-1943	738,023
Total	3,321,563

c. Ore in Stock

The stockpile balance was within 5,000 tons of the amount last year, and is listed as of December 31st, 1943:

Grade	Tons
Morris Standard	38,128
Morris Silicious	13,201
Total	51,329

MORRIS MINE
ANNUAL REPORT
YEAR 1943

2. PRODUCTION
SHIPMENTS &
INVENTORIES (Cont.)

e. Production by Months

Month	Days	Morris Standard	Morris Silicious	Total Tons	Tons per Man Per Day
January	25	25,141	6,500	31,641	5.46
February	24	22,861	9,616	32,477	5.93
March	27	32,325	10,876	43,201	6.99
April	26	27,163	9,021	36,184	6.10
May	26	26,905	8,360	35,265	5.90
June	26	27,595	10,564	38,159	6.55
July	26	34,521	5,882	40,403	6.82
August	26	29,306	7,656	36,962	6.43
September	24	27,579	7,502	35,081	6.71
October	26	28,035	9,377	37,412	6.60
November	25	23,113	12,116	35,229	6.46
December	25	24,419	11,420	35,839	6.52
Total	306	328,963	108,890	437,853	6.37

The increased proportion of the product from sub level stoping operations in 1943 was reflected by the larger average daily product and tons per man per day as shown in the following comparison:

Year	Average Daily Product	Tons Per Man Per Day	Average No. Men Employed
1942	1,387	6.22	222
1943	1,428	6.37	224

f. Delays

There were no production or operating delays of any extent in 1943.

3. ANALYSIS

Shipments

The combined analysis of ores sampled and analyzed by the Inland Steel Company for 1943 follows:

	Natural Analysis					
	Iron	Phos.	Silica	Mang.	Alum.	Moist.
Morris Standard	52.234	.068	7.75	.45	2.50	11.72
Morris Silicious	46.105	.061	16.72	.33	3.10	10.66

MORRIS MINE
ANNUAL REPORT
YEAR 1943

3. ANALYSIS (Cont.)

Analysis of Ore in Stock Dec.31,1943

	Tons	Average Natural Analysis Iron	Phos.	Sil.	Mang.	Moist.
Morris Standard	38,128	51.82	.069	7.79	.44	11.75
Morris Silicious	13,201	45.78	.070	16.28	.33	10.70

Analysis of Ore Reserves

	Tons	Expected Natural Analysis Iron	Phos.	Sil.	Mang.	Alum.	Sul.	Moist
Morris Standard	2,926,987	51.98	.076	8170	.44	2.50	.013	11.50
Morris Hi-Sul.	144,608	52.15	.092	7.25	.40	2.26	.400	10.50

4. ESTIMATE OF ORE RESERVES

The estimated total ore reserve,using a factor of 12 cu. ft. per ton, and after allowing deductions for rock and loss in mining, stood at 3,071,595 tons on December 31, 1943. This compares with a total of 2,997,594 tons for the previous year. The actual gain, however, amounted to 511,854 tons when 1943 production is considered. The estimate includes 144,608 tons of high sulphur ore on Chase Lease #24, leaving a net total of 2,926,987 tons of Morris Standard ore as of December 31, 1944.

The following table shows a summary of the estimate by leases with the changes that have occurred during the year:

Description	Estimate Dec.31,1942	1943 Product Standard	Silica	Est. After Deduct.Product	Actual Est.Dec. 31,1943	Increase over 1942 Est.
Chase Lease #9	1,791,867	178,976	48,557	1,564,334	1,884,682	320,348
Chase Lease #24	427,732	82,840	30,097	314,795	409,077	94,282
Hi-Sul. Chase Lease #24	95,777	7,771	2,015	85,991	144,608	58,617
Chase Lease #25	33,273	-	-	33,273	33,273	-
Chase Lease #26	26,140	-	-	26,140	26,140	-
Total Lease	2,374,789	269,587	80,669	2,024,533	2,497,780	473,247
C.C.I.Lands	622,805	59,376	28,221	535,208	573,815	38,607
Total	2,997,594	328,963	108,890	2,559,741	3,071,595	511,854

MORRIS MINE
ANNUAL REPORT
YEAR 1943

5. LABOR & WAGES

Inland, in company with all other operators on the Marquette Range, experienced difficulty in maintaining a full working crew because of enlistments, the draft, and migration to defense plant areas. The latter occurred to a lesser extent than the other causes, although a wage increase retroactive to July 12th was granted by the WLB, bringing the base rate up to 78¢ per hour. The working schedule of 48 hours per week also allowed considerable overtime, but in spite of all this the labor shortage was prevalent to the extent that in some cases development work was curtailed to a single shift basis in order to maintain production on the two shift schedule.

The total wages and average earnings of employees under the above conditions set new peaks in 1943.

6. SURFACE

Office and Shops

Improvements to the surface plant included a new smokestack for the central heating plant, and additional concrete sidewalks and steps between the office and dry buildings.

Deep Well Pumps and Test Holes

Surface pumping continued from deep wells 1, 2, 3A, 4, 5, 6 and 8. Two small pumps also operated intermittently in the two caves. The pump was removed from well No. 7 when this hole became practically dry, and a new well completed at No. 9 by the Layne Northwest Company was awaiting delivery of a pump at the end of the year. The total quantity of water handled, the average pumping rate and the cost are shown in the following comparative table:

	1942	1943
Average surface pumping rate	2267.6 gpm	2242.4 gpm.
Gross tons water pumped	4,432,192	4,390,989
Capital Expenditures	$ 9,555.62	$ 17,689.79
Operating Cost	19,392.00	20,134.00
Total Cost	$28,947.60	$ 37,823.79

The detail showing the pumping rate at the various wells by months is as follows:

MORRIS MINE
ANNUAL REPORT
YEAR 1943

6. SURFACE(Cont.)

Deep Well Pumps & Test Holes Cont.

