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ELECTRICAL DEPARTMENT
ANNUAL REPORT
YEAR 1942

CLIFFS SHAFT MINE:

Due to the increased production and opening of new contracts in this mine during the year 1942 trouble was experienced from over loading of cables and feeder lines with subsequent low voltage conditions at certain parts of the mine. To remedy this condition the following was done: The 2300 volt line was extended to "B" shaft, an oil circuit breaker installed and a 1/0 2300 volt cable extended from surface to the 10th level. From this cable was taken a line at the 2nd level and a new 150 Kva substation with the necessary protective equipment installed, together with larger cables on the 2nd level feeding from that substation. At the same time a temporary cable which had been installed from the 2300 volt overhead feeder line to "A" shaft, following a previous cable failure, was replaced by a new 2/0 3-conductor 2300 volt line.

A burn out experienced with the 100 H.P. motor operating the top tram necessitated the removal of that motor and substitution of a 125 H.P. motor. Fortunately this burn out occurred on Saturday afternoon and it was possible to make the replacement during the night and the following Sunday so that the tram cars were in condition to operate when production was started Monday morning. The 100 H.P. motor which failed has been rewound and is now stored, complete with coupling, and ready for use should a second failure of this equipment occur.

Considerable difficulty has been experienced in the past due to failure of the band wires on the 750 H.P. motors operating the hoists. These band wires were replaced during the year and at the same time the hoist controls were so adjusted to limit the speed of the motors during the lowering cycle as much as was practical. It is hoped that the combination of new band wires and reduced lowering speed will eliminate some of the difficulty which has been experienced in the past.

It was possible to remove from this mine a complete motor generator set consisting of a 220 H.P. alternating current motor and a 100 K.W. direct current generator, with complete starting and protective equipment, and install this unit at the Princeton Mine, which then necessitated a unit of this character to operate its underground haulage system. The removal of this unit was made possible by a larger set having been installed at the Cliffs Shaft and the fact that the unit removed was no longer necessary for active operation.

The increase of the use of welding to repair minor breaks and build up worn parts around the mines has caused a considerable demand from the mine superintendents for arc welding to be done at the mine. Most of the operations were conducted by using a resistance type machine which is extremely ineconomical and does not do good work and also constitutes a considerable drain on the capacity of the haulage generator unit. Accordingly a demand for a new arc welding set for this mine was made and in December a 220 volt A.C. welder with a 300 ampere secondary capacity was purchased. This unit was placed in the mine welding room and if it proves as satisfactory as expected we feel that other mines will require similar units in the future.

ATHENS MINE:

On July 2nd there was a break in the winding on the rotor of the 850 H.P. induction motor which drives the flywheel set operating the skip hoist at this mine. This break necessitated the shipping of the rotor to the General Electric Service Shop at Milwaukee for complete rewind of the rotor and exciter and the machine was not back in service until July 13th.

The 60 H.P. motor driving the #1 blower at the 10th level burned out during the year and was replaced by a 50 H.P. motor which we had on hand. The 60 H.P. motor was immediately rewound and is now on hand for a spare for this equipment. This burn out did not cause any delay in the production schedule of the mine.

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ATHENS MINE:

During September a new 150 K.W. motor generator set, complete with switch panels, was installed in the 10th level pump station to be connected with the underground haul^{off}-system in order to serve as a spare and furnish additional haulage capacity to the two 100 K.W. rotary converters installed at that place. This was necessitated by the destruction of a unit similar to the 100 K.W. converters which burned out early in the year.

NEGAUNEE MINE:

This mine had several minor delays during the summer on account of coil breaks on the armature of the 500 H.P. direct current skip hoist motor. Fortunately we had on hand a spare armature for this motor and were able to install this armature in the motor on Saturday and Sunday preceding Labor Day. After several days of operation it was observed that because of drying and lack of use since this armature had been repaired the windings were loose and moving between the armature laminations and the commutator rings. These coils were wedged and tied in place on the succeeding Sunday^{so} no delay would be caused to the hoisting equipment and the motor is now operating satisfactorily. We immediately ordered a new winding for the armature which had been removed and it is anticipated that the new windings will be installed in the armature early in the year 1943 and at that time these coils will be wedged and tied so that if this armature is needed the trouble that occurred in the old unit will be avoided.

