FUSEGATE NEWS

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Our Projects

Fusegates under construction at Jindabyne

Construction work is nearing completion on the upgrade of Jindabyne Dam, approximately 65 km west of Cooma, New South Wales. It includes construction of a new auxiliary spillway controlled by Fusegates combined with modifications to the existing spillway. The eight reinforced concrete Fusegates for Jindabyne are the largest in the world to date at 7.6-m high with the heaviest unit weighing in at approximately 380 tons.

View looking downstream

Aerial View of the works

Ghrib Dam project near completion

In Algeria, efforts to raise the Ghrib Dam, realized on behalf of the state agency, Agence Nationale des Barrages et Transferts, are nearing completion. Twenty 4.50m-high, labyrinth-crested Fusegates have been installed on the spillway sill. In early November 2006, two flap gates, 4 m high and 15 m wide, designed for the release of ordinary flooding, will be added. Upon completion, this structure – the largest ever implemented by Hydroplus – will store an additional 70 million cubic metres of water for irrigation and supply purposes. Following the awarding of the contract, Hydroplus will have delivered this project in only sixteen months. The Ghrib Dam mandate is the eighth project in Africa for Hydroplus and the third in Algeria – and consolidates the company's global leadership position in the water management industry.

Close view of Ghrib Fusegates

Dam optimization

There is probably little debate about the fact that demand for more dams in the drier and more developing parts of the world continues and this is against a backdrop of increasing environmental constraints on such green field projects.

It could be argued that before new dam projects are planned, owners could be well advised to first look at increasing the return from their existing storage reservoirs. This approach can not only provide a lower unit cost of additional m^3 of water supplied but can also reduce significantly the negative environmental impacts sometimes associated with new dams.

When Fusegates are used to achieve this end there is often no increase in Maximum Water Level and the task of retro-fitting an existing spillway with Fusegates can often be achieved quickly, economically and with little disruption to the asset.

Optimizing hydropower schemes in Greece

Due to widespread public concern regarding the environment, there appears to be little opportunity for building either large or small new hydroelectric power plants in the future in spite of the strong policy drive towards expanding the proportion of energy gained from renewable sources.

Raising the reservoir, if feasible, increases storage capacity as well as the water head above the turbines, which results in increased electricity production and improved efficiency.

The latter possibility has been studied at Kastraki hydroelectric plant located in continental Greece. The 96-m high earthfill embankment generates a reservoir with 785 million m3 of storage capacity with an installed capacity of 320 MW, producing on average 640 GWh per year.

Kastraki dam: Artist's interpretation

The study concluded that the application of Fusegates offers significant operations and cost advantages other spillway control systems considered.

The permanent reservoir would be raised with 20 Fusegates, each 1.80-m high and 6.00-m wide. As a result, the useful storage volume would be increased from 53 to 97 million m3 without affecting the stability of the dam and its supporting structures.

From a financial standpoint, it is estimated that this 1.5-million-euro project would generate a net increase of power production of approximately 41 GWh per year, resulting in a total financial benefit of approximately 3.5 million euros per year.

The dam owner, PPC, is currently completing the evaluation of the project.

Optimizing irrigation schemes in Thailand

There are more than 3,000 irrigation dams in Thailand, most of which are owned and operated by the Royal Irrigation Department. With a useful storage capacity ranging typically between 5 and 20 million cubic metres, the majority of these dams are classified mainly as medium-sized. Built in the last 20 years using modern design methods, they were mostly designed, however, for the 1:100 years flood due to cost considerations.

In order to deal with an increasing demand in water, the Thai authorities are seeking alternatives to the construction of new reservoirs. New dam projects actually involve social and environmental constraints, which increase considerably the duration of the project and the construction costs. Meanwhile, the development of the flood plains located downstream of the dam embankments requires an increase in the safety of the dam in terms of the ability of the spillway to discharge exceptional floods.

A study has been sponsored by the French Government to assess the potential of the Fusegate System to deal with the dual requirement of increasing the storage capacity of ten selected irrigation dams located in the north and east of Thailand while enhancing their safety.

Flood control reservoirs, an unexploited ressource?

Application of the Fusegate System on a lowered spillway sill results in an increase in the initial storage capacity while ensuring the discharge of the revised design flood. It was shown that the cumulative storage capacity of these ten dams can be increased by 62 million m3 (+23%) in addition to enhancing safety. The return period of the design flood increases from 1:100 to 1:500 years. From a financial standpoint, the cost of the modifications would result in a price of stored water of 0.40 euros per m3 on average.

This matter will be discussed during the Hydro Asia 2006 conference, which will take place at the Montien Riverside Hotel in Bangkok, Thaïland from November 30 to December 1.

At a glance:

- 10 dams selected across Thaïland
- 23% storage capacity increase on average
- 0.40 euros per m3 of water stored on average
- More safety in terms of discharge capacity
- Limited social and environmental impact

Dam optimization - References:

- S. Chevalier, J. Rayssiguier
"Optimization of existing dams"
ICOLD annual conference proceeding, Montreal, 2003
available on Hydroplus web site

- J. Stefanakos, N. Moutafis and A. Kagiannas
"Increase in storage, efficiency and energy production by the installation of Fusegates at Kastraki HEP, Greece"
Hydro 2006, Porto Carras, Greece

- S. Lacroix, S. Sucharit, P. Agresti
Increasing storage capacity and improving safety of irrigation schemes in Thailand
Asia 2006, Bangkok, Thailand

Spillway and dam safety

Dam safety is highly dependant on the ability of the spillway to pass extrem floods. Therefore, the selection of a spillway control system, which is reliable and operational at any time, is of vital importance.

Gate malfunction in Nigeria

A dam located in the north-western corner of Nigeria collapsed on the afternoon of the September 30, 2006 following more than 24 hours of heavy rain. The sluice gates on the spillway failed to function, causing the rainwater to overtop the dam.

Hundreds of people were left homeless after the dam failure, as flooding destroyed more than 500 homes. In addition, floodwaters also devastated many hectares of farmland and contaminated wells on which the population of the area depended for drinking water.

This accident illustrates once again the safety benefits of combining conventional gates and self-operating spillway control systems.

The collapsed embankment and spillway

Events

2006 ANCOLD
SYDNEY, AUSTRALIA
20 to 22 November 2006

ASIA 2006
BANGKOK, THAILAND
31 November to 1st December 2006

Fusegates, a reliable alternative

Shongweni Dam

Fusegates operate completely independently – no need for human supervision, electrical power or systems control.

Fusegates are designed to protect, at all times and under all conditions, the dam as well as people and property located downstream. Fusegates also provide a level of reliability and operational accuracy that is superior to that of traditional non-mechanical systems, such as fuseplugs.

Rigorous studies, using scale models and full-scale prototypes, have been conducted on the stability of Fusegates and on conditions that can have an impact on overturning, such as earthquakes, impacts from heavy objects, ice pressure, lack of maintenance, vandalism, sabotage, degradation of joint seals, blockage of drain holes and the obstruction of drain holes and inlet wells. These studies have demonstrated the exceptional reliability of Fusegates, a key benefit in an area where system failures can have catastrophic consequences .

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