

Meadow Grounds Lake Dam Dam Evaluation Summary February 14th 2013

Dam Description and History:

Meadow Grounds Dam is located in Ayr Township in Fulton County, Pennsylvania. The dam and lake areas are leased to the Pennsylvania Fish and Boat Commission (PFBC) by the Pennsylvania Game Commission. The dam was designed and built by the PFBC and construction of the dam was complete in June 1964. As the permit holder for the Meadow Grounds Dam the PFBC is responsible for its safe operation and maintenance.

Meadow Grounds Dam is categorized by the Pennsylvania Department of Environmental Protection (PADEP) as a High Hazard (Category 1), size class B structure. The drainage area of the dam's watershed is 3.2 square miles on Roaring Run. The zoned earth embankment creates a 204 acre reservoir and at normal pool stores 3130 (acre-feet) of water. A normal pool elevation of 1495.3' is maintained throughout the year via the principal and auxiliary spillways. The zoned earth fill dam is 39 feet in height and 530 feet long. The auxiliary spillway at Meadow Grounds Dam is a trapezoidal-shaped concrete chute cut into rock through a natural saddle about 200 feet to the right of the dam's right abutment. The spillway is provided with a 67 foot long trapezoidal-shaped weir that discharges into a concrete lined stilling basin and then into a riprap lined earth channel.

Current Conditions:

Dams given a "High Hazard" classification have the potential to cause extensive damage and possible loss of life in the event of a dam failure. Dams in Pennsylvania are regulated by the PADEP Division of Dam Safety and are subject to thorough inspections and evaluations to preserve the safety of the residents that live downstream of the reservoir. In the event of a dam failure a total of 163 residents and 65 homes would be negatively impacted.

In 1965 upon filling the reservoir, water began emanating from the downstream left abutment-embankment contact prompting the unsuccessful remedial extension of the left "toe" drain. Shortly after reservoir filling similar seeps were observed emanating from the right downstream abutment-embankment contact area and wet areas were observed downstream of the principal spillway outlet structure. These wet areas and seeps were again documented in the US Army Corps of Engineers Meadow Grounds Dam Phase 1 Inspection Report, dated August 1979. The Phase 1 inspection report recommended that "Drainage and seepage conditions should be reevaluated and remedial measures implemented." To date, no official engineering evaluation of the seepage has occurred. These seeps from the abutment-embankment contact indicate that water is flowing through the fractured shale foundation that the dam was built upon as seen on the original project plans (Sheet 3 of 11 "Core Boring Results & CL Location"). If not corrected these seeps could lead to a serious dam safety condition known as piping. Piping along the abutment-embankment contact is a well documented type of failure that can occur during normal conditions, known as a "sunny day" failure. By impounding any water within the reservoir there is significant risk of a "sunny day" dam embankment failure. A "sunny day" embankment failure is defined as the sudden, rapid and uncontrolled release of impounded water that can occur unexpectedly without warning and may not be caused by a rainfall event.

In 2005, PFBC attempted to mitigate the seepage emanating from the right and left abutment-embankment contacts using gravel drains or “French drains” with little success. In June 2011 a sand filter style of drain was built along the left downstream abutment-embankment contact and to date, appears to be controlling but not slowing the seepage in that area. In May 2012 the gravel drain on the right abutment-embankment contact was damaged when high flows through the drain washed out much of the aggregate within the trench.

On February 12th, 2012 PADEP Division of Dam Safety deemed the Meadow Grounds Dam spillway seriously inadequate because the spillway was found to only able to safely pass approximately 52% of the Probable Maximum Flood (PMF). The PADEP Division of Dam Safety recommends that the reservoir be lowered or completely drain the dam until a rehabilitation project was complete. By regulation a high hazard dam must be able to convey 100% of the design flood without endangering the safety or integrity of the dam as per *Pennsylvania Code, Title 25, Chapter 105, Subchapter B, Section 105.94*.

Recommended Actions/Timelines:

It is recommended that the Meadow Grounds reservoir be drawn down in its entirety to perform engineering analysis of the dam embankment and its foundation materials so that the dam can correctly be rehabilitated to meet current dam safety engineering standards of practice. By drawing down the reservoir the Commission can greatly reduce the risk of a hydraulic or structural failure. Below is a tentative timeline for the Meadow Grounds Dam reservoir drawdown.

December 10 (2012) – March 1 (2013)

PFBC internal coordination for scheduling, fish salvages, permits, etc. Fish salvage operations to begin immediately.

March 4 - April 8 (2013)

Meadow Grounds Lake drawdown is initiated at a rate of 2 feet per week until the reservoir is 10 feet below the normal pool elevation. PFBC engineering and maintenance personnel shall take seepage weir measurements prior to removing stop logs at every 1-foot increment.

April 8 – May 10 (2013)

Fish salvage operations continue until complete. PFBC maintenance and engineering personnel shall continue to take seepage weir measurements on a weekly basis.

May 10 – Drawdown Complete (2013)

Drawdown remainder of reservoir and continue to monitor. Install security items and signage.