



**US Army Corps
of Engineers**
Pittsburgh District

East Branch Dam Safety Initiative

Improving Public Safety

Summary

East Branch Dam is owned and operated by the Pittsburgh District, U.S. Army Corps of Engineers. As part of a risk management approach to improving public safety, the Corps has classified East Branch Dam as Dam Safety Action Class (DSAC) II. East Branch Dam is considered to have unconfirmed (potentially unsafe) issues which merit further study and analysis, largely because it has a history of seepage related problems, including a serious episode in 1957 that required lowering the lake until repairs could be made. There have been no observed changes in seepage conditions or performance of the dam in the time since repairs were completed. The dam functioned safely during the record pool event in 1972 resulting from Hurricane Agnes. As a result of the DSAC II classification, the Pittsburgh District has implemented Interim Risk Reduction Measures to reduce the risk to the public. These measures include increased monitoring, 24/7 staffing, updating emergency operation plans, reducing the water level in the reservoir to relieve pressure on the dam and stockpiling emergency materials on site.

These and other short-term actions allow us to operate the dam to meet our public safety objective while we further investigate our concerns and pursue long-term repairs, if necessary. As we take steps to reduce risk to public safety, we recognize that recreation, water supply, hydropower and the environment may be impacted. The Pittsburgh District staff will continue to work with our stakeholders and the public to keep them informed of the dam safety issues related to East Branch Dam.

Dam Safety Program

The U.S. Army Corps of Engineers' Dam Safety Program is critical to addressing our nation's aging infrastructure, reducing the risks of flood and storm damage and making sure Corps owned and operated dams are operated safely and minimize risk to the public.

The Corps owns and operates 610 dams that serve a variety of purposes including navigation, flood damage reduction, water supply, irrigation, hydropower, recreation, environmental enhancement and combinations of these purposes. The Pittsburgh District owns and operates 16 flood damage reduction dams and 23 navigation locks and dams. As part of our responsibility in managing these dams, the Corps has a comprehensive Dam Safety Program that has public safety as its primary objective. Corps dams are routinely inspected and continually evaluated for safety in accordance with the Federal Guidelines for Dam Safety issued in 1979.

Risk management changes are being implemented in the Dam Safety Program to allow prioritization of work at the national level, thereby providing a standard strategy for the continued safety and security of our projects and the affected public. Dam safety risk has two components: probability of dam failure and consequences if failure were to occur.

In 2005, 2006 and 2007 the Corps of Engineers performed Screening Portfolio Risk Analysis that considered performance and consequence of failure (risk-informed screening) to prioritize approximately one-third of Corps-owned and operated dams nationwide that were perceived to have the highest risk. All 16 Pittsburgh District flood damage reduction dams and four of our 23 navigation dams were screened as of 2007. The Corps of Engineers goal is to screen the remainder of the portfolio by the end of Fiscal Year 2009.

The Corps of Engineers instituted a Dam Safety Action Classