

# 300,000 Vinyl Spheres | College of Engineering

10/16/2020

How USU Researchers are Working to Save Colombia's Tallest Dam

Engineers at Utah State University are racing to develop a unique solution to ensure the safety of the largest hydroelectric project in Colombia. The Ituango Dam on the Cauca River is the tallest in this South American country. The dam's hydro-electric plant is projected to generate 2.4 megawatts of power.



*USU's Dr. Brian Crookston (right) works alongside IHE Delft Institute's Dr. Daniel Valero to test a 1:10 scale model of a system designed to save Colombia's tallest dam. The plan involves filling a leaking tunnel with thousands of vinyl balls.*

In 2018, the project suffered a setback when landslides blocked a diversion tunnel designed to route the Cauca River around the construction site. The blockage caused the dam to fill beyond its designed capacity. A separate diversion tunnel, which was intentionally sealed during construction, reopened and caused a surge of outflow. The flows prompted evacuations along the river's path.

Now engineers are working to seal the partially-clogged tunnel. Their solution is to fill the tunnel with thousands of vinyl spheres. Brian Crookston, an assistant professor of civil engineering at USU and hydraulic engineering researcher Daniel Valero of the IHE Delft Institute for Water Education in the Netherlands, designed the concept.



"Our idea is rather simple," said Crookston. "The diversion tunnel is already partially full of debris. By filling the remaining voids with vinyl spheres, we may be able to stop the flow completely. We use access shafts to drop the spheres into the void until it's completely filled."

The team tested the concept using a 1:10 scale model at the Utah Water Research Laboratory. Last fall, a delegation of Colombian authorities visited the lab to see a demonstration.

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