	Jan.	Feb.	March	April	May	June
Pump #1	300	220	220	270	220	240
#2	90	75	70	57	75	-
#3A	1,120	880	1,120	780	700	700
#4	40	40	40	25	60	60
#5	345	300	330	330	320	390
#6	127	124	116	70	60	124
#7	12	-	-	-	-	-
#8	495	470	460	460	472	472
Cave #1	-	--	-	-	20	10
Cave #2	-	-	-	-	40	Caved
	2,529	2,109	2,356	1,992	1,967	1,996

	July	Aug.	Sept.	Oct.	Nov.	Dec.
Pump #1	200	300	290	270	270	270
#2	108	108	-	111	109	111
#3A	700	780	860	1,020	960	1,090
#4	60	60	-	-	40	-
#5	430	410	390	440	420	395
#6	100	100	100	100	100	100
#7	-	-	-	-	-	-
#8	472	Repair.	472	472	472	472
#9	-	-	-	320	-	-
Cave #1	10	10	15	15	15	-
Cave #2	40	35	30	25	25	-
	2,120	1,803	2,157	2,757	2,411	2,438

The deep well pumping was effective in lowering the average ground water level an additional 2'-6-1/8" in 1943. The average drop since pumping started in 1937 now amounts to 49'-8-3/8" as measured in the test holes in the sand and gravel above the rock ledge. No new test holes were put down in 1943, and the following tabulation records the changes in water level at each hole during the year.

MORRIS MINE
ANNUAL REPORT
YEAR 1943

6. SURFACE (Cont.)

Deep Well Pumps & Test Holes (Cont.)

Test Hole	SEA LEVEL ELEVATION Jan.1, 1943	Dec.31 1943	Ft.Lowered in 1943	Depth Remaining to Ledge
501	1453.8	1431.4	22.4	34.5
503	1434.6	1444.6	-10.0	146.6
504	1438.3	1439.4	- 1.1	89.0
505	1458.9	1454.6	4.3	89.8
506	1447.4	1443.9	3.5	38.2
507	Dry	Dry	-	-
508	1415.4	1415.7	- 0.3	63.9
509	1417.3	1421.0	- 3.7	117.8
510	1446.4	1449.9	- 3.5	95.8
511	1445.7	1445.0	0.7	129.5
512	1430.2	1447.1	-16.9	125.7
513	1465.0	1468.0	- 3.0	143.8
514	1454.9	1453.5	1.4	102.4
515	1466.2	1468.4	- 2.2	111.7
516	1472.8	1473.0	- 0.2	21.8
517	1445.3	1446.3	- 1.0	91.7
518	1400.5	1399.3	1.2	75.9
519	1406.8	1405.7	1.1	93.7
520	Dry			
521	Dry			
522	1356.9	1355.9	1.0	7.9
523	Dry			- 4.7
524	1468.3	1453.2	15.1	108.1
526	1415.8	1415.7	0.1	96.1
527	1432.4	1434.2	- 1.8	73.6
528	1441.4	1445.2	- 3.8	103.9

7. UNDERGROUND

a. Pumping

The water entering the mine in the years 1941 and 1942 showed a gradual decline from the high point of 1157 g.p.m. average reached in 1940. This trend was reversed in 1943 when the average quantity pumped increased from 844.1 to 931.2. This increase occurred on the 4th and 9th Levels, the former due probably to extension cracks in the ledge over the southeast portion of the mining area tapping additional surface water, and the latter to extended development and mining at this lower elevation. A review of the gallons per minute on the various levels by months through 1943 follows:

MORRIS MINE
ANNUAL REPORT
YEAR 1943

7. UNDERGROUND (Cont.)

a. Pumping (Cont.)

	4th Level	6th Level	7th Level	8th Level	9th Level	TOTAL
January	97.5	37.1	254.0	284.0	184.5	857.1
February	138.5	36.6	234.7	282.7	180.1	872.6
Macch	138.5	36.6	223.8	254.7	215.8	869.1
April	127.4	37.6	230.3	255.1	195.9	846.3
May	114.5	41.0	243.5	282.3	298.6	979.9
June	126.4	46.7	244.1	286.0	259.9	963.1
July	125.6	48.8	254.3	309.0	217.0	954.7
August	128.0	53.7	245.0	331.2	229.3	987.2
September	130.0	49.6	233.5	327.0	232.0	972.1
October	139.6	48.4	230.3	317.4	227.9	963.6
November	141.2	44.7	228.0	343.7	231.4	989.0
December	132.0	42.0	222.4	311.9	215.4	923.7
Yearly average						931.2

The comparison with the average quantities of the preceding five years follows:

	G.P.M. Average
Year 1943	931.2
1942	844.1
1941	896.4
1940	1157.0
1939	784.3
1938	581.2

The operating expense for underground pumping amounted to $58,521.00, and this added to the surface cost, resulted in a total figure of $96,344.79 for the year. The combined surface and underground operating costs amounted to 18¢ per ton hoisted, and the total pumping showed a ratio of 14.2 tons of water for each ton of ore produced.

The U. S. Bureau of Mines Plant Protection investigating engineers complimented Inland operating officials on the size and arrangement of the underground pumping plant, the type and placement of the protective underground concrete dams, and the two level second outlet connections to the Lloyd Mine. Mr. Stampe, one of the inspectors, was outspoken in his praise of the way the water problem had been handled.

MORRIS MINE
ANNUAL REPORT
YEAR 1943

7. UNDERGROUND (Cont.)

b. Development

An average of four or five contracts continued development work throughout the year. This consisted of additional drifting and raising on and above the 8th and 9th Levels. Much of it was in connection with sub level stoping operations, four of which were underway at various times on Chase Lease #24, and the fifth on the fee lands to the east.

Development on the 8th Level was concentrated at the east end where the crosscut to develop the ore located in drill hole #8 was finished in January, immediately east of the 400 coordinate line. A second cross-cut was then driven off on the 600 line but this work and exploration drifts on the -110' and -70' sub levels was disappointing in that no appreciable height or extent of ore was located above the 8th Level.

Development on the 9th Level to enter the ore mentioned above, was started in August. The first cross-cut southwest of the shaft was turned off on the 1200' line and extended a distance of some 400' to the south. This crosscut located several runs of ore, and at the end of the year, drifting had been started to the east in order to develop the full length of the deposit.

