ELECTRICAL DEPARTMENT
ANNUAL REPORT
YEAR 1950

ATHENS MINE:

Several interruptions occurred during the year in the ore hoist due to failure in the equipment. The most costly were failures of coils and risers in the D.C. generator of the M-G set. The hoist was kept in operation with a grounded armature coil during the month of April while occasional stops were made for tests in attempts to locate the faults. The coil failure was finally located and temporarily repaired April 29. A complete set of coils for the rewind of this armature was ordered from the General Electric Company. The material for the job arrived and the rewind was made in July.

The usual maintenance and minor repairs were made to the cage hoist motor and controls during the year.

The 400 HP Ingersoll-Rand compressor synchronous motor and exciter were repaired and repainted during the vacation period. The switches and starting equipment were also repaired at this time.

Some of the panel wiring and a potential transformer failed when the low voltage release coil on the oil breaker for the Nordberg compressor burned out. Repairs were made with Negaunee Mine spare equipment.

Several improvements were made in the M-G haulage setup during the year. The current carrying capacity was increased with the installation of twin conductor 500 MCM cables from the distribution panels on the 10th level to the 6th and 8th levels and the extension of the same size cable about 1400 ft. into the 8th level.

Several minor repairs were made to controls and grids for the 10th level pumping equipment.

The #1, 400 HP Westinghouse wound rotor pump motor was taken out for repairs to the rotor. The #2, 400 HP pump motor was taken apart for a cleaning and repaint job.

CAMBRIA-JACKSON MINE:

Several delays occurred in the hoisting during the year due to failures in the rotor of the 700 HP Westinghouse motor taken from the Maas Mine and installed for the Cambria hoist in August, 1949. This rotor was built for the Maas skip hoist in 1934 and was stored at the Maas Mine until the Cambria installation. The first failure occurred in March, 1950, when repairs were made at the mine. A break in the insulation occurred again April 24 which could not be repaired on the job, so the entire motor was sent to the General Shops for a change to the spare rotor which was completed April 26. The faulty glass insulated rotor was then shipped to the Westinghouse Electric Corporation for repairs and returned for the change of rotors July 1-2. The glass tape wound rotor is now operating while the old rotor is stored at the Cambria-Jackson Mine.

Some failures in the stator winding of the Allis-Chalmers 250 HP motor on the Laidlaw-Dunn-Gordon compressor occurred until August 13 to 20 when this stator was completely rewound. New overload relays were also installed during the rewinding period for the protection of this motor.

ELECTRICAL DEPARTMENT
ANNUAL REPORT
YEAR 1950

CAMBRIA-JACKSON MINE: (Continued)

Considerable repair work was done on the General Electric 150 KW haulage M-G set in the month of March. The motor and generator were taken apart for a new line-up and rebuilding of bearings and repairs to brush-holders and couplings.

The single conductor 300 MCM cables taken from the Negaunee Mine 12th and 13th levels were installed on the 8th level from the shaft to the new winze location.

The 2300 volt, 3-conductor cable from the pump station connections on the 7th level to the location of the conveyor at the winze was tested and connections completed in March. A three pole oil circuit breaker and disconnecting fuse jacks are provided at the pump house connections. The automatic pushbutton control for the 75 HP, 2300 volt wound rotor motor for operation of the conveyor belt was also set up at that time.

The failure of a 10-conductor signal cable in the main shaft near the 7th level occurred and caused some delay. Temporary connections were made with several 2-conductor Tirex portable cords until a 10-conductor cable formerly used at the Republic Mine was put in to replace the faulty cable.

The new 600 ampere Westinghouse oil circuit breaker bought to replace the overloaded breaker in the main line at the engine house panel was installed in July. New 600 ampere line disconnecting switches were also put in the line ahead of the breaker at this time.

CLIFFS SHAFT MINE:

The hoisting equipment has served very well during the year with regular maintenance plus a few inspections when the motors were taken apart during "off" hoisting periods. Inspections of the motor and rotor band wires of the 750 HP "B" Shaft hoist motor were made in April and September. A number of the soldered holding clips of the band wire had failed and were renewed.

A similar inspection of the "A" Shaft 750 HP hoist motor was made in September. These banding clips made of heavier brass material were all in good condition. A change in material from thin copper to the brass type was then made on the "B" Shaft motor with good results.

Rotor bar failures have occurred on the rotors of the 438 HP General Electric synchronous Ingersoll-Rand compressor motors. Riveting these bars to the end rings was considered a remedy for several years but the burning and loosening occurred too often. The #1 compressor motor was tied up for several days after such a rotor bar difficulty. All the bars were then welded to the outer rings which seems to have resulted in a permanent remedy.

Only minor changes in the haulage equipment were made during the year. The 100 HP rotary converter was taken out of the engine house and sent to the General Shops for repairs to the commutator and slip rings.

The pumping equipment has been in operation with routine maintenance during the year.

