Features of the Substation at the Hog Island Shipyard

BY W. B. WEST

Hydroelectric Research Engineer, New York

THE Hog Island Shipyard, near Philadelphia, Pennsylvania, constructed as a war measure, and which is known all over the world as one of the largest shipyards in existence, is operated throughout by electrical power purchased from the Philadelphia

OUTDOOR 66,000-VOLT BUS STRUCTURE—MAIN SUBSTATION

Electric Company and transmitted over a double-circuit, 66,000-volt stranded copper No. 00 transmission line. There is also another single-circuit line operating at 13,000 volts. Both are three-phase circuits. At the main substation (shown in an accompanying illus-

TRANSFORMER BANK AND HIGH-TENSION OIL SWITCHES.
MAIN SUBSTATION

tration) there are twelve General Electric transformers with a capacity of 2000 kv-a. each. The frequency throughout the system is 60 cycles per second. The primaries of the transformers are delta-connected, and the secondaries are Y-connected. Their temperatures were 55 deg. cent. when the writer was at the

station in March, 1920. They are purely oil-cooled. Monthly tests are made of the oil in the transformers, and if the oil is below the 28,000 point it is filtered by a filter which is located on the interior of the substation. It too, is a standard G. E. type.

The 66,000-volt oil switches are arranged as shown in one of the illustrations. The bus structure is com-

THE BUS STRUCTURE

posed of bronze coated pipes, $1\frac{1}{4}$ inches in diameter, suspended from eight-disk Ohio Brass insulators. The connections from all switches to the overhead bus structure are also $1\frac{1}{4}$ -in. pipes.

The oil switches in the main substation are operated by electric motors $\frac{1}{4}$ h. p. each, using direct current at 110 volts pressure. This applies to three switches.

In the storage battery room there are 58 Gould storage cells which operate the oil switches and fire

A "GARDEN" OF ELECTRICAL EQUIPMENT

alarms. Each is capable of delivering $2\frac{1}{2}$ volts maximum.

There is a private telephone exchange in the main substation. Trunk lines run from this P. B. X. exchange to the main telephone building. From the P. B. X. exchange telephone connections are made to the various plants throughout the yard which receive power from the main substation. Therefore, the op-

DETAILS OF CHOKE COIL CONSTRUCTION

eration of the entire system is not only under the control of the load dispatcher in the main substation, but men in the main office may also communicate with operators at the various plants.

From the main substation power is distributed to the seven air compressor stations at a voltage of 4150, and to the pumping stations and other utilities. The compressor plants supply compressed air for the operation of riveters and other structural devices.

Construction was carried on under the greatest imaginable handicaps, as to isolation of location from transportation, bad drainage, weather conditions, and other causes coincident with the construction of the shipyard which was being carried on at the same time.

E. T. Smith who is Electrical Superintendent has immediate supervision of this station's operation. F. G. O'Neil is in charge of the Utilities Department.

GENERAL VIEW OF THE MAIN DEAD
END TRANSMISSION TOWER CLOSE-UP VIEW OF TYPICAL LINE TOWER SHOWING DETAILS
OF CONSTRUCTION CLOSE-UP VIEW OF MAIN DEAD END TOWER SHOWN INSIDE
SUBSTATION

SWITCHBOARD ROOM—MAIN SUBSTATION

SWITCH ROOM—MAIN SUBSTATION