The 11th Congress of the International Commission on Large Dams (ICOLD) was held in Madrid, Spain, on June 11-15, 1973. The Congress was preceded by sessions of the technical committees and by the 41st Meeting of the Executive Committee. The Congress was attended by about 1500 delegates from 80 member countries of ICOLD, that is, one and a half times the number of delegates who were present at the previous 10th Congress; 90 countries are members of ICOLD.

The delegation from the Soviet National Committee on Large Dams included the following: A. A. Borovoi (head of the delegation, Chairman of the Soviet National Committee on Large Dams, Government Committee for Construction of the USSR), A. S. Boikov (Giprovodkhoz), I. I. Golosov (CKNT SSSR), E. G. Gaziev (Gidroproekt), E. L. Matveenko (Gosatoll SSSR), N. S. Rozanov (Chairman of the Technical Committee on Large Dams, B. E. Vedeneev VNIIG), V. M. Semenkov (member of the Technical Committee on Large Dams, Scientific-Research Department of the Gidroproekt Institute), and A. A. Sorokin (member of the Technical Committee on Large Dams, Lengidroproekt).

In accordance with a previously approved program, four topics were discussed during the 11th Congress.

**Topic 40. Effects of Constructed Dams on the Environment.** A total of 59 papers from 26 countries were presented on this theme. The general reporter was M. Cheret (France). As representatives of the Soviet Union, E. G. Gaziev and I. I. Golosov participated in the discussion, with the paper "Aspects of the effects of large reservoirs on the environment." The different aspects of the consequences of dam engineering on the environment were reflected in the papers and discussions. In the papers it was pointed out that investigations in the reservoirs of different physical, hydrochemical, and biological processes, including those that are undesirable are only in the initial stage, and that there are no methods for controlling or regulating these processes.

Many authors pointed out that the harmful effects of dams on the environment are amply compensated for by the advantages of multipurpose utilization of the reservoirs. The harmful effects can and should be reduced to a minimum and are of a temporary nature.

It was stated that in the investigation, design, and construction of dams it is necessary to examine in more detail and with more profundity the problems relating to the biological regimen of reservoirs and the multipurpose utilization of their biological products, the ensuring of the safety of downstream regions in the case of dam failure, the thermal contamination of reservoirs by outflow from thermal electric plants and industrial enterprises, the planning and organization of systematized full-stage observations on large dams, the ensuring of optimal (from the environmental standpoint) conditions for carrying out construction work, and the aesthetic quality of the structures.

**Topic 41. Flow and Energy Control during Construction and after Completion of Dams.** This topic was treated in 83 papers from 28 countries. As a contribution of the Soviet Union, the paper "Passage of water and ice during construction and operation of large dams on major Siberian rivers," was presented by L. K. Domanski, B. P. Feringer, F. G. Gun'ko, G. A. Rubinskii, and A. G. Solov'ev.

The general reporter, M. Verchon (Yugoslavia) classified the papers presented at the Congress according to four basic directions: a) investigation of stream regimens, determination of peak flows for spillway design, and problems arising during the reservoir operation; b) construction of spillways and stilling basins, and energy dissipation.
problems; c) passage of flows during dam construction and closing off of river channels; and d) construction of dams in river estuaries.

He mentioned also the progress achieved in this field thanks to the work being carried out by several organizations and specialized institutes. However, many important problems remain. Among them are the effects of cavitation, vibration, and pulsations on spillway structures, which can cause serious harm. Of increasing importance in this connection is the joint efforts of the designers and scientific workers to effectively solve these problems.

On the basis of the general reporter's analysis of the material presented, the following main aspects were considered in the discussions: a) comparison of different methods for estimating probable floods; b) economic aspects of the selection of design flows for permanent and temporary structures; c) theoretical aspects and manifestations of the effects of cavitation, vibration, and pulsations; d) full or partial protection of different types of stilling basins against scour; e) protection of cofferdams subjected to temporary overflow; f) temporary structures on pervious alluvia; g) cavitation-resistant materials for spillway structures and energy dissipators; h) construction of cofferdams for dams in river estuaries. V. M. Semenkov, from the Soviet National Committee on Large Dams, participated in the discussion with the report "Flow aeration in spillways, for protection against cavitation damage."

Topic 42. "Impervious Elements and Slope Protection on Earth and Rock-Fill Dams." The paper "Measures for water proofing the Nurek dam," was presented by V. L. Vutsel', P. P. Listrovyi, M. P. Malyshyev, and V. I. Shcherbina, from the Soviet Union. This topic was treated in 53 papers from 27 countries. The subjects of all the papers were combined in the following manner: clay cores, 19 papers; asphalt-concrete diaphragms, 3 papers; reinforced-concrete facings, 5 papers; asphalt-concrete facings, 7 papers; other types of impervious materials, 5 papers; slope protection, 10 papers; new methods and materials, 2 papers; and other subjects, 2 papers.

The general reporter, M. Gerard (England) devoted special attention to new materials, new construction methods, and recent investigations. He mentioned the successful results of utilizing vinyl-resin concrete instead of asphalt concrete for dam facings in France; the use of "Cyclopesan" masonry made from bituminous mortars for diaphragms in rock-fill dams (France); investigations on the use of a foam grout for grouting rock fills (France); and large-scale tests carried out to investigate the wave action on rip-rap slope protection.

The basic tendencies in the development of different types of impervious elements for earth and rock-fill dams, which were described in the papers presented during the Congress, are determined by the following concepts: a) expansion of the field of application of diaphragms using different mixes of bentonite with earth, cement, and concrete; b) improvement of the flexibility and mobility of clay cores by introducing or constructing buffer zones in their foundations; c) use of asphalt concrete diaphragms in preference to asphalt-concrete facings. As regards slope protection on dams, there is a tendency to use simple methods, consisting of placing of rip-rap.

Discussions were held, with the participation of the Soviet delegate A. A. Sorokin, who briefly described the subject matter in the report presented by N. I. Zinevich, V. L. Kuperman, K. K. Kuz'min, and L. A. Tolkachev, on an impervious element of the Atbashinsk dam.


The general reporter, Mr. Arthur (U.S.A.) gave recommendations intended to simplify design. He, in particular, recommended the construction of dams of simpler design, even in the case where this leads to an increase in the volume of the structure, but reduces construction time. He stated that a reduction in the volume of a concrete dam inevitably leads to the need for a more complex shape, and that this increases the construction cost. He mentioned also the recommendations for replacing the use of seals between the concrete blocks by a new waterproofing method consisting in the application on the upstream face of an impervious cover made from Thiokol plastics (Yugoslavia), and for using an approximate method for determining the shape of arch dams with the help of electronic computers (Canada). In connection with the improvement of the construction techniques, the general reporter mentioned the use of electronic computers for determining the optimal sequences and durations of different types of construction operations.

He mentioned the advantages of the methods of continuous placing of concrete in dams, used in the USSR, the U.S.A., and Austria, and gave a favorable evaluation of the use, in concrete dam construction, of sliding forms, of new methods for stabilizing jointed foundations, etc.