CASE HISTORY OF A HIGH HAZARD DAM

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Section 51-3-51 of the Mississippi code of 1972, as amended, states that anyone wishing to construct, repair, or modify a dam in the State of Mississippi must, prior to construction thereof, make application for and receive written authorization from the Commission on Environmental Quality. Section VII of the Regulations promulgated by the Commission defines a High Hazard dam as one that should it fail, there is the possibility of loss of life and/or major property damage downstream.

Vice Lake Dam is a high hazard dam located in Lauderdale County, Mississippi, South of Meridian. The dam is 1670 feet long, 53 feet high, impounds a 178 surface acre lake at normal pool; it originally had a riser and conduit for the principal spillway and an earthen grass lined emergency spillway. The dam is classified as high hazard because of several houses downstream that could in danger should the dam fail.

The dam application originally submitted was approved on April 7, 1994, with certain conditions. One of the conditions was that if any changes to the design, as approved April 7, 1994, was desired, our Office was to be notified and approval of the changes given prior to their construction. This was not the case as we found out later.

The engineer was to furnish us with a set of construction drawings and specifications prior to construction, for approval. In March 1995, we received a telephone call from the engineer stating there were sand boils appearing at the toe of Vice Lake Dam. This was the first we knew that the dam was under construction. The Dam Safety staff had not received any construction plans and specifications.

After arriving on the site, the staff talked with the engineer and learned that the core ditch for the foundation of the dam had not been dug down to hard material. The area of the dam's foot print was covered with a deep layer of black muck. The black muck went too deep for the backhoe to dig through it. Although the dam was not completed, there was approximately 25 feet of water behind the dam. The conclusion was made that there was a small confined aquifer under the dam and lake bed. The downward pressure from the weight of the dam and the water behind the dam was causing an upward pressure at the toe of the dam forming the sand boils. Also, pressure could be forcing water through the black muck under the dam. The engineer was told to lower the water level behind the dam and to develop a means to control the sand boils. This was done; the dam did not experience any severe problems.

The staff also discovered that the approved 36-inch reinforced concrete pipe through the dam had been replaced with a 36-inch polymer coated corrugated metal pipe (CMP). CMP pipes are not allowed in High Hazard Dams, especially not one that would have 50 feet of fill over it. Staff members later crawled up the CMP and discovered that it had ruptured and that the concrete manhole pipe that was used for the riser was failing under its own weight. The riser was approximately 40 feet high.

The engineer who was responsible for the original design and construction of the dam was replaced by another engineer. This engineer was given the job of salvaging the project and producing a structure that would be acceptable to the Commission.

A 24-inch steel pipe was used to line the 36-inch CMP and the annular space was then grouted. The 24-inch steel pipe was connected to the 24-inch gate valve that had been installed when the riser was constructed. This gave the dam owner a means of lowering the lake should the need arise. Holes were punched through the sides of the concrete pipe riser so water would fill the riser and equalize pressure on it.

The upstream slope was shaped to a 3:1 by moving the centerline of the dam over. The downstream slope was flattened to a 4:1. A toe drain system and a sand blanket filter was installed to control and collect the seepage that had caused the sand boils originally.

The unauthorized changes to the design to cut cost and speed up construction, in the long run, almost doubled the cost of the dam and delayed completion approximately a year. The final approved design and construction of the dam resulted in a structure unlike any other constructed in Mississippi. Because the original principal spillway was no longer functional, a new spillway had to be designed and constructed.

The dam owner had already stocked his lake with fish and did not want the lake drained to construct a new spillway. The engineer designed a siphon type principal

spillway consisting of 3-18 inch PVC pipes. This could be constructed without draining the lake. We have other dams in Mississippi with siphons for spillways but none of this magnitude.

The original design and construction of this High Hazard Dam is a good example of what NOT TO DO. It can be very expensive to construct a dam; however, it can be even more expensive to try and cut corners when constructing an un-approved High Hazard Dam.