ELECTRICAL DEPARTMENT
ANNUAL REPORT
YEAR 1950

CLIFFS SHAFT MINE: (Continued)

The main blower on the 6th level for mine ventilation was stopped on account of a rectifier failure in the automatic starter. A rectifier from the starter of the #2 Ingersoll-Rand compressor at the Mather Mine "B" Shaft was used until their installation was completed, at which time the rectifier was returned to Mather Mine "B" Shaft. The blower starter was set up with a 220 volt A.C. magnetic contactor to keep the blower in operation until the arrival of the necessary rectifier on order from the General Electric Company.

LLOYD MINE:

Routine repairs and maintenance of the hoisting equipment was carried on during the year. One short delay occurred due to the failure of a control contactor on the cage hoist panel. A temporary repair was made until a rebuilt contactor was installed.

The installation of a geared limit switch formerly used at the Mackinaw Mine was made with the overwind equipment of the hoist at the winze. Some damage to the equipment and several delays occurred during the year before the installation of this overwind protection.

The motors and starting equipment of the two compressors were taken apart for repairs during the month of August.

On account of water difficulties in the mine during the month of May, a number of changes were made in the pumping setup. A 40 HP Allis-Chalmers line starter and pump were taken from Mather Mine "A" Shaft to the 7th level; also, a 30 HP pump and magnetic starter from the Spies Mine and a 40 HP starter and pump from Mather Mine "B" Shaft. A new 3-conductor, #4, 2300 volt cable in the shaft was extended from the 5th to the 7th level, three 25 KVA, 2200/480/240 volt transformers from stock were installed on the 7th level, and three 25 KVA, 2200/240/120 volt transformers from Mather Mine "B" Shaft were installed on the 9th level to replace two 15 KVA transformers and one 10 KVA transformer taken from stock for the emergency and later returned to the Storehouse. Some changes in cables and switches are now being made for a more permanent setup of pumps in the next year.

MAAS MINE:

The D.C. Ward Leonard controlled skip hoist equipment has served well during the year with the exception of some delays caused by overloaded skips. Two bearing failures occurred during the summer season, one on the commutator end and the other on the coupling end of the D.C. generator. Spare bearings are kept at the mine so little time was lost in bearing changes.

Thermo relays with signal lights and alarms have been installed for the skip hoist motor and generator bearings and set for contact closing at 65° C.

Installation of the 200 HP hoist equipment on the 5th level for the winze was completed in April.

ELECTRICAL DEPARTMENT
ANNUAL REPORT
YEAR 1950

MAAS MINE: (Continued)

The temporary sinking hoist at the 6th level winze was taken to the west end of the timber tunnel on surface and set up for handling equipment and unloading trucks. It has a 50 HP A.C. motor which is now connected to three 10 KVA, 2300/440/220 volt transformers recently used at the old Lake Mine.

No. 2 Ingersoll-Rand compressor was tied up from September 12 to 18 for shimming and wedging coils in the stator of the 438 HP General Electric synchronous motor. This repair job occurred on account of shrinkage of coil insulation. Air was supplied by Negaunee Mine during the shutdown.

The haulage generators have been overloaded much of the time, mostly from the extra demand due to more continuous operation of scraper machines. Arrangements are now made for a larger generator, also feeder cables and control equipment. The compensator and starter switch for the No. 2, 100 KW haulage M-G set failed on February 17, and set fire to the switch and wiring on the panel which finally opened the main overload protecting breaker and cut off all power from the mine until the equipment could be properly disconnected. The panel wiring has been repaired and the switch rebuilt in the General Shops while the trip coils were rebuilt by the Industrial Engineering & Sales.

MATHER MINE "A" SHAFT:

The skip and cage hoist equipment has worked well for the year on regular maintenance with the exception of one delay when a riser broke down in the armature of the south generator of the skip hoist M-G set. This was discovered December 3 and was repaired and running again December 4.

Material for the hoist to be set up underground for shaft sinking has been prepared in the shops and sent to the mine. This includes the 75 HP General Electric wound rotor motor recently loaned to the North Range Mining Company. A primary contactor panel formerly used at the Princeton Mine top tram and a controller from the Maas Mine were also rebuilt and are now stored at the mine for this hoist job.

Relocating compressor panels and exciter M-G sets in the engine house has been completed.

Installation of the electrical equipment for the screen, conveyor and crusher in the headframe was also completed.

Three 8-ton Westinghouse locomotives on order during 1950 were delivered in December and are now on the trestle ready for top tram car operation.

Extension of the two 350 MCM, 3-conductor, 2300 volt power cables from the 6th to the 7th level with the necessary subway boxes and switch connections, and the installation of a 150 KVA substation on the 7th level were also completed.

One of the older battery locomotives from Mather Mine "A" Shaft has been rebuilt in their shop and sent to Mather Mine "B" Shaft for their timber tunnel operations. The Mather Mine "A" Shaft now has two of the Jeffrey combination locomotives. The 10-ton General Electric locomotive, Serial No. 4083, from Negaunee Mine was rebuilt in the General Shops and sent to the Mather Mine "A" Shaft in February.

