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In October 2010, a small depression on the downstream side of the Left Earth Embankment at the Big Falls Hydroelectric Plant was observed to have increased in depth and diameter. Following the observation of a second deepening depression a day later, Xcel Energy initiated a Watch Condition of the Emergency Action Plan (EAP). The Federal Energy Regulatory Commission, Rusk County, and Dairyland Power Cooperative were notified and a reservoir drawdown was initiated. A fine to medium sand backfill was placed in the sinkholes for temporary stabilization.

Following initiation of the EAP, several potential mechanisms for the depressions were hypothesized and evaluated. Potential failure modes, construction records, record drawings, historic photographs and rock/soil conditions were all reviewed. The review of historic photographs indicated that numerous wooden trestles were utilized as the foundation/bridge to transport materials from the bank/shoreline to the project features during construction of the dam in 1922. There was no visible evidence of the trestle downstream of the dam. However, there were remnants of the trestle along the upstream side of the dam and no records were located that provide information about the removal of the trestle within the footprint of the earth embankment dam (prevailing theory is that they were buried).

Drilling investigations were conducted and a repair was completed at twenty-two depression locations and consisted of augering into the depressions to remove loose or objectionable material and placing more suitable material. The repair sequence included the following steps:

- 1) Augering holes 3 feet in diameter down to the top of an underlying Rock Fill zone of the embankment.
- 2) Casing of boreholes as necessary to allow for excavations to remain open during excavation and backfilling procedures.
- 3) Backfilling the augered holes in lifts with a fine to medium sand material (properly filtered) that is free draining.
- 4) Compacting of backfill lifts with a specially designed flat tamping plate on a drill rig to densify materials with verification via a Dynamic Cone Penetrometer.