



BORDE SECO DAM

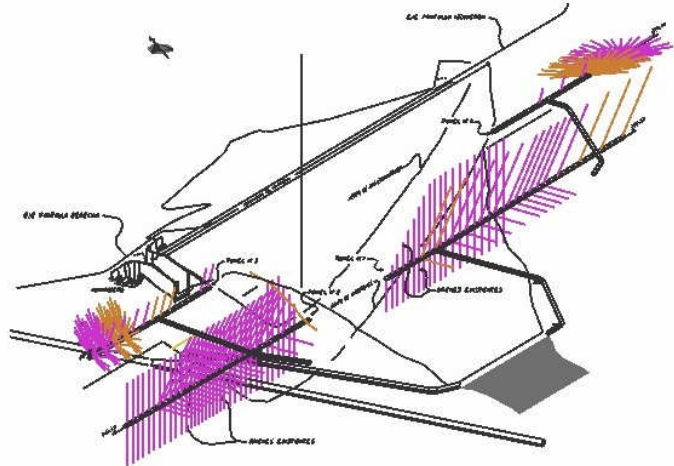
Venezuela, 2003-2005

CARACTERISTICS OF THE PROJECT

Purpose: Rigid and plastic diaphragm cut with hydromill, on both abutments and in the core of an existing dam. New grout and drain curtains. Automatic Monitoring system.

Works:

- Field Investigation with roto-percussion hammers, cored borings, pressure water Tests, TV surveys, Down-hole and Cross-hole logging and Radar Tests;
- Excavation and casting of 22 000 m² of concrete panels: cut with hydromill in hard rock, soft rock and silty embankment cast with hard concrete plus 2 000 m² of panels in plastic concrete of low module ($< 5000 \text{ kg/cm}^2$) and low permeability ($< 1 \times 10^{-6} \text{ cm/s}$). Maximum panel depth 65 m.
- Perforation of 6 600 m of drainage wells 60 m deep in friable/soft rock, lined with PVC slotted from the small existing abutment tunnels. Maximum length 60 m.
- Installation, on both abutments, of a system of piezometers in order to carry out a real time monitoring of the unconfined surface aquifer and of 2 deep confined aquifers. The recording system consists of 59 piezometers connected to a data-logger which directly transfers the readings to a central scanning and recording computer. Piezometers are Casagrande type (open) with stick-in vibrating wire transducer for pressure and temperature



Foundation Materials:

- Silty Sandstone and Limestone.

PROFESSIONAL SERVICES PERFORMED

Project and construction supervision of the diaphragm wall and monitoring system of drainage of grout curtain of the abutments of dam. Creation of two 3D geohydrologic models in order to simulate the filtration process under abutments and foresee the piezometric surfaces.

The SC activities started in 2001 with a Contract Tender. During 2004 DESURCA decided to reduce the total amount for the rehabilitation works of the Groupment SC-TREVI. This produced a change of project and the reduction of quantities. We eliminated all the drainage holes under the level 310.00 m slm. In order to drill the drainage holes all existing tunnels were equipped of ventilation and lighting systems.

Works started from 2004 to the end of 2005, as contractually scheduled, although during excavation were encountered some difficulties: presence of a very hard rock (more than 1000 kg/cm²) which creates several breaks of machines and big leaks of bentonitic mud for the presence of carstic cavities (316 – 307 – 301 – 295 m slm) of variable from centimetres to meters.