The most important ore disclosure in 1943 was encountered in the second 9th Level crosscut, which was started in October and which by the end of the year had cut 150' of ore. Development of this second crosscut was done by the mining contract taken from #11 stope when the sulphur content became too high to mix with the standard Morris grade.

A scraper transfer drift and branch raises to the -140' sub level were opened in order to mine the narrow ore body remaining between the two south dikes at the 8th Level elevation and below. This work was underway during most of the year by #20 contract.

Considerable small raises and drift development, in addition to full size openings described above, were necessary in advance of sub level stoping operations. A larger percentage of the product resulted from stoping in 1943, and the development in connection with this mining was therefore more extensive than for some years past.

c. Stoping

Mining operations continued on Chase Lease #24, Chase Lease #9 and the fee lands to the south and east. The vertical extent reached from the 120' sub on down to the -170' sub or in other words 30 feet above the 7th Level to 160 feet above the 9th. The mine product, averaging

MORRIS MINE
ANNUAL REPORT
YEAR 1943

7. UNDERGROUND (Cont.)

c. Stoping (Cont.)

nearly 37,000 tons per month, resulted from an average of 17 or 18 mining contracts and during most of the year four of these were sub level stoping.

Four of the five stopes that were worked were at the west end of the property on Chase Lease #24 and the fifth on fee land to the east. The center of the top slicing operations in the main deposit moved on down from the -130' sub to the -150'. The latter is 180' above the 9th Level so that at the present rate, several years mining is still available above the 9th Level. A detailed description of the mining operations follows:

Chase Lease #24

The three main stopes that were worked at the west end of the deposit were those of Nos. 4, 21 and 9 contracts. No. 4 contract completed a transfer drift on the 10' sub at the west end of #75 deposit and extended small raise development in ore a distance of 100' above. Stoping operations were carried on east and west of the 3000 coordinate line and reached a maximum width on the 50' sub of 90'. Mining will extend well into 1944 in this area with present development showing an extension of at least 70' to the west.

The second stope on #24 lease was mined by No. 21 contract east and west of the 2800 coordinate line. The transfer for this stope was on the 0' sub and mining reached a height of 120' above. Stoping was completed in October and during November and December No. 21 contract resumed slicing operations under the stope on the 50' sub.

The main productive area in 1943 was sub level stoping operation of No. 9 contract, extending from the -190' to the -30' subs in the southwest portion of #33 deposit near the corner formed by Leases #9, #24 and the fee lands. The vertical extent of this stope is greater than the others and a maximum width of 90' was mined on the -70' sub. Operations here will also extend well into 1944 with development in ore extending 80' west of the present workings on the -150' sub. The fourth stope on this lease was in the high sulphur deposit at the northwest end of the 9th Level. The mining operations of #11 contract extended from the -140' to the transfer drift on the -220' sub level. The ore in the upper portion of this deposit was low enough in sulphur content to be mixed with the Standard Morris Grade but the ore left in place on the lower subs averages .450 and could not be absorbed in the regular product. As a result, mining was discontinued in October and the contract transferred to development on the 9th Level.

MORRIS MINE
ANNUAL REPORT
YEAR 1943

7. UNDERGROUND (Cont.)

c. Stoping (Cont.)

Fee Lands

Mining operations on the fee lands extended from the 7th Level elevation to the transfer drift of #23 contract on the -60' sub.

A large proportion of the fee land product resulted from the sub level stope mining of No. 23 contract, centering on the 3600 south coordinate line. During the first half of the year, development and mining were conducted above a transfer on the -30' sub with the stope outline reaching a maximum length of 130' and a width of 55' on the 10' sub. A second transfer was then driven at a lower elevation in October, with stoping underway during the balance of the year on sub levels from the -20' to the -60'.

Mining operations of two radial slicing contracts also extended on the fee lands east of Chase Lease #9 at various times during the year. No. 7 contract workings extended from the 30' to the 0' sub and those of No. 13 contract from the 0' to the -10' sub.

South of Chase Lease #9 slicing operations of several contracts in the central portion of #33 deposit also extended on the fee lands. The largest areas mined were those of Nos. 16 and 25 contracts, which at the end of the year were nearing the property corner on the -130' sub level. The workings in this vicinity extend as high as the -70' sub and mining was nearing completion at the -130' elevation.

Chase Lease #9

Top slicing operations in the central part of the deposit were underway from the 20' to the -160'. An average of 7 or 8 contracts were mining throughout the year in Nos. 33 and 75 deposits.

Nos. 14 and 15 contracts mined large areas in the central and easterly portions of #75 deposit. The stoping operations of #21 and #4 contracts were above on the westerly extension of this deposit on Lease #24. The lowest workings in this area were those of #15 on the -30' sub at the end of the year.

Contracts Nos. 1, 2, 5, and 22 continued slicing operations in the central portion of #33 deposit on subs from the -50' to the -80'. The most extensive operation was on the -70' sub where the ore on the north side of the dike was removed, having a length of 500' with an average width of 70'.

MORRIS MINE
ANNUAL REPORT
YEAR 1943

7. UNDERGROUND (Cont.)

c. Stoping (Cont.)

Chase Lease #9 (Cont.)
Top slicing operations were underway at the west end of #33 deposit to the north and south of Chase Lease #9 - C.C.I. fee boundary line. The uppermost workings were on the -100' sub and extended down to the -160' sub where mining was underway at the end of the year by Nos. 6 and 12 contracts. Mining conditions were good in this area and extraction was at a rapid rate, with nearly complete removal of the ore between mining limits on the -130', -140' and -150' sub levels. Development by No. 20 contract reached the -150' sub late in the year and in 1944 the ore between the two south dikes will be mined in conjunction with the main area to the north. The latter should also result in a possible increase of the fee land proportion of the total product.

TILDEN MINE
ANNUAL REPORT
YEAR - 1943

1. GENERAL

A comparatively small tonnage was required of the property this year with 139,991 tons produced from the pits and an additional 12,486 loaded from the stockpiles for a tonnage shipped of 152,447. Of this total shipment, 116,801 tons was of the Tilden Silica grade and the balance, 35,676 tons consisted of Low Phosphorous ore.

The Low Phosphorous output, this year, constituted the highest percentage of this grade to the total season shipments in the fifteen year life of the pit and this feature was accompanied by a record high in tons per shovel shift produced.

Operations this year, despite the lower than average required output, were carried on very smoothly owing to the stripping program initiated in the East Half of the West Pit under E. & ACC 117. Activity was interchanged between ore production at irregular intervals and stripping with no lost time whatsoever. Further, the stripping program, as carried on under much more favorable weather conditions than is the usual case with such an undertaking, has proven by cost sheet analyses to be very economical. Of the total yardage set up for the stripping project amounting to 192,000 yards, approximately one-third was removed this year.

Immediate advantage of the overburden removal was taken in the utilization of the waste for the construction of truck haulage roads, a new main approach to the property and of a dam to impound water necessary for washing operations. The beneficial effects of the improvements were felt in the ore production this season and a measure of satisfaction was obtained by the fact that all of these by-product projects were completed with no extra charges incurred whatsoever.

Primary blasting costs were again pared for the third consecutive year and of greater importance was the fact that the secondary blasting figures, essentially a criterion of the primary work, were also lowered on the cost per ton basis.

The two Euclid 15-ton trucks have maintained very efficient service and have indicated the possibility of rail haulage abandonment at the property in favor of this type equipment. The pits are in an excellent state of development with a potential production per season in excess of 600,000 tons. In view of the facts that the main bench of the West Pit possesses a relatively short life leaving the Lower Bench with access by a 10% grade as the bulk producer, and that the 2nd Bench of the East Pit, designed to eliminate the Low Phos. production difficulty, is entered by an 8% grade, the problem of transportation resolves itself into one of roads and motorized equipment.

No delays of any consequence were encountered in the 1943 operations and a review of the time lost, as charged against operating shifts, showed a consecutively lower rate for the fourth year.

In a special election in February of this year, the employees of the property chose the C.I.O. as their representative for the purpose of collective bargaining.

TILDEN MINE
ANNUAL REPORT
YEAR - 1943

2. PRODUCTION
SHIPMENTS &
INVENTORIES

a. Production by Grades

	Tilden Silica	Low Phosphorus	Total
West Pit - - - - - -	74,127	-	74,127
East Pit - - - - - -	30,188	35,676	65,864
Total - - - - -	104,315	35,676	139,991

b. Shipments

Shipments for this property totalled 152,477 tons, leaving a balance on hand of 33,667 tons on stock:

Tilden Silica - - - - -	116,801
Tilden Low Phos.- - - -	35,676
Total - - - - - -	152,477

c. Stockpile Inventories

No ore was stocked at the Tilden Mine in 1943. The tonnage stocked, by grades, in the three years previous is given below:

	1942	1941	1940	In Stock Dec. 31, 1943
Tilden Silica - - - - -	47,990	48,829	31,241	19,852
Tilden Low Phos.- - - -	-	3,073	10,742	13,815
Total- - - - - - -	47,990	51,902	41,983	33,667

A total of 12,486 tons of Tilden Silica was loaded from the stockpile at a cost of $198.61 or $0.0159 per ton.

d. Broken Ore Reserves

The book figures of the broken ore reserves are as follows:

East Pit - - - - - - -	168,182 tons
West Half of West Pit-	11,722 "
Total - - - - - -	179,904 tons

In addition to the above broken ore figures, 7,032 tons of ore in the Summit Pit.

e. Product by Months

Month	Days Operated	Average Tonnage Per 8 Hr. Shift	Total Tons
May	8 (8-1-8 hr.)	2291	18,327
June	19 (3-1-8 hr.) (8-2-8 hr.)	1319	25,075
July	22 (10-2-8 hr.) (2-1-8 hr.)	1205	26,508

TILDEN MINE
ANNUAL REPORT
YEAR - 1943

2. PRODUCTION
SHIPMENTS &
INVENTORIES (CONT.)

e. Product by Months (Cont.)

Month	Days Operated	Average Tonnage Per 8 Hr. Shift	Total Tons
August	13 (13-1-8 hr.)	2326	30,238
September	12½ (12½-1-8 hr.)	2021	25,272
October	7 (7-1-8 hr.)	2081	14,571
Total	81½ (1-8 hr. shifts)	1718	139,991

The average daily output of 1718 tons in 1943 compares with 1680 tons in 1942, 2033 tons in 1941, 1787 tons in 1940 and 1980 tons in 1939.* Ore shipped from stockpile by months:

April - - - 57 tons
November-12,429 "
Total 12,486 tons

A summary of the total production, by pits, from the first year of operation, 1929, to date, is given below:

Year	Product from West Pit	Product from East Pit	Product from Summit Pit	Yearly Product
1929	441,769	---	---	441,769
1930	287,043	---	---	287,043
1931	126,441	10569	---	137,010
1932	19,957	---	---	19,957
1933	62,532	31572	---	94,104
1934	110,650	57038	---	167,688
1935	145,457	40575	4,479	190,511
1936	217,225	69515	4,601	291,341
1937	217,586	87832	---	305,418
1938	66,815	18774	---	85,589
1939	100,717	69559	---	170,276
1940	127,023	78589	---	205,612
1941	193,544	109399	---	302,943
1942	135,920	99287	---	235,207
1943	74,127	65864	---	139,991
Total -	2,326,806	738573	9,080	3,074,459

Output By Pits

Month	West Pit	East Pit
May	11,315	7,012
June	2,640	22,435
July	4,888	21,620
August	28,254	1,984
September	13,730	11,542
October	13,300	1,271
Total -	74,127	65,864

* Actual loading efficiencies are much greater than indicated in this table. A brief explanation of loading factors is given in Section "F" - Ore Shipments.

