

MONITORING DEFORMATION BEHAVIOUR CAUSED BY ALKALI-AGGREGATE REACTION

Location: Mactaquac Dam, Keswick Ridge, New Brunswick

Located on the Saint John River, the Mactaquac Dam has an operating capacity of over 650 megawatts. Initially projected to last until 2068, Alkali-aggregate reaction (AAR) within the concrete used in the powerhouse and spillway has significantly reduced the dam's expected 100-year lifespan. AAR causes the concrete within these structures to swell and crack, requiring constant monitoring and annual maintenance at substantial cost.

NB Power engineers use several technologies to monitor deformation behaviour in the structures. One of these is inverted pendulums that measure the overall tilt of the dam intake, powerhouse, and spillway gate. However, the pendulums' low deformation tolerance and expensive installation costs led engineers to install ShapeArray because of its wider tilt tolerance.



MACTAQUAC DAM

Data showed good agreement between ShapeArray and the inverted pendulum. ShapeArray is a valuable tool in both automating long-term deformation readings and avoiding the need for precision drilling required in inverted pendulum installations.

"MEMS-Array Monitoring of a Dam" Danisch et al. In Proceedings of the CDA 2011 Annual Conference, Fredericton, NB, Canada, October 15-20, 2011
Photo: Mactaquac Dam, Located in Keswick Ridge, New Brunswick

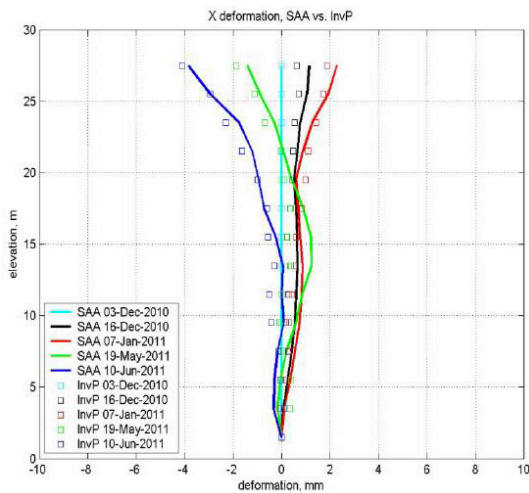


FIGURE 2
Comparison of the X data from the SAA and Inverted Pendulum.



FIGURE 3
Comparison of the Y data from the SAA and Inverted Pendulum.