

ELECTRICAL DEPARTMENT  
ANNUAL REPORT  
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ATHENS MINE

On December 2nd considerable difficulty was encountered when the field piece of the 900 H.P. direct current skip hoist motor slipped on its base plates and forced the armature against the brushholders. Hoisting was continued until Sunday by loosening the brushholders and grinding the tips of several holders to clear the commutator. When, on Sunday morning December 5th, the field piece was jacked off its base it was discovered that the cast iron base plates had broken around the dowell pin holes. New dowell pin holes were drilled in the heavier casting and the motor properly shimmed for correct clearance.

After a pump cable failure which caused considerable delay when it opened the main substation switch, separate protection for these cables was provided. This protection consisted of a 300 ampere circuit breaker, with the necessary transformers and relays. Installation of this protective equipment was completed on February 15, 1943.

While cleaning up slip rings and brushes on the #2 400 H.P. Prescott pump motor, a bad bearing was discovered. The motor was taken apart, completely cleaned and the bearings sent to the general shops for repairs. This work was done during March.

On May 30th part of the reversing and contactor control in the skip hoist controller was changed from cylinder and finger to cam operation. This was done by W. A. Baxter of the General Electric Company.

An automatic water level control was installed on the #2 surface well pump during the month of June.

The pole line carrying the pump cables and signal cables from engine house to the shaft was rebuilt during the month of September.

On account of the poor condition of wood runners in the circular portion of skip road the rope speed of the skip hoist has been reduced during the past several months. This rope speed is now set at 1285 feet per minute or 51 RPM drum speed. The last change was made on November 10, 1943.

CAMBRIA-JACKSON MINE

The 40 H.P. centrifugal pump motor on the 5th level of this mine was in bad condition when the mine was taken over by our company. The motor finally burned out, was completely rewound in the shops and returned to the mine June 23rd.

The locomotives in this mine were in very poor condition. It was, therefore, decided to take them out one at a time to be sent to the shops for repairs. One Good-man locomotive was taken out and sent to the shops on July 5th. After experiencing much difficulty in obtaining parts for this work, one locomotive was rebuilt and taken to the 7th level and the second is now in the shops.

After considerable trouble and some delay in the haulage set up at the mine, caused by poor bearings and motor coil burnouts on the motor generator set, plans were made to rebuild the old spare M.G. set installed in the large building formerly used as the main engine house. This spare set consisted of a 150 K.W. General Electric 250 V.D.C. generator and a Crocker-Wheeler 150 H.P. alternating current induction motor. The motor was too small for the load and was replaced by a 250 H.P. 600 R.P.M. General Electric motor formerly used on the Stephenson mine Prescott pump. This set is now running and known as the #2 haulage set.

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CAMBRIA--JACKSON MINE (Cont'd.)

A complete set of coils were ordered for the #1 haulage set motor which will be rewound in our shops.

CLIFFS SHAFT MINE

The hoisting was interrupted on February 1st when a connection on the rotor circuit of the hoist motor of the B shaft hoist burned off. Repairs were made from 6:15 P.M. to 4:20 A.M.

Ammeters were placed on the engineers operating platforms for A and B shaft hoists in an attempt to better control the current peaks and seems to be quite effective.

On May 5th the shaft limit switch cable broke down, causing a break in the Lilly hoist control latch coil circuit. This was repaired during the night without any serious delay.

The lower tram controls in the crusher house were changed to a new location in the southeast corner of the building. Open wiring on lighting and controls was also changed to rigid conduit.

A pump cable failure occurred in the #1 cable in A shaft on February 6th. The cable was burned near the collar of the shaft and approximately 30 feet of this cable was replaced with new 2/0 size. This work did not cause any delay as the #2 cable carried the load while repairs were made.

Several breakdowns in the winding of the motor on the 100 K.W. haulage motor-generator set have occurred during the year. Five coils have been cut out of the motor winding and a new winding has been ordered.

The magnetic brake on the crusher tram hoist was out of order on April 26th due to burnout of coils. Laminated core and brake bands were adjusted and repaired. Two coils were ordered and a spare brake band made.

The 250 H.P. Westinghouse motor and across the line starter for the new centrifugal pump was installed and given a trial run in the month of July.

LLOYD MINE

After experiencing trouble with commutator on the 15 H.P. direct current motor on ventilating fan on the 4th level it was found that the commutator insulation had broken down. A scraper machine motor was revamped to do this job while the regular motor was repaired during January. There was no delay in production since changes were made on Sundays.

The #2 compressor motor at this mine was taken to the shops for repairs to the rotor bars and bearings. At the same time a new tie ring was made and all stator coils properly tied. This job was done in January with no delay to operations.