TILDEN MINE
ANNUAL REPORT
YEAR - 1943

2. PRODUCTION
SHIPMENTS &
INVENTORIES (CONT.)

f. Ore Shipments

	1943 Tons	1942 Tons
On Hand January 1, 1943	46,153	52,483
Output for year	139,991	235,207
Total	186,144	287,690
Shipments	152,477	241,537
Balance on hand	33,667	46,153
Decrease in Output	95,216	
Decrease in Shipments	89,060	
Tons stocked		47,990
Decrease in Tonnage Stocked	47,990	

1936	77-1-8 Hour Shifts and	57-2-8 Hour Shifts - Total	191-1-8 Hour Shifts
1937	113-1-8 Hour Shifts and	20-2-8 Hour Shifts - Total	153-1-8 Hour Shifts
1938	40-1-8 Hour Shifts and	0-2-8 Hour Shifts - Total	40-1-8 Hour Shifts
1939	78-1-8 Hour Shifts and	4-2-8 Hour Shifts - Total	86-1-8 Hour Shifts
1940	107-1-8 Hour Shifts and	4-2-8 Hour Shifts - Total	115-1-8 Hour Shifts
1941	141-1-8 Hour Shifts and	4-2-8 Hour Shifts - Total	149-1-8 Hour Shifts
1942	91-1-8 Hour Shifts and	11-3-8 Hour Shifts 8-2-8 Hour Shifts - Total	140-1-8 Hour Shifts
1943	45½-1-8 Hour Shifts and	18-2-8 Hour Shifts - Total	81½-1-8 Hour Shifts

The short table below indicates the increase in efficiency of all phases of production leading to actual shovel loading. An explanation of this table would offer the facts that in a Low Phos. ore operation, one shovel only has been used, loading from the East Pit.

Drilling and loading analyses have shown that no defined zones of ore of low phosphorous content exist, but there do appear irregular concentrations of this type ore in two localities of the East Pit. Advanced planning for Low Phos. production is shaped entirely by previous analyses inasmuch as the concentrations are too small in extent, both horizontally and vertically, to be outlined economically by exploration drilling.

The difficulties attendant to this form of ore production entailing spotty loading and restricted shovel moves, because of track location, are quite obvious. It follows, that the tons obtained, per shovel shift, would be low in this operation and the percentage of Low Phos. output for the entire season would be reflected in the tons per shift obtained for all ore loading for the reason, that is, a high percentage of Low Phos. output for the season's loading would result in a low figure of tons per shift obtained for all ore loading, and vice versa.

It may be noted from the table that the Low Phos. tonnage has increased from 1941 and that the percentage of this type ore to the total production has also increased. The tons per shift obtained, however, has also increased in both phases.

TILDEN MINE
ANNUAL REPORT
YEAR - 1943

2. PRODUCTION SHIPMENTS & INVENTORIES (CONT.)

f. Ore Shipments (Cont.)

Year	Low Phos. Tons	Low Phos. Tons/Shift	Total Tons Production	Percent Low Phos./ Total Prod.	Tons/Shift Total Prod.
1940	19,107	618	205,612	9%	1,787
1941	12,926	1,077	302,943	4%	2,033
1942	39,039	1,148	235,287	16%	1,680
1943	48,674	1,187	139,991	35%	1,718

g. Delays

A reduction in lost time chargeable to delays was again made for the third successive year at the property. The time lost, as charged against the total number of shifts operated, is shown below:

Year	Hours Delay	Total Shifts Year	Time Lost/Shift Worked
1943	23¾	81½	.291 hrs.
1942	41½	140	.296 "
1941	67½	149	.453 "
1940	80	115	.695 "

There were no extensive individual delays during the year and the total time lost, chargeable to the various pieces of equipment, was as follows:

Equipment	Hours Delay
Power Shovels	15
Crushing Plant	
(a) Electrical Storm	2½
(b) Other causes	5¼
Haulage	1
Total	23¾ Hours

h. Delays from Lack of Current

Of the total delays charged to the Power Shovels, 6½ hours were lost because of power breakdown. The crushing plant was also delayed 1½ hours for lack of power and also 1 hour delay was incurred because of an electric storm, during which times, it is the practice to shut down the crushing plant to avoid the possibility of the circuit breakers throwing out while the crushers were under load. Neglect of this precaution would necessitate unloading of the crusher manually.

3. ANALYSIS

a. Average Mine Analysis on Output

Grade	Iron	Phos.	Sil.	Mang.	Alum.	Lime	Mag.	Sul.	Loss on Ignition
Tilden Silica	39.35	.034	42.15	.08	.87	.22	.20	.009	.15
Tilden Low Phos.	37.35	.014	45.25	.08	.56	.14	.10	.009	.13

TILDEN MINE
ANNUAL REPORT
YEAR - 1943

3. ANALYSIS(CONT.)

b. Average analysis on Straight Cargoes

	Mine			Lake Erie		
	Iron	Phos.	Sil.	Iron	Phos.	Moist.
Tilden Silica	39.33	.033	41.98	40.53		1.82
Tilden Low Phos.	37.36	.014	45.16	38.25	.014	1.95

c. Analysis of Ore in Stock

	Iron	Phos.	Sil.	Mang.	Alum.	Lime	Mag.	Sul.	Loss on Ignition
Tilden Silica	39.00	.033	42.62	.09	.88	.27	.27	.010	.33
Til. Low Phos	38.00	.018	44.25	.09	.46	.18	.10	.009	.20

4. ESTIMATE OF ORE RESERVES

a. Developed Ore

1. West Pit

In the West Pit ore reserves and stripped reserves had been regarded as the same inasmuch as conditions prior to 1943 had precluded further stripping in that area. During 1943, however, a stripping project was initiated in the East half of the West Pit under E & ACC117, employing Company men and equipment, designed to ultimately make available a total of 920,000 tons of ore in this section. A total of 236,500 tons of ore was stripped during 1943.

