

## Bituminous geomembrane, the blueprint to safe water resources

PAU LLINAS\*<sup>1</sup>, BERTRAND BREUL<sup>1</sup>, BERNARD BREUL<sup>1</sup>

<sup>1</sup>*Axter Coletanche*

The world's water is in an increasingly critical state. Once limited to certain parts of the world, now drought occurs everywhere leading at the same time to floods in certain periods. In addition, a lot of water resources cannot be obtained as either the aquifer is in salty-fractured soils or it is not economically viable to extract it from the subsoil. This paper will present a solution adopted in different countries such as USA, France and India to drive and settle the integrated water management by applying a reasonable policy. In order to leave no one without access to safe drinking or irrigation water supply, construction of hydraulic structures for water management is of vital importance. Using an efficient solution for reservoir and canal lining like bituminous geomembrane instead rigid materials like concrete - despite the evidence of its rapid deterioration due to settlements - is therefore very important.

The paper will present the structure of bituminous geomembrane (BGM) and its exposed application directly to sunlight thanks to its high UV resistance by showing case studies of reservoir and canal lining: Bel-Air reservoir (Maryland, USA) ensuring safe drinking water and Roza Reservoir (Washington, USA) for storing water in winter and returning it through a network of irrigation canals to Naches-Selah and the lining of these canals. The paper will also mention a similar case in France with Mannes reservoir in the French Alps which provides water for irrigation and potable water for the city of Gap (40,000 inhabitants) and two other irrigation canals: Nagpur Pench Canal (Maharashtra, India) and Canal de Provence (France) - managed by the biggest irrigation company in France - for irrigating all south of France taking water from the Alps.

To complete the use of bituminous geomembrane, some case histories in dam applications will be detailed: a 30-m high earth and rock fill dam in Peru, a 23-m high concrete dam in Chile and one earth 42-m high dam in France, being classified as high dam per the definition established by the International Commission on Large Dams (ICOLD). Finally, for exposing an idea of the longevity of this geomembrane, the results of a survey done by the French Ministry of Agriculture on a dam in Corsica after 30 years of service will be presented.

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