LOWER BUREYA HPP

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Data are cited for the new, to-be-constructed Lower Bureya HPP on the Bureya River in the Amur Oblast'.

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The design of Lower Bureya HPP on the Bureya River was developed by Lengidroproekt in 1985, passed all required appraisals, and was approved in October 1986, but construction of the hydroelectric power plant was not initiated in that period.

The Lower Bureya HPP, which is situated 90 km downstream from the Bureya HPP, is designed as a component part of the United Bureya Complex. As the main plant, moreover, the Bureya HPP has operated in all sections of the load curve, while being its counter-regulator, the Lower Bureya HPP is intended for operation in the basic part of the curve.

The region in which the lower Bureya HPP is to be constructed is characterized by:

— a monsoon climate with a prevalence of stable, clear, and freezing weather with a calm or light wind in the winter. In terms of water regime, the Bureya River is referred to as a Far Eastern type of which a multiple-peak high-water/flood regime in the warm period of the year, and a lengthy low-water winter period are characteristic. 75 – 90% of the annual flow is passed during spring and summer, and from 10 to 20% in the fall, while the winter percentage of the annual flow is 3 – 4;  
— an average temperature of the lowest five-day period of minus 37.6°C;  
— an annual amount of precipitation ranging from 601 to 776 mm;  
— a mean annual wind speed ranging from 1.1 to 2.1 m/sec, and a maximum of from 18 to 20 m/sec;  
— a design seismicity at the construction site of 7 and 8 points, depending on the level of liability associated with the buildings and structures;  
— an exposed stratum of weathering zone in the section containing the basic structures, and minimum volumes of excavations for construction of a highway on the right bank, as well as a short length of thrust front of the structures within the hydroproject;  
— a snow cover that is established during the first half of November, and recedes in mid-April. Moreover, the depth of frost under the surface of the ground denuded of snow for the average winter is 240 cm for the clayey loams, and 287 cm for the sandy soils. Frost development is initiated from the beginning of October, and attains its maximum value by the end of April; and,  
— ground water in the constriction area, which forms a single, on the whole, pressure-free water-bearing horizon, and drains into the Bureya River and its tributaries. The depth of the ground-water table varies from 0.5 to 10 m. Ground water is close to the surface water with respect to chemical composition.

In 1995, construction permits and cost resumes for the Bureya and Lower Bureya HPP, which were under construction at that time, were unified. Erection of structures for the Lower Bureya HPP was never initiated. Measures were only partially taken to transplant people from the impoundment zone of reservoir to be created for the Lower Bureya HPP, which would simultaneously serve as the lower pool of the Bureya HPP. In 2003, construction permits and cost resumes for the two plants were separated again, whereby construction on the Bureya HPP was continued, and construction on the Lower Bureya HPP put on hold.

The question concerning construction of the Lower Bureya hydroproject was revived in 2007, when an active study was initiated to correct the design. The first block of concrete in the basic structures of the Lower Bureya HPP was placed in 2010 in the presence of President of the Government of the Russian Federation V. V. Putin.

The changes introduced to the design were associated with changes in costing conditions, the appearance of new regulatory documents, and the need to meet new requirements relative to the safety of the hydroproject.
The following substitutions were made to the corrected and approved design:

- the right-bank earthen dam by a concrete gravity dam;
- the spillway dam with bottom openings by a spillway dam with a surface spillway;
- the earthen dam with a clayey-loam core by an earthen dam with a clayey-loam core and a wall in the ground within the bed of core; and,
- the three 107-MW generating sets by four 80-MW sets.

The following are included as component parts of the basic structures for the Lower Bureya HPP (Fig. 1): spillway dam, powerhouse, assembly area with insert, right-bank concrete dam, earthen channel dam with clayey-loam core, mating abutment, partitioning wall, right-bank retaining wall, production-engineering building, and a building housing a 220-kV complete power-distribution unit.

A service passageway is to be located at the crest of the basic structures. The assembly platform with an insert is to be cut into the right bank, and incorporated into the thrust front of the hydropower. The right-bank dam will abut the assembly platform on the side of the right bank, and the channel powerhouse on the channel side. The spillway dam will abut the powerhouse on the channel side. The partitioning wall is to be placed on the side of the lower pool between the powerhouse and spillway dam. The mating abutment, which is to be built on the sides of the upper and pools in the form of a jet-directing wall providing for smooth intake and discharge of the flow, will be situated between the spillway dam and earthen channel dam. The earthen dam will have a rectangular planform. The platform near the powerhouse is organized on the right bank below the right-bank concrete dam.

Construction of the Lower Bureya HPP will make it possible to:

- eliminate winter demands of a number of villages situated in the tailrace of the Bureya HPP;
- enhance the reliability and quality of power supply to consumers located in the zone of influence of the Lower Bureya HPP;
- preempt construction of a thermal power plant operating on organic fuel. Here, the saving of expensive imported fuel will amount to approximately 700,000 tons of hydrocarbon fuel per year; and,
- create an infrastructure promoting improvement of social and economic conditions of the people living in regions contiguous to the Amur Oblast'. As a result of construction of the Lower Bureya HPP, the Bureya region will acquire a whole series of entities of social import.

At the present time, the preparatory period of construction is essentially completed: the first phase of the con-

Fig. 1. Basic structures of Lower Bureya HPP: 1, spillway dam; 2, powerhouse; 3, assembly platform with insert; 4, right-bank concrete dam; 5, earthen channel dam with clayey-loam core; 6, mating abutment; 7, partitioning wall; 8, right-bank retaining wall; 9, platform near powerhouse; 10, production and engineering building; 11, building housing 220-kV complete distribution unit; NBL, normal backwater level; HL, high-voltage line; SS, substation.