BRIEF DESCRIPTION OF ELECTROLYTIC WHITE LEAD PLANT OF THE ANACONDA LEAD PRODUCTS COMPANY

The plant was constructed in 1919 as the first commercial application of a new electrolytic process for the manufacture of white lead developed on a laboratory scale by Elmer A. Sperry at Brooklyn, New York. Further development in a 1-ton pilot unit was carried on at East Chicago preceding the construction of the commercial unit. As originally constructed, the plant had an annual capacity of 3,600 tons. This has gradually been increased to 10,000 tons. The plant is located at 151st Street and McCook Avenue, East Chicago, Indiana, and occupies an area of six acres, forming part of the thirty-two acre area occupied jointly with the plants of the International Lead Refining Company and the Anaconda Zinc Oxide Department. The buildings shown in green on the attached map are the property of the Anaconda Lead Products Company.

Transportation Facilities

The Indiana Harbor Belt Railroad, the Baltimore and Ohio Chicago Terminal and the Pennsylvania Railroad enter the plant yard and furnish transportation facilities. In addition to the single track serving the White Lead Plant, four storage tracks having a capacity of 92 cars are provided for the three plants. The main track entering the storage yard passes over a 100 ton Fairbanks track scale. A narrow gauge track extends south from the cell room and connects with the narrow gauge system of the International Lead

Refining Company. Other transportation within the plant and Chicago area is handled by truck.

Buildings

The main cell room and filter building, the dryer building, sub-station and extension of the boiler house are of brick and steel construction. The pulverizer building is of steel and corrugated iron. The original boiler house, warehouse, carpenter shop and extensions to the cell room building are of wood and corrugated iron.

Cell Room

The White Lead is produced in 48 cells. No additional cells have been added, but increased capacity has been obtained by increased current density. The cells are constructed of concrete, lined with asphalt, with hard rubber fittings, and are connected in series by copper bus bars. Each cell contains 17 steel cathodes, each encased in a linen diaphragm, and 18 lead anodes. Three 3-ton electric monorail hoists deliver anodes from narrow gauge rack cars to the cells, and remove scrap. Lead anodes and scrap, loaded on rack cars, are transported by a gasoline locomotive over the narrow gauge system between the cell room and the plant of the International Lead Refining Company.

Solution System

The cathode and anode in the electrolytic cell are separated by the diaphragm surrounding the cathode. Separate electrolytes circulate about the cathode and anode and each electrolyte passes

through an independent circulating system. The catholyte discharged from the cell passes through a carbonating system which consists of a coke-burning boiler, gas lines, gas scrubber, and fan delivering the carbon dioxide gas to two vertical steel absorption towers with porcelain filling, through which the catholyte descends counter-currently to the flow of gas, and is returned to the cell. A reinforced concrete Dorr thickener, 25 ft. in diameter 10 ft. high, asphalt lined with lead covered steel mechanism, receives anolyte carrying the white lead in suspension from the cells. The clear anolyte over-flow from the thickener is returned to the cell.

Pumping Equipment and Sumps

Two cast iron centrifugal pumps deliver the cell catholyte discharge from concrete sumps to the carbonating towers, and two similar pumps deliver the carbonated catholyte to an overhead tank, from which it returns by gravity to the cathode frame. The flow of catholyte is handled in iron piping. Two bronze centrifugal pumps deliver the anolyte and suspended white lead from two concrete sumps to the Dorr thickener. The clear over-flow from the thickener flows to a concrete sump from which it is returned by two similar pumps to the cells. Rubber lined wooden launders, brass pipe and hard rubber pipe and rubber hose are used in the anolyte system. The cell room basement is water-proofed, and equipped with sumps and pumps for reclaiming solution drippage. The anode slime recovery system includes wash tanks, pumps and settling tanks.

Filter

A diaphragm pump transfers the thickened pulp from the Dorr thickener to a pulp storage tank from which it flows by gravity to the Moore filter. The Moore filter equipment consists of seven rectangular concrete tanks, two 4-ton mono-rail hoists, three filter baskets, two vacuum pumps, five filtrate pumps and receivers, and three wooden filtrate tanks. Rubber vacuum hose and brass pipe are necessary in the portion of the system handling anolyte; the remainder of the equipment, including receivers, is of iron. With this equipment the white lead is washed counter-currently, the enriched solutions returned to the main anolyte system and the washed white lead discharged to a small wooden storage bin. Intermediate storage of washed pulp between the filter and dryer is provided by a rectangular wooden pulp storage bin. The washed pulp is pumped from these storage bins to the dryer building.