ELECTRICAL DEPARTMENT
ANNUAL REPORT
YEAR 1950

MATHER MINE "A" SHAFT: (Continued)

Some difficulty occurred with the 275 HP main drive motor of the 120-B shovel. The motor was taken into the shops for a complete rewind of the stator and returned to the shovel in the month of March.

MATHER MINE "B" SHAFT:

Installation of the M-G sets and auxiliary generators and control equipment for skip and cage hoists was completed during the year.

The 500 HP synchronous motor with controls and M-G exciter set for the No. 2 Ingersoll-Rand compressor was also completed with the compressor installation.

The Negaunee Mine 200 KW haulage M-G set with D.C. and A.C. control equipment was taken from the Negaunee Mine engine house and stored at the Mather Mine "B" Shaft for installation on the 7th level.

Installation of the new Allis-Chalmers haulage M-G set was made in the engine house with panels and circuit breakers completed and the 4/0 600 volt concentric twin conductor cable extended to the 10th level. The main 2300 volt, 350 MCM, 3-conductor power cables with subway boxes and connections at the levels have also been extended to the 10th level.

Five Goodman combination locomotives were taken into the mine, four to be used on the 6th level and one on the 7th level.

The surface electrical equipment completed during the year also includes a 300 KVA substation near the shop building for the supply of A.C. power at 440/220 volts for power and 110 volts for lighting, and the electrical equipment in the headframe for the crusher and conveyor setup.

NEGAUNEE MINE:

The 350 HP Westinghouse motor of the older flywheel M-G hoist set was taken to the shops where the stator was completely rewound and the rotor rebanded. The main circuit breakers and control panels were then moved from the east end of the building into that section near the old M-G set which was used for power and control of both skip and cage hoists from the month of August for the remainder of the year. The motors, generators and control grids for the hoist M-G set in the east wing of the engine house were removed to make room for the new building changes. Line and main service entrance to the building were also rebuilt temporarily. The control panels, circuit breakers, oil tanks and pumps for the lubricating system were stored at the mine. The larger motors, generators, and bearings are stored in the Princeton shop building.

Moving of the 200 KW haulage M-G set from the Negaunee engine house to the Mather Mine "B" Shaft left Negaunee Mine without D.C. power for the timber tunnel locomotive. To supply this power temporarily, the 35 KW M-G set formerly used for the pan conveyor at the Maas crusher and moved to the Mather Mine "B" Shaft for D.C. power supply for the engine house crane, was taken to Negaunee Mine and is temporarily set up in the engine house.

ELECTRICAL DEPARTMENT
ANNUAL REPORT
YEAR 1950

NEGAUNEE MINE: (Continued)

Circuit breaker and cables for the main blower plant were also moved from the east end of the engine house and relocated temporarily.

The three 5 KVA, 2200/240/120 volt transformers formerly used on the controls of the Kennedy Mine hoist were reconditioned in the shops and set up in the 10th level pump station for the 220 volt, 3 phase cable connection and power supply for welding the discharge pipe lines and the new 11th level pipe line to the Athens Mine.

Electrical repair jobs on the pumping equipment have been small during the year. Some trouble occurred in the 75 HP Westinghouse wound rotor motor of the 14th level plunger pump due to bearing wear. The motor was taken to surface in March and sent to the General Shops for bearing and rotor repairs.

SPIES MINE:

Some difficulty occurred due to overloaded skips from the 6th level trench. The current limiting relay setting was changed to 300 amperes for the increased power requirement. A 300 ampere current transformer from Negaunee Mine was put into the control circuit to replace the 200 ampere transformer formerly used. Larger cables were also put into the rotor circuit from the motor to the secondary control panel.

The failure of a 6-way subway box connecting the 2300 volt, 3 phase power cables at the 8th level occurred several times, and temporary repairs were made until it was decided to replace the old equipment. The installation of a new subway box complete with potheads and disconnecting links was made in December.

Extension of a 3-conductor, #4, 440 volt cable to the newly prepared sump on the 6th level was completed and a 40 HP, 250 gallon pump was set up to pump water to the 4th level. This pump failed due to the acid condition of the water and a pump with a 60 HP motor borrowed from one of the Iron River mines was put in its place in September. A combination magnetic starter formerly used with a 40 HP pump motor at the air shaft was set up with the 60 HP motor to operate with a relay and electrode water level control. Seven hundred (700) feet of #4, 3-conductor cable for this change was bought from Mather Mine "A" Shaft.

Failure of the shunt field rheostat of #1 haulage generator occurred in October. A rheostat which was formerly a part of the Negaunee Mine Westinghouse haulage M-G set and stored in the Princeton shops was used to replace the broken down equipment.

The #4/0 twin conductor cable connecting the 4th and 6th level trolley and rails through a raise near the workings to improve the D.C. voltage was completed in the month of May.

Negaunee Mine General Electric 6-ton LM-2T6-LL locomotive, Object No. C-2-11D-D57, was rebuilt in the shops and sent to the Spies Mine in April.