Assumption: 13 cu. ft. equal one ton

Total developed ore as of January 1st, 1943	1,606,154 tons
Total ore developed during 1943	236,500 "
Total ore developed as of Dec. 31, 1943	1,842,654 tons
Ore mined in 1943	74,127 "
Total developed ore as of January 1st, 1944	1,768,527 tons

2. East Pit, including Summit Pit

Assumption: 14 cu. ft. equal one ton
Tonnage above 1500' elevation (Track grade from Crushing Plant)

Total developed ore, January 1, 1943	4,862,389 tons
Ore mined in 1943	65,864 "
Total developed ore, January 1, 1944	4,796,525 tons

Upon completion of washing operations in the East Pit area, the stripped reserves will be as follows:

Above 1500' elevation	East Pit -	1,543,535 tons
	Summit Pit-	228,000 "
Total		1,771,535 tons
Possible Lower Bench	East Pit 1440' - 1500'	1,028,570 tons
Total stripped reserves		2,800,105 tons

TILDEN MINE
ANNUAL REPORT
YEAR - 1943

4. ESTIMATE OF ORE RESERVES (CONT.)

3. Developed Ore as of January 1st, 1944

West Pit	1,768,527 tons
East Pit, incl. Summit	4,796,525 tons
Total Tilden Mine	6,565,052 tons

c. Estimated Analysis of Reserves

		Iron	Phos.	Sil.	Mang.	Alum.	Lime	Mag.	Sul.	Ign.	Moist.
1.	West Pit										
	Dried	39.17	.034	41.91	.09	.90	.20	.22	.009	.24	
	Natural	38.50	.033	41.20	.09	.88	.20	.22	.009	.24	1.70
2.	East Pit										
	Dried	37.00	.015	45.00	.09	.54	.20	.17	.009	.34	
	Natural	36.50	.015	44.40	.09	.53	.20	.17	.009	.34	1.34

f. Estimate of Production

The following tables show the estimated production and analysis that can be produced during the coming year. The first table shows the tonnages available by mining and loading without selective loading from the East Pit. The 7,000 tons of broken ore in the Summit Pit are omitted here, inasmuch as this ore cannot be loaded out profitably now.

The figures in the second table are based on the assumption that any Low Phos. ore shipments will be produced by selective loading in the East Pit.

1. ESTIMATE OF 1944 PRODUCTION AS TO PITS

Grade	Tonnage	Iron	Phos.	Sil.	Sul.	Moist.	Iron Nat'l.
Tilden Silica West Pit	350,000	39.12	.049	42.50	.014	1.90	38.38
Tilden Silica #1 East Pit	100,000	37.50	.020	46.00	.011	2.00	36.75
Total	450,000	38.80	.043	43.30	.011	1.92	38.03

2. ESTIMATE OF PRODUCTION BY GRADING EAST PIT ORE

Grade	Tonnage	Iron	Phos.	Sil.	Sul.	Moist.	Iron Nat'l.
Tilden Silica (includes West Pit and 50,000 tons of East Pit)	400,000	39.00	.036	42.00	.011	1.67	38.35
Tilden Low Phos. (Selected from East Pit Shipments)	50,000	37.00	.015	45.60	.009	1.36	36.50
Total	450,000						

From the above tables, it will be noted that the Low Phosphorus ore can be obtained only by analyzing each car and segregating those that contain the proper material. Using this method, a cargo can be obtained only by accumulating a sufficient number of cars and holding them for shipment.

TILDEN MINE
ANNUAL REPORT
YEAR - 1943

5. LABOR AND WAGES

a. Comments

1. Labor

Labor conditions in general were satisfactory during the 1943 season. Although no ore was stocked at the property this year, the stripping program in the West Pit provided employment for the crew during the intervals between ore production. An election to determine the representative, if any, for the purposes of collective bargaining for certain employees of the Company at the Tilden Mine, was held at the property on February 24th, 1943. The results of the poll indicated a unanimous choice of the 21 voters for representation by the C.I.O.

b. Comparative Statement of Wages and Product

	1943	1942	Increase	Decrease
Product	139,991	235,207		95,216
Number of Shifts and Hours	81½-1-8 hr.	140-1-8 hr.		58½
Avg. No. of men working	28	43		15
Average Daily Wage	7.22	6.64	.58	
Tons per man per day	45.38	47.01		1.63
Labor Cost per ton (Labor stmt.)	.170	.150		.020
Labor Cost per ton (Cost Sheet)	.196	.169	.027	
Total No. of Days	3,302½	5,279¼		1,976¾
Amount paid for Labor as per Labor Statement	23,864.32	35,307.05		11,442.73
Amount paid for Labor as per Cost Sheet	27,485.30	39,811.86		12,326.56

TILDEN MINE
ANNUAL REPORT
YEAR - 1943

7. OPEN PIT OPERATIONS

a. Stripping

A small amount of stripping was accomplished in January, 1943 to complete the removal of overburden under E&ACC102 in the East Pit. This work was concluded on January 12th with a yardage of 2,378 for the month and a total of 20,585 yards for the project. Laying of water line for washing the stripped area has been partly completed and it is expected that this phase of the stripping will be accomplished in the summer months of 1944.

The stripping operation carried on in the Lower Bench West Pit, simultaneously with the above mentioned East Pit project was also concluded in January 1943. The yardage removed for the month was 5,440 and a total of 31,848 for the entire job. This South slope of the Lower Bench was washed during the year and the detritus cast by the No. 52 Shovel at the end of the operating season into a berm adjacent to the railroad main line to form a protective buffer for the initial blast in that area.

In April, E&ACC117 was obtained for the removal of 192,000 yards of overburden in the East Half of the West Pit and work was immediately started on a two shift operation. The No. 29 Shovel was used for the job and serviced by the two Euclid truck, utilizing the R. D. Tractor and bulldozer for grading on the dump and for feeding the shovel from the high bank. The close proximity of the stripping to the broken ore in the East Half permitted the use of the No. 29 Shovel by short moves to engage in both production and overburden removal. The total amount of burden removed during the year amounted to 75,485 yards. The bulk of this material was dumped in the disposal area South of the L. S. & I. tracks and the balance was utilized in the construction of a new main approach to the property.

TILDEN MINE
ANNUAL REPORT
YEAR - 1943

7. OPEN PIT
OPERATIONS (CONT.)

a. Stripping (Cont.) E. & A. CC-60 - Tilden Mine Stripping

For stripping and washing 23,000 yards of Overburden at the Tilden East Pit to make available 700,000 tons of ore.

