CONSTRUCTION OF THE KHODZHIKENT HYDROELECTRIC STATION

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The KHODZHIKENT hydroelectric station is the second stage in the construction of the Central Chirchik hydroelectric system (Charvak, Khodzhikent, and Gazalkent power plants). The accompanying reservoir is designed to completely regulate the daily flow from the Charvak hydroelectric power plant when operating at peak load. The operation of the Khodzhikent and Charvak plants will be synchronized after completion of the Gazalkent installation.

The basic parameters for the Khodzhikent hydroelectric plant are as follows: 1) a fixed output of 165,000 kW under a rated head of 34 m; 2) average yearly generation of electricity of 560,000,000 kWh; 3) an aggregate reservoir capacity of 31,000,000 m³; 4) an effective reservoir capacity of 9,000,000 m³ for regulating the daily flow from the Charvak hydroelectric plant; 5) a reservoir surface area of 2.4 km².

The Khodzhikent hydroelectric station is comprised of the following structures: a run-of-the-river hydroelectric plant (see Fig. 1) set into the face of the dam, equipped with ground spillways designed for the passage of flows during construction and, later, for flood releases during plant operation; an earth river dam made of loam; left- and right-bank disks with drainage networks; a 110-kW open switching station.

The width of the Chirchik River Valley at the site of the hydroelectric structure is 150 m. The foundation for both the power plant and the earth dam is composed of bedrock, i.e., carbonate aleuroargillaceous and aleuroarenaceous rocks with occasional interlayers of gravelite. When dry this bedrock has a compressive strength of 116.7-560.1 kg/cm²; water saturation reduces this value to 8.6-217.6 kg/cm². Argillaceous varieties of these rocks are highly prone to weathering, especially during periods of variable moistening.

Since the left slope above the flood plain of the Chirchik River is a slide area, it was necessary to carry out major water-lowering operations in a foundation pit equipped with a system of drainage and upland ditches, as well as a drainpipe network. The plant is situated on the left-bank terrace above the flood plain of the river, which made it possible to work in the foundation pit under dry conditions after first installing a drainage system and taking preventive measures against any adverse phenomena which may arise during the construction phase.

The 358-m-long channel section of the dam spans the main channel of the Chirchik River and joins a right-bank dike which is 1019 m long, and prevents flooding of the vineyards along the right-bank terrace above the flood plain. Provision is made for an open drain field with a gravity flow along the dike to discharge water into the tail bay.

The 239-m-long left-bank section of the dam spans the terraces above the flood plain of the Chirchik River and joins a dike 1700 m long, which provides the village of Karankul' and the Barrazh-Charvak railway line. Provision is made for a drain field 1800 m long between the dike and the railroad to discharge water into the tail bay.

A block design has been selected for the hydroelectric superstructure, which houses three vertical generating units, an assembly platform, and six bottom spillways passing beneath the spiral chambers and emerging above the draft tubes. Each spillway opening measures 4 x 4 m at the outlet. The passage of rated flood flows with 0.1% frequency at a rate of 2040 m³/sec is effected by the operation of two units and five bottom spillways. Provision is made for the operation of three units and six spillways during passage of floods with a 0.01% frequency. The grids and gates of the penstocks, as well as the gates of the bottom spillways are served by a gantry crane (load capacity 2 x 125 tons) with a clamp hook for cleaning the grids.

The machine room is served by an electric travelling crane with a load capacity of 320 x 32 x 10 tons. Three TD-80000/110 power transformers are located along the spans near the tail bay. The staff offices are located

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in the abutment near the head bay. The machine room houses three 55,000-kW turbines fitted with PL-40/587/8500 rotors. An open switching station is located on the right-bank terrace above the flood plain near the tail bay.

The block electrical circuit for generator-transformer is designed to operate on generator voltage. Provision is made for an automated remote-control system, monitored from the control panel of the Charvak power plant, to ensure proper functioning of the Khodzhikent plant.

The earth loam dam reaches a maximum height of 40 m in the channel section, a width of 10 m along the ridge, and has fixed slopes at 1:3 and 1:3.5. The dam is secured to the foundation and the sides by means of notched insets. The upper slope of the dam within the working area is reinforced by monolithic ferroconcrete slabs measuring 7.5 × 7.5 × 0.25 m. The left-bank dike is composed of coarse gravel with a loam apron, 6-10 m high and 6.5 m wide along the crest; monolithic ferroconcrete slabs are also used to reinforce the upper slope. The right-bank dike is constructed of rolled loam 5-8 m high.

Only a few auxiliary industries are planned for the area near the construction site of the hydroplant, since the basic enterprises, workers’ accommodations, concrete-manufacturing plants, and warehouses of the Charvak hydroelectric works will be utilized during this project.

Construction of the hydroplant foundation pit was completed by end of 1974: 1,510,000 m$^3$ of earth were excavated, and the total fill comprised 485,000 m$^3$. A concrete base was laid beneath the foundation slab of the plant structure and beneath the apron slab in the early part of 1975. The following operations were also completed during this period: 1) preliminary work on the foundation pit along the upper and lower left-bank retaining walls; 2) trimming operations on the apron down to the protective layer; 3) extensive cleaning work below the left-bank dike and ground excavation in the open left-bank drain field; 4) excavation work was begun on the notched insert for the left-bank dike; 5) the foundation pit beneath the left-bank section of the channel dam was completed; 6) the temporary (for the duration of the construction phase) bridge across the Chirchik River in the tail bay was finished.

Large-scale concrete work was started on the basic structures in the middle of 1975, as follows: 1) the foundation slab for the upper right-bank retaining wall (10,600 m$^3$ total volume) was completed; 2) concreting operations have been completed on the foundation slabs for the first and second units (3370 m$^3$), as well as on the second level of draft tube buttresses in the first unit, along which T-form floor beams made of precast ferroconcrete are arranged; 3) the metal structures making up the floor of the ground spillway network have been assembled, the draft tube buttresses in the second unit have been completed, and the floor beams for these pipes have been assembled; 4) work has been completed on the inset of the third unit near the head bay, and the next level has been concreted up to the assembly areas for the floor structures of the ground spillways; 5) concreting has been completed on the inset near the head bay; 6) concreting operations are presently being carried out on the apron.

A KBGS-101 concrete-laying crane was assembled to expedite concrete pouring of the apron from the tail bay side. A caterpillar crane similar to the ĖKG-4.6 excavator was installed in the first unit on the head bay side to effect the assembly of reinforcing cages and concrete feed. Another such crane was used to concrete the right-bank