V. I. LENIN PLYAVIN'SK HYDROELECTRIC STATION
IN THE LATVIAN SSR AND ITS OPERATION

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The entire Soviet nation is going all-out in preparing to celebrate a noteworthy date, the centennial of Vladimir Il'ich Lenin. The name of V. I. Lenin is especially dear to power engineers. The slogan "Communism—this is Soviet power plus electrification of the entire country," which was put forward by V. I. Lenin on December 22, 1920, at the 8th All-Russian Congress of Soviets when discussing the plan of the State Commission for Electrification of Russia (GOELRO), was the core of the program for the development of the Soviet national economy.

The development of power engineering in Latvia was also begun during the first days of Soviet power after the Great October Socialist Revolution. During the course of preparing the GOELRO plan in 1919, the Dolensk hydroelectric station on the Daugava River (the present Riga hydroelectric station) was designed and the draft of the state plan was worked out for the electrification of Latvia, in which the construction of stations on the Daugava River with a capacity of 185,000 hp was outlined. In the absence of fuel resources, water-power engineering has played a leading role in the national economy of the republic. Petr Stuchka, first chairman of the Council of People's Commissars of Latvia, after whom the city of builders and operating personnel of the V. I. Lenin Plyavin'sk station is named, paid great attention to the electrification of the republic.

The German intervention during the Civil War, counterrevolution of bourgeois power in Latvia, and the Second World War postponed the accomplishment of these plans for several decades. Only in 1939 was the first unit of the Kegum hydroelectric station started up which, after its destruction by the fascists, was rebuilt in 1947 with the fraternal help of all peoples of our country, and in 1953 its capacity was brought up to the design capacity. In 1968 the V. I. Lenin Plyavin'sk hydroelectric station was started and construction of the Riga station was begun in 1966 (see Table 1). Water-power engineers have played a prominent role in the power resources of the republic.

Brief Description of the V. I. Lenin Plyavin'sk Hydroelectric Station. The Plyavin'sk station is the upper unit of the sequence of stations on the Daugava River [1], one of the largest waterways of Northwest USSR. The main hydrologic characteristics of the river at the site of the Plyavin'sk station are: drainage area 81,600 km²; mean annual discharge 619 m³/sec; mean annual runoff 19.4 km³/year.

Preparatory work at the construction site began at the end of 1960 and the main work started in March, 1961. In October, 1961, concreting began on the main structures. On July 9, 1965, the excavation was flooded and on July 16...

Fig. 1. Distribution of the heads of subsurface waters under the station powerhouse on April 10, 1969, at a head of 22 m. 1) Drainage in front of the impervious blanket.
TABLE 1

<table>
<thead>
<tr>
<th>Name of hydroelectric station</th>
<th>Stage of readiness</th>
<th>Installed capacity, MW</th>
<th>Number of units</th>
<th>Head, m</th>
</tr>
</thead>
<tbody>
<tr>
<td>V. I. Lenin Plyavin'sk Kegum</td>
<td>Constant operation</td>
<td>825</td>
<td>10</td>
<td>40.0</td>
</tr>
<tr>
<td></td>
<td>Constant operation</td>
<td>72</td>
<td>4</td>
<td>15.9</td>
</tr>
<tr>
<td></td>
<td>Plan for expansion</td>
<td>264</td>
<td>7</td>
<td>14.0</td>
</tr>
<tr>
<td>Riga</td>
<td>Under construction</td>
<td>384</td>
<td>6</td>
<td>18.0</td>
</tr>
</tbody>
</table>

Fig. 2. Lines of equal hydrostatic head along the bottom surface of the concrete structures of the station. 1) Calculated values; 2) actual values.

the river was dammed [5]. In December, 1965, the first five units were started up within two weeks (at a head of 22 m) and in December, 1966, the station reached the design capacity with the installation of the tenth unit. In July, 1966, taking into account the wishes of the workers, the Council of Ministers of the Latvian SSR conferred the name of V. I. Lenin on the Plyavin'sk station. On July 15, 1968, the station was accepted by the State Commission for continuous operation.

The structures were constructed under complex hydrogeological conditions. The powerhouse is of the pierless spillway type, built with a stabilizing impervious blanket. The structures also include a downstream apron, assembly area block, coupling and retaining walls, and channel and right- and left-bank dams and dikes. In the foundation is a system for lowering the pressure of subsurface waters, and grout curtains have been built. Description of individual units of the complex was given earlier [3].

Operation of the Structures. Observations during construction and three years of service show that the geologic and hydrologic conditions of construction were correctly evaluated in the plan. There are divergences from the actual conditions only in certain details.

Piezometric observations of the distribution of the pressures of subsurface water under the structures show that the overall character of seepage in the foundation corresponds to the design assumptions and the magnitude of uplift pressure on the bottom surface of the powerhouse is less than the design, with the exception of a portion of the left-bank abutment (Figs. 1 and 2).