DETAIL	AMOUNT E. & A.	AMOUNT EXPENDED TO DATE	UNEXPENDED
20,000 yards of Stripping at 15¢ per yard.....	$3,000.00	$1,372.72	$1,627.28
3,000 yards of Washing at 73¢ per yard.....	2,190.00	921.76	1,268.24
10 percent on above for Contingencies.....(1)	519.00	171.15	347.85
Test Pits - East Pit Advancement area....(2)		191.52	191.52
Exploratory Drilling East Pit advancement area(2)		2,206.75	2,206.75
Social Security Taxes (2)		21.68	21.68
Total.....	$5,709.00	$4,885.58	$ 823.42

(1) Under the exacting conditions of clean bulldozer work demanded in this area, the equipment was put to a much more severe use than is usually the case which necessitated several repairs to the equipment.

(2) Note: Not included in original estimate.

(3) No work done in 1943.

a. Stripping (Cont.) E. & A. CC 102 - Tilden Mine Stripping East Pit

For stripping 11,000 cubic yards, and 2,000 cubic yards overburden at the Tilden East Pit to make available 137,000 tons and to facilitate mining operations in the East Pit where the height of the bank is being cut into two benches.

DETAIL	AMOUNT E. & A.	EXPENDED 1942	EXPENDED 1943	EXPENDED TO DATE	UNEX-PENDED	COST PER CU. YD.
11,000 cu. yds. stripping at 30¢ per yard.....(1)	$3,300.00	4,651.83	1,175.91	5,827.74	2,527.74	.283
2,000 cu. yds. washing at 73¢ per yard.....	1,460.00	---	774.76	774.76	685.24	
5,400 cu. yds. of filling for 2nd bench road.....	540.00	---	355.05	355.05	184.95	
Temporary surfacing road	250.00	---	3,160.46	3,160.46	2,910.46	
50 ft. Culvert.....	100.00	285.00		285.00	185.00	
Changing transformers etc.	200.00	154.92		154.92	45.08	
10 percent for contingencies	585.00	---			585.00	
Total.....	$6,435.00	5,091.75	5,466.18	10,557.93	4,122.93	

Actual yardage - 20,585 yards.

TILDEN MINE
ANNUAL REPORT
YEAR - 1943

7. OPEN PIT
OPERATIONS (CONT.)

a. Stripping (Cont.) E. & A. CC 113 - Tilden Mine Stripping West Pit

To make available 170,000 tons of ore for mining, and also make a better mining operation and reduce the cost per ton slightly on the ore taken from the lower bench.

DETAIL	AMOUNT E. & A.	AMOUNT EXPENDED 1942	AMOUNT EXPENDED 1943	EXPENDED TO DATE	UNEXPENDED
Moving Pole Line	$ 370.00	300.00	0	300.00	70.00
40 feet Culvert at 3.65.....	146.00	145.27	0	145.27	.73
Planking R.R.Tracks for Trucks	80.00	71.09	0	71.09	8.91
Locomotive rental & Track Wk.	212.00	82.82	0	82.82	129.18
*30,000 yards of stripping at 10¢ per yard.....	3,000.00	2,538.29	1,119.64	3,657.93	657.93
6,000 yards Washing & Cleaning at 50¢ per yard.....	3,000.00	0	1,840.96	1,840.96	1,159.04
10 percent for Contingencies	680.80				680.80
Total.....	7,488.80	3,137.47	2,960.60	6,098.07	1,390.73

*This Item was completed on January 13th, 1943 with a total yardage of 31,840 and a cost per yard removed of $0.114.

E. & A. CC 117 - Tilden Mine Stripping West Pit

For stripping 192,000 yards Overburden at the East end of the West Pit to make available 920,000 tons of ore.

DETAIL	AMOUNT	AMOUNT EXPENDED 1943	UNEXPENDED	YARDS	COST PER YD.
*192,000 yards at 12¢ per yd.	$ 23,040.00	9,819.94	13,220.06	75,485	.13
10% for Contingencies	2,304.00		2,304.00		
Total	25,344.00	9,819.94	15,524.06		

*Includes clearing work, cutting trees, etc.

f. Drilling, Blasting & Explosives

1. Drilling

	1943			1942		
	Shifts Worked	Footage Drilled	Footage per 8 hr. shift	Shifts Worked	Footage Drilled	Footage per 8 hr. Shift
East End of West Pit	126	2018	16.01			
E. Pit(1st.&2nd. Benches)	82	1535	18.71	242	5344	22.08
Lower Bench West Pit				151	3305	21.88
W. End of West Pit				15	240	16.00
Totals	208	3553	17.08	408	8889	21.78

The decrease in footage per shift in 1943 of 4.70 feet is attributed to the greater number of moves necessary to attain a smaller total footage.

TILDEN MINE
ANNUAL REPORT
YEAR - 1943

7. OPEN PIT OPERATIONS (CONT.)

f. Drilling, Blasting & Explosives

1. Drilling

	1943			1942		
	Bits Used	Footage Obtained	Footage Per Bit	Bits Used	Footage Obtained	Footage Per Bit
East End of West Pit	324	2018	6.22	0	0	0
E. Pit(1st.&2nd. Benches)	140	1535	10.96	669	5344	7.98
Lower Bench West Pit				357	3305	9.26
West end of West Pit				37	240	6.49
Totals	464	3553	7.65	1063	8889	8.36

Statement of Drilling Costs for Year

	East End West Pit	East Pit	Total
Labor	3,659.17	1,655.78	5,314.95
Supplies	1,484.56	1,274.91	2,759.17
Totals	$ 5,143.73	2,930.69	8,074.12
Net Footage	2,018	1,535	3,553
1943 Total Cost Per Foot	2.55	1.906	2.27

No depreciation charges were made against drilling in 1943. The unit cost of drilling for this year as compared to the cost per foot in previous years, excluding the depreciation charges, is as follows: 1942 - $1.64; 1941 - $2.23 and 1940 - $2.11. Drilling in this past season has consisted mainly of shallow holes in both the East Half of the West Pit and in the 2nd Bench East Pit which entails a greater proportion of time spent in moving equipment against total footage drilled. Furthermore, the actual setting-up of the rigs was done on rough slopes necessitating more cribbing work than is usually necessary, which entails greater labor charges at a higher wage rate than formerly.

