

HYDROPLUS IN THE USA Terminus Fusegates Underway

The 6.5 m-high Fusegates at Terminus Dam – located on the Kaweah River, South of Fresno, CA – are the biggest concrete Fusegates in the world so far.

The existing spillway is a 93.6 m-wide concrete sill with a notched center section that is 41.2 m-wide. For the proposed arrangement, a total of six Fusegates made of reinforced concrete are required, each 11.7 m-wide, 6.5 m-high, and 13.0 m in length at the crest.

Instead of the conventional arrangement of wells set in the Fusegate structure, the wells are located at the right abutment of the spillway and are connected individually to the Fusegates using embedded pipes. Such arrangement allows the water to discharge unencumbered along the complete Fusegate crest length.

Their installation will allow for an increase of the storage capacity of the reservoir (Lake Kaweah) by $50 \times 10^6 \text{m}^3$ and improve the flood protection capacity.



MODEL STUDIES AT UTAH STATE UNIVERSITY

As of October 2003, the concreting of the sill and construction of the inlet conduit are completed and the casting of the Fusegates is underway. The construction works are scheduled to be completed early 2004.

The application of the Fusegate System enables the American taxpayers to save about US \$4 million compared to the next economical solution which was involving the widening and heightening of the existing uncontrolled spillway.



DOWNSTREAM VIEW OF THE SPILLWAY

AUSTRALIA

Construction Stage at Dartmouth

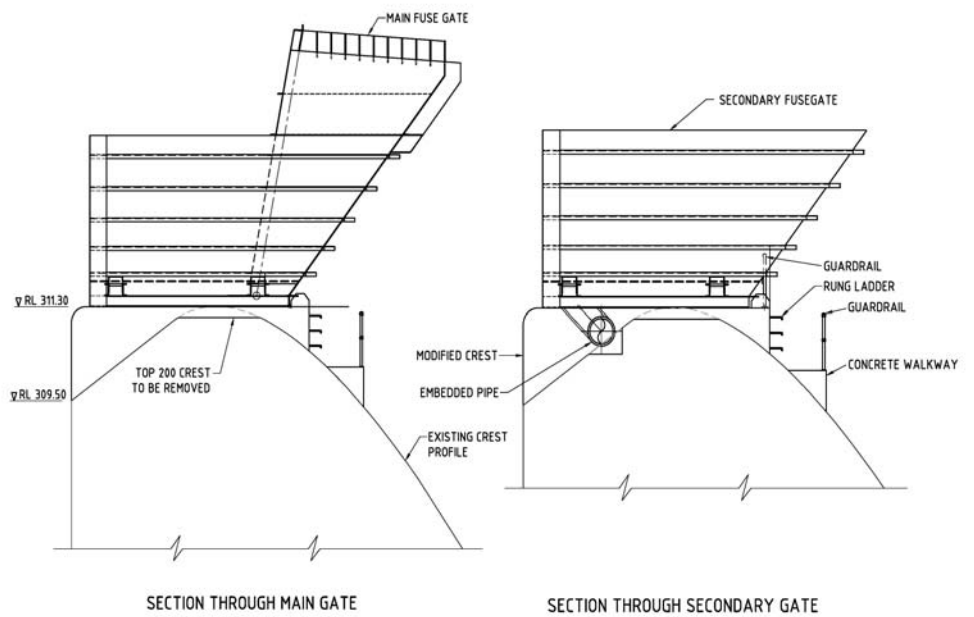
To allow greater flexibility in their generation and hence a better response to the peaks in electricity demand, Southern Hydro decided to increase the Full Supply Level of Dartmouth Regulatory Dam from 3.0 to 3.5 m.

The Regulating Dam is located on the Mitta Mitta River, approximately 8 km downstream of Dartmouth Dam. It is a 23 m-high concrete gravity structure with a 60 m-long central spillway section. The dam forms the storage required for regulating releases from the Dartmouth Power Station back to the Mitta Mitta River, so as to satisfy environmental requirements.

After an initial assessment of the economic benefits, a detailed review of raising options was undertaken, including different proprietary products and conventional spillway gates. It was concluded that the Hydroplus System would provide the greatest benefits when all aspects of the raising were considered, including dam safety, long term reliability, maintenance and cost.

The project involves the installation of ten labyrinth crested Fusegates, 3.3 m-high by 5.8 m-wide, on the free spillway sill. Although this is the second Fusegate project in Australia, it is unique in that difficult access conditions determined that construction in mild steel would be the most appropriate.

TYPICAL CROSS SECTION THROUGH SPILLWAY SILL



The installation contractor devised an ingenious method for installing the huge structures over the top of the gate-house which blocks direct access to the spillway. Design was very much undertaken with the installation method in mind to ensure a high quality project with minimum contractual risk.

Completion of this project is scheduled for the end of October 2003.



FUSEGATES ONTO SPILLWAY

The construction stage of this project will be presented at ANCOLD, Hobart on October 28th, 2003 by the project team.

ALGERIA

Speedy Storage Capacity Boost

HYDROPLUS successfully raised the Beni Amrane dam in Algeria within 16 weeks. The Fusegates provide an additional 7.1M m³ of storage capacity without raising the Maximum Water Level calculated for a 10.000 m³/s flood.

Located 50 km East of Alger, the Beni Amrane dam provides potable water to the capital. Commissioned in 1998, this gravity dam quickly suffered from an important silting which reduced the storage capacity from 11.6M m³ to 5M m³ beginning of 2003. To restore the initial potential, the National Agency for Dams (ANB) preferred the Fusegate option to dredging, as the system is faster to put in place and more economical.

Seven straight crested Fusegates, 3.75 m-high by 14.60 m-wide, were installed on the free spillway sill. Made from concrete, each weighs 510 tons. Their design is directly derived from the experience gained at Lyell dam project in Australia.

The modification of the spillway sill construction of the Fusegates was undertaken by local contractors under strict supervision of HYDROPLUS.

The Ministry of Water Resources set up a tight project planning programme in order to store as much of the spring run-off as possible. The challenging deadline was met thanks to continuous operation teams.

Luckily, the major earthquake of May 21st did not claim any casualty on the dam site. The HYDROPLUS installation behaved satisfactorily under the earthquake loading (with a magnitude of 5,1 on the Richter scale) and no damage occurred to the Fusegates.



CLOSE-UP VIEW OF INLET SHAFTS

Recent Papers and Forthcoming Conferences

- **THE BEHAVIOR OF FUSEGATES IN ICE-AFFECTED ENVIRONMENTS**

By H. Kocahan, HYDROPLUS
ASDSO 2003 - Minneapolis, Minnesota, USA

- **ANCOLD 2003 - Hobart, Tasmania, Australia**
October 24 to 28

"Increasing Storage Capacity at Dartmouth Regulatory Dam with Fusegates: the Construction Stage"

By W.D. Hakin from HYDROPLUS, P. Buchanan from GHD, D. Connors from Southern Hydro, and D. Loidl from Geotechnical Engineering.

HYDROPLUS

5, cours Ferdinand-de-Lesseps

92851 Rueil-Malmaison Cedex—FRANCE

Tel: +33 (0)1.47.16.44.34 / Fax: +33 (0)1.47.16.42.12

contact@hydroplus.com

www.hydroplus.com