When ropes were lengthened on the skip hoist it was learned that the dial set up and travel of the Lilly hoist controller did not have the proper range for the added depth of the shaft. It was therefore decided to purchase new type D Lilly controllers for skip and cage hoists. These controllers were received and installed before August 1st.

The cage hoist primary contactor panel stripped a keyway, breaking the shafting which supports the laminations and movable contacts. This caused a delay to hoisting operations of 3 hours on August 13th while repairs were being made.

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LLOYD MINE (Cont'd.)

The burning of the low voltage contactor and coil on the cage hoist panel caused a delay from 8:20 A.M. to 1:30 P.M. on September 14th. A similar coil, with some relay contacts, was found in the old Lake Mine storage which served until replacement parts were received and permanent repairs made.

One of the General Electric LM-2T6-LL locomotives was sent to the general shops for repairs in October and is now in the blacksmith shop.

MAAS MINE

During a lightning storm on the night of May 5th a portion of the winding was burned out on the #2 compressor motor. This necessitated stopping the motor from 10 P.M. to 7 A.M. in order to temporarily repair the stator winding. One coil had been cut out of this winding previously and this motor is now running with five coils out.

For a period of several months trouble was experienced due to breaking of coils on the 350 H.P. General Electric centrifugal pump motor. It was finally decided to send this motor to the General Electric Co. shops to be rewound and shipment was made on June 30th. While this motor was out the mechanical department decided to take the centrifugal pump out of service due to its worn condition. When the rebuilt motor arrived it was installed at Negaunee Mine 3rd level pump house to replace an identical motor which had not been giving satisfactory service at that point. The 350 H.P. centrifugal pump motor which was taken out of service is now in fair condition and stored in Negaunee storage buildings.

The cooling coils in the liquid rheostat for the skip hoist control sprung a leak on November 11th which required the installation of a drain pipe to keep the tank from overflowing. The dilution of the liquid in the tank necessitated replenishing of the solution to keep the hoist running until the following Saturday night and Sunday, when new piping was put in and the copper coils repaired. There was no delay in hoisting operations.

MATHER MINE

Due to a partly open valve on the slip regulator of the cage hoist motor-generator set its solution was drained too low, causing a flashover, burning some of the electrodes. This burning was not serious and repairs were made in about 4 hours the afternoon of January 18th. The drain valve on this tank has been so arranged that this difficulty is not likely to occur again.

While hoisting operations are comparatively light it was decided to leave the cage hoist motor-generator set stopped and run both skip and cage hoists at a lower voltage and slower speed, powered by only the skip hoist M.G. set. This arrangement has prevailed since March 8th.

Installation of photo electric relays in each skip way at the 1750 foot level loading chute in position to signal to the skip tender when skip is properly spotted was completed and tested November 28th. This equipment consists of 4 photo electric relays, each mounted in an enclosure with removable front door, also small transformers and reflector units with 6 volt lamps mounted in separate enclosures. This equipment is working out very well and other than cleaning, the only attention required over a two months period was the change of one burned out lamp.

During the month of April four 6 ton locomotives, complete with batteries and two extra batteries, were taken underground, two on the 1600 foot level and two on the 1750 foot level. The motor-generator sets for charging these batteries were also set up at this time.

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MATHER MINE (Cont'd.)

On April 8th the permanent mine signal cables were extended to the 1750 foot level. One power cable was extended to the 1900 foot level April 26th and another to 1900 feet on April 28th. Cable #1 supplies the power at 2300 volts for substations underground, plus the main pumping equipment. Cable #2 is connected to 150 K.V.A. transformers in the engine house basement and supplies power at 440 volts for opening the 2050 foot level and 440 volt skip pit pump. These cables are 3 conductor, 350,000 circular mills with 5000 volt insulation and ultimately will carry electric power into the mine at 2300 volts A.C.

A breakdown occurred and was followed by a flashover that burned the D.C. breaker and parts of the panel for the 150 K.W. direct current generator in the engine house. This breaker and switch set up is completely enclosed with insulating board and steel. The complete unit was manufactured by the Westinghouse Elec. & Mfg. Company and was installed to furnish power for the surface D.C. equipment, including the top tram Larry cars. The Westinghouse Company are now preparing the necessary equipment to prevent further difficulty with this panel and breaker.

After several interruptions caused by poor contacts in the cylinder and finger construction of the main controllers of the skip and cage hoists, the matter was brought to the attention of the General Electric Company. During the month of May the necessary material was shipped to the mine to revamp these controls for cam operated contacts. This work was completed on May 29th and 30th by Mr. Baxter of the General Electric Company.

Mr. Baxter has also made several changes in amplidyne control panels, contacts, resistors, condensers, etc. largely in an effort to accomplish a better coordination of electric power and mechanical braking under all emergencies created by overwind, overspeed or power failure.

NEGAUNEE MINE

The rewinding of the spare armature for the 500 H.P. skip hoist motor which was started in December 1942 was completed on February 21st. This work was done by a Westinghouse service man and two of our shop men during the period December 18, 1942 to February 21, 1943.

The #2 haulage set was taken apart on May 31st after considerable difficulty with the D.C. field coils of the 220 H.P. synchronous motor. The tests on two of the field coils after being taken out revealed shorted turns. These coils were repaired in the general shops and the motor put in condition after about one week shutdown. This job did not delay mining operations.

The shaft house and trestle lighting was rebuilt during the summer. All lighting circuits, including flood and all other lighting purposes, are now 115 volts.

Difficulty was encountered which caused considerable delay in the hoisting when one of the contactor coils opened intermittently on the skip hoist panel. The first stoppage occurred on September 31st for about 2 hours. After several interruptions the coils were shifted from one contactor to another in an effort to find the open circuit. Several coils were finally replaced with new ones from the Westinghouse Elec. & Mfg. Co. Spare coils of this type are now kept on hand in the engine house.

PRINCETON MINE

The haulage system at this mine has not been entirely satisfactory during the past year. One of the principal causes of trouble can be attributed to the small copper conductors used for the necessary long distance transmission of power at 250 volts.

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PRINCETON MINE (Cont'd.)

In an attempt to carry on under these conditions, the 100 K.W. motor-generator set was used almost continuously instead of the synchronous convertor. The voltage at the machine was raised to 280 volts with the overload circuit breaker set at 700 amperes. This arrangement worked without interrupting the service for some time until a high resistance short near the end of the 7th level built the load up to a point just below the protective setting of the D. C. breaker. This caused an overheating of the 215 H.P. synchronous motor and burned out the winding. The motor has been rewound and is now running.

Work is now under way to double the copper capacity from the feeder panel in the engine room to #3 shaft. Another 4/0 cable will also be installed in #3 shaft with further extension of double trolley feeders about 1800 feet on the 6th level, a feeder bus for parallel operation of generator and convertor, with the installation of a circuit breaker on the mine load which will trip without interfering with the parallel operation of these machines.

A completely rebuilt set of resistors were sent to the Princeton Mine #2 engine house to replace the grids now used on the control of this skip hoist. The present resistor bank developed a number of hot spots and open connections during the summer. The new set of grids are now on the engine house floor at the mine waiting for an opportune time to make this change.

SPIES-VIRGIL MINE

The installation of the cage hoist at this mine was completed and given a trial run on November 30th. Many difficulties and delays were encountered in this work on account of slowness of deliveries of materials. The primary and secondary contactor panels with oil circuit breaker and panel were taken from the Republic Mine from the 1000 H.P. hoist formerly used at this mine. The equipment needed some parts and repairs, some of which were taken from various mines using similar equipment, other parts were ordered from the General Electric Co. The resistors for the controls, backing out switch and the master controller were ordered for this job from the General Electric Co. on April 29th, received November 18th.

A rebuilt Lilly hoist controller, formerly used on the Lloyd Mine cage hoist, was also installed on this job, was tested and approved on January 10, 1944.

Due to a break in the rotor circuit of the 400 H.P. skip hoist motor at this mine about 9 P.M. June 29th, the hoisting operations were stopped from that time to 6:30 A.M. of June 30th. The men in the mine at this time came out by way of the ladder road. The motor was repaired on the job. New insulating tubes and washers have since been made and installed in slip ring assembly.

Some difficulty was also encountered in the movement of cables in the shaft while the shaft repairs were in progress. Two breaks occurred in the #4 3-conductor pump cable. This cable is now connected to subway box in new concrete enclosure near shaft house and has two splices in the shaft. This is a 2300 volt circuit and is used on transformers and pumps for the upper levels.

The main 2/0 2300 volt 3-conductor cable is also connected in this subway box near the shaft. This cable seems to be in good condition and is the power cable for the main pumps at the 1200 foot level. An overload circuit breaker of 300 amperes, 5000 volts, with panel was taken from Republic Mine and installed in the engine house for the protection of these pump cables. A new cable of 2/0 size, 3-conductor, 2500 volts, was also installed in a conduit from the engine house to the shaft.

Work on cleaning up and repairing pump motors and switches at this mine is now progressing satisfactorily.

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SPIES-VIRGIL MINE (Cont'd.)

Several new junction boxes for the signal system have been sent to the mine and also several hundred feet of second hand signal cable in good condition from the General Storehouse. Rebuilding this signal system will be under way as soon as possible.

During September 800 feet of 4/0 concentric haulage cable was shipped to the mine to reinforce the present shaft cable which is also 4/0 concentric. In anticipation of the requirements on the new drifting operations, combination feeder and trolley clamps have also been ordered for the proposed double 4/0 feeder in this drift.