Cost of Operating 9" Churn Drills in East End of West Pit - 1943

Total Footage of Holes Drilled	2,018
Total Footage of Holes Lost	0
Net Available Footage	2,018

Operating	Labor	Supplies	Total	Cost Per Foot
Drilling at Mine	$ 2,332.72	13.20	2,345.92	1.162
Sharpening Bits	647.66	267.67	915.33	.455
Pipe and Fittings		424.35	424.35	.210
New Bits				
New Rope		43.40	43.40	.002
Electric Power		276.98	276.98	.137
Truck and Tractor	499.26	144.66	643.92	.319
Total Operating	$ 3,479.64	1,170.26	4,649.90	2.285

TILDEN MINE
ANNUAL REPORT
YEAR - 1943

7. OPEN PIT OPERATIONS (CONT.)

f. Drilling, Blasting & Explosives(Cont.)

1. Drilling (Cont.)

Cost of Operating 9" Churn Drills in East End of West Pit - 1943 (Cont.)

Maintenance	Labor	Supplies	Total	Cost Per Foot
Drill Maintenance	$ 179.53	183.27	362.80	
Bit Maintenance		131.03	131.03	
Total Maintenance	179.53	314.30	493.83	.265
Total Maintenance and Operating....	3,659.17	1,484.56	5,143.73	2.55

TILDEN MINE
ANNUAL REPORT
YEAR - 1943

7. OPEN PIT
OPERATIONS (CONT.)

f. Drilling, Blasting & Explosives (Cont.)

1. Drilling (Cont.)

Cost of Operating 9" Churn Drills in East Pit - 1943

Total Footage of Holes Drilled - 1535
Total Footage of Holes Lost - - 0
Net Available Footage - - - - 1535

Operating	Labor	Supplies	Total	Cost Per Foot
Drilling at Mine	$ 1,280.10	$ 113.87	$ 1,393.77	$ .907
Sharpening Bits	281.63	196.95	478.58	.312
Pipe and Fittings		273.64	273.64	.113
New Bits		283.30	283.30	.184
New Tools		172.71	172.71	.112
New Rope		52.45	52.45	.034
Electric Power		128.22	128.22	.083
Truck and Tractor	145.98	43.36	189.34	.123
Total Operating	$ 1,607.71	$ 1,264.50	$ 2,672.21	$ 1.868
Maintenance				
Drill Maintenance	48.07	10.41	58.48	.038
Bit Dresser Maintenance				
Total Maintenance...	$ 48.07	10.41	58.48	.038
Total Maintenance and Operating.....	$ 1,655.78	$ 1,274.91	$ 2,730.69	$ 1.906

TILDEN MINE
ANNUAL REPORT
YEAR - 1943

7. OPEN PIT OPERATIONS (CONT.)

f. Drilling, Blasting & Explosives (Cont.)

2. Blasting

For the third consecutive year, a reduction in primary blasting costs was accomplished. A proportionate decrease in secondary blasting costs substantiates the policy of substituting ammonium nitrate powders for the previously used gelatins. This saving was made, despite a greater amount of dynamite employed to break a given tonnage than was formerly considered necessary. The current method in dealing with the extremely hard and blocky Tilden ore is based on the belief that deck loading of high cost gelatin dynamites can be replaced by full column loads of cheaper ammonium powders, and due to the price differential, the greater quantitative use of the latter explosives will still provide a reduction in primary blasting costs.

Further, the use of the low cost powders permitted a change to be made in the spacing of the drill holes producing a greater tonnage per foot of hole drilled.

The comparative blasting costs are noted in the short table below:

Year	Primary Blasting	Secondary Blasting	Combined
1940	$ .054 per ton	$ .004 per ton	$ .058
1941	.051 " "	.003 " "	.054
1942	.049 " "	.003 " "	.052
1943	.045 " "	.002 " "	.047

The figures of the table represent the cost of dynamite and accessories only for the operation. During the past season, the secondary blasting of large chunks was accomplished by the mudcapping method rather than the usual bulldozing procedure in which the chunks are drilled with pneumatic hand-machines and an explosive charge placed in the hole. The mudcapping method consists purely of placing the explosive charge on the face of the chunk where it will work to the best advantage. This latter method often necessitates the use of greater amounts of dynamite in repetitive charges than does bulldozing, but the labor and time of laying airlines, the slow drilling in the hard ore and drill machine maintenance are eliminated. With this feature in mind, it is interesting to note that the secondary blasting costs for dynamite used is less for the 1943 season than in previous years, a fact which might indicate a greater fragmentation obtained in the primary operation or possibly, a more balanced sizing of the breakage.

In the strictest sense of operating economy, it would be unnecessary to produce fragmentation smaller than the dipper opening of the shovel, inasmuch as the crushers should produce the ultimate reduction in size of the product. With adequate transportation in the past several seasons, however, the time consuming unit in ore production has been the crushing system, therefore, it has been necessary to supply a feed in as small a size as possible to lift the daily output.

TILDEN MINE
ANNUAL REPORT
YEAR - 1943

7. OPEN PIT
OPERATIONS (CONT.)

f. Drilling, Blasting & Explosives (Cont.)

2. Blasting (Cont.)

One blast only was fired in 1943, that in the Southeast corner of the East Pit. The dynamites used were manufactured by Hercules Powder Co. and listed as E.P. 85 and Hercomite Bag F. These dynamites had not been used previously at the Tilden Mine. The cost comparison was very favorable to these powders, and if the shovel clean-up in the East Pit area is satisfactory, it can be conservatively assumed that breakage requirements throughout the pits can be satisfied. The data pertinent to the blast is given below:

Location	Blast No.	Date	No. of Holes	Footage Blasted	Tonnage	Pounds Dynamite	Tons Ore Per Pound Dynamite
1st. Bench East Pit	21-A	10/29/43	8	627	26,918	11,255	
2nd. Bench East Pit	3-A	10/29/43	26	908	14,628	10,186	
TOTAL TILDEN MINE.....			34	1,535	51,046	21,441	2.38