

In addition to its importance as a switching station, the substation maintains optimum bus voltage to provide the best possible service to customers. A synchronous condenser, manufactured by Elliott Company, maintains a suitable voltage on the 115-kv system. However, the station bus voltage is not the controlling factor since loads are not served directly from the Beaver Creek installation. Rather, the distribution substations on the network are the points at which approximately constant voltage is needed. The over-all system voltage can be adjusted over a considerable range by the operator at the substation.

Power generated in the Colorado-Big Thompson Project's hydro-electric power plants on the eastern slope of the Rocky Mountains is delivered to the Beaver Creek substation over Bureau transmission lines extending through Greeley and Brighton, Colorado. From the substation, the power continues over a network of 115-kv lines radiating out to Sterling, Colorado (where interconnection is made with the Missouri River Basin transmission system) and Holyoke, to Akron, Yuma, Wray, and Limon, all in northeastern Colorado. These lines supply energy for distribution systems operated by REA co-ops and municipalities.

Three of the 115-kv lines may either supply power or represent loads, depending on system operating conditions. These lines emanate from the Beaver Creek installation and extend respectively to Greeley, the Colorado-Big Thompson Project substation at the Flatiron Power and Pumping Plant, and a Missouri River Basin Project substation at Sidney, Nebraska. The remaining lines supply distribution substations only.

The Beaver Creek installation's 115-kv bus structure is designed to supply seven 115-kv transmission lines, one 46-kv line, and the substation's 40,000-kva, 13.8-kv syn-

chronous condenser. Two of these 115-kv line positions are spares for future expansion of the Colorado-Big Thompson Project power system. In addition to the main bus, the substation is equipped with a 115-kv transfer bus. With the exception of the bay serving the transformer for the 46-kv line, there is one 115-kv oil circuit breaker for each line position. The 46-kv line is protected by a 46-kv oil circuit breaker and the 3-phase transformer is protected by 115-kv fuses. An additional 115-kv breaker is installed between the 115-kv bus supplying the transformer bank and the transfer bus, serving as a transfer breaker if any 115-kv breaker is taken out of service.

Three single-phase, 115-kv, grounded wye to 13,800-volt transformers are installed in the switchyard to supply the synchronous condenser. Each transformer has a self-cooled rating of 12,800 kva, which can be increased to 16,000 kva by the addition of cooling fans.

Initially, network analyzer studies indicated that the bus at the substation should be maintained at about 107 kv during periods of light loads. These studies also showed that the voltage should be increased to about 115 kv during periods of heavy system loads. During periods of light loads, the capacity of the transmission lines tied into the substation causes the voltage to rise at distant

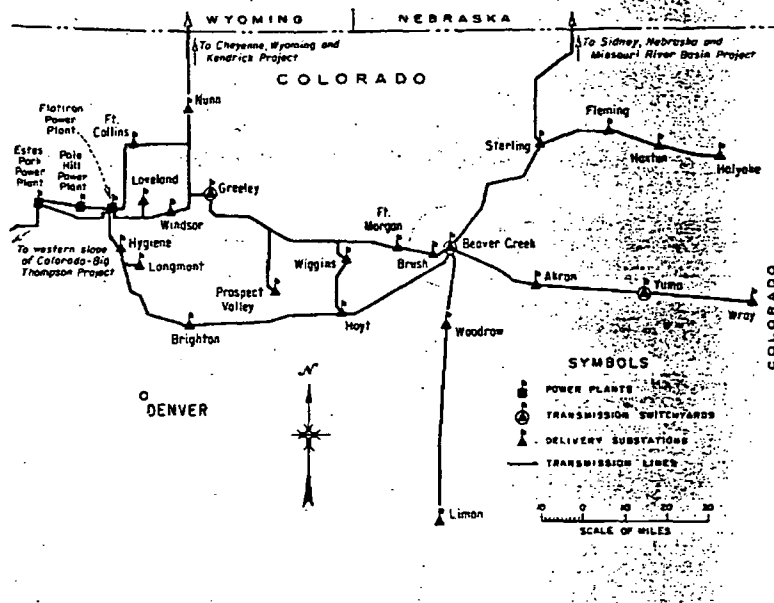


Diagram of northeastern Colorado 115-kv transmission system on which the Beaver Creek substation is located near the load centers. The system is supplied by several hydro stations. An Elliott 35,000-kva, 450-rpm generator serves the Pole Hill Power Plant. Three Elliott 13,333-kva, 240-rpm generators are installed in the Kortz power plant in the Kendrick Project, mentioned at top of diagram, and two Elliott 18,950-kva, 164-rpm generators will soon be in operation at the Alcova power plant, also part of the Kendrick Project.