After perhaps 20 years of operation it was noticed that the coils in the 440 H.P. 2200 volt A.C. motor for the Ingersoll-Rand air compressor were becoming loose and moving in their slots. It was thought advisable to place non-conducting rings on both sides of the armature laminations and tie all of the stator coils to these rings. This prevents the stator^{coils} from moving and should prevent further trouble with the motor.

During the year a new blower plant was installed which necessitated purchase and installation of a 125 H.P. motor with panel to be used for the purpose of driving the blower. This blower plant is equipped with thermostatic controlled individual heating units which are cut in in proper numbers to supply the warm air necessary for the blower plant operation. Steam for the individual heating units is supplied by a boiler adjacent to the blower plant and the stoker is driven by a 5 H.P. motor.

MAAS MINE:

After approximately 20 years operation it was noticed that the coils in the 438 H.P. synchronous motors driving both the Ingersoll-Rand air compressors were moving in their slots. In order to avoid further trouble a non-conducting ring was placed on each side of the motor laminations and each of the coils was tied to these rings.

We had additional trouble with the compressor motors when the bearings on the exciter of the synchronous motor driving the #1 compressor failed. A temporary arrangement was made for exciting this synchronous motor from another source. No serious delay was occasioned by this failure.

It was noticed in routine inspection that the bearings on the cage hoist motor had worn to the point that they gave an unequal air gap clearance on this motor. Accordingly new bearings were purchased and installed to avoid a shutdown of this equipment during operating time and the old bearings have been removed and rebabbitted so that they will be available should they be needed in the future.

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MAAS MINE:

The 75 H.P. motor driving the Prescott pump on the 5th level of the mine was removed and completely overhauled by the installation of new internal resistance, new coupling, rebabbitted bearings, etc. The equipment was subsequently installed and is working satisfactorily.

The liquid rheostat forming the resistance for the motor of the skip hoist has given considerable trouble in the past due to its having become worn after years of operation. This rheostat was completely rebuilt and again installed the latter part of this year. In addition it is anticipated that in the early part of 1943 additional pumping capacity will be installed which will make this control apparatus more reliable.

LLOYD MINE:

Our records show no serious electrical difficulties and no new electrical equipment installed during 1942.

SPIES-VIRGIL MINE:

Considerable trouble was experienced with the Westinghouse rotary converter which is in service as a spare source of power for the haulage system of this mine. The first trouble was experienced early in the year and was a break down of the insulation in the rotor, at which time the rotor was sent to the Westinghouse shops in Milwaukee for repair. This rotor was returned in the spring and later in the year a field coil on the same machine failed. This coil was repaired and the machine put back in service but for several weeks recurring difficulties were had which caused the commutator of the rotor to flash over. Several different tests were made on the machine as a means of revealing the new source of difficulty and the trouble was finally located as a loose connection in the lines feeding the set. After these were repaired no further difficulty was experienced. Although these delays were troublesome they resulted in no delay in mine production.

In the fall the 50 H.P. motor driving the 3rd level pump burned out in such a manner that complete rewinding of the stator was necessary. We were fortunate in locating another stator of the same size which could be installed. Accordingly this was borrowed from the Maas Mine and placed in service on the pump and rewind materials were ordered for the stator which was removed. It is expected that this rewind job will be completed early in 1943 and either the rewound stator will be placed on the pump or will be returned to the Maas Mine in place of the one borrowed, whichever seems best at the time.

PRINCETON MINE:

The electrical equipment for the Princeton Mine has been installed during the year after completion of the dewatering. Considerable trouble was experienced from time to time with this equipment since much of it was not in the best of condition when installed and much of it had been in operation for some time before installation. However, these difficulties were no more than could be expected with the type of equipment and the difficulties under which they were operating. It is expected that most of the trouble had been eliminated by the end of the year.