Dryer

The drying equipment of the original plant consisted of one tunnel dryer 200 ft. in length, in which the white lead was dried on trays carried on rack cars. In 1921 the length of the tunnel was increased to 250 ft. and a second tunnel of equal length constructed. This equipment was replaced in 1927 and dismantled in 1928. At the present time, the washed white lead pulp, pumped from the storage bins, is delivered in the dryer building to a 4 ft. x 6 ft. Oliver filter for dewatering. The filter is equipped with a compression belt attachment. The filter cake is conveyed by belt conveyors to a swinging conveyor discharging the material across the

width of the dryer hearth. The dryer is a 12 ft. x 60 ft. Lowden Dryer with steam heated hearth plates of cast aluminum and bronze wire rabbles. A ventilating system, including a suction fan and hood covering the hearth area of the dryer, is used to remove water vapor. The material is dried as it is conveyed over the hearth surface by the rabble mechanism. It is discharged from the Lowden Dryer for additional drying upon a steam heated drag conveyor 84 ft. in length, the discharge of which is elevated to a storage bin in the pulverizer building.

Pulverizer

The white lead from the storage bin is pulverized in a Raymond Roller Mill with air separation system, which delivers the air-floated and dried product from a cyclone collector through a packer into wooden barrels for shipment. The air supply to the air circulation system of the Raymond Mill is heated by a McCann-Harrison heater, and the excess air is withdrawn through a Dracco filter. The pulverizer building is equipped with a Fairbanks platform scale and a Toledo platform scale for weighing the barrelled product. A set of rolls is installed for the production of special products. The barrelled product is delivered directly into cars from a loading platform extending the length of the building.

Warehouse

A frame and corrugated iron warehouse, having a floor area of 2,500 sq. ft., adjacent to the pulverizer building and served by the same track, is used for current stock of barrelled product and for empty barrels.

Sub-Station

All power used by the three plants occupying the area is purchased from the Northern Indiana Public Service Company, and enters the Anaconda Lead Products Company Sub-station at 11,000 volts. All incoming power is transformed from 11,000 volts to 2,200 volts before distribution. A portion is further transformed for equipment requiring lower voltages. The sub-station contains switchboard equipment for general distribution of power, a 3,600 ampere, 240 volt motor generator set controlled by automatic switchboard equipment, for supplying direct current to the cell room, and a 25 K.W. 250 volt motor generator set for furnishing direct current for hoists. The automatic switchboard equipment was installed in 1929. Air for cooling generators and transformers is drawn from the outside through a spray washer and cooler.

Boiler House

The steam boiler equipment of the original plant consisted of two 60 H.P. and one 35 H.P. locomotive-type boilers. A 150 H.P. boiler of similar type was added in 1921. A 328 H.P. Stirling boiler, equipped with automatic stoker, was installed in 1926 replacing the locomotive type boiler equipment, with the exception of the 35 H.P. boiler. The locomotive type equipment is still intact and is available for use when necessary. The boiler plant is equipped with feed water heater, pumps and auxiliary equipment. Coal for the Stirling boiler is delivered to an overhead bin by a belt elevator. This boiler plant furnishes steam for drying white lead, heating buildings, and other general purposes as required by the three plants.

The 35 H.P. locomotive-type boiler is fired with coke, and used as a carbon dioxide gas producer for the carbonating system. A Permutit water softener, which furnishes water for the boilers in the three plants, is installed in a small building adjacent to the boiler plant. This building also contains a 250 g.p.m. Gould Triplex pump, formerly used for delivering water from the city supply to an elevated wooden storage tank. Increase in city water pressure has made this equipment unnecessary. Metered city water is used on the Moore filter and for all other purposes.

Change House

A 20 ft. x 40 ft. frame building, equipped with steel lockers, shower baths and toilet facilities, is used for a change house.

Shops

A 30 ft. x 40 ft. frame and corrugated iron building, originally used as a general shop, is now used as a carpenter shop for the three plants. The equipment consists of a planer, table saw and band saw. A small frame and corrugated iron building adjacent to the cell room, is used as a shop for repair of cathode frames. This building formerly housed the anode straightening press prior to the transfer of this operation to the Refinery. The general office building, storeroom and shops, analytical and research laboratories and other general service departments including fire protection, owned by the International Lead Refining Company, are used by the Anaconda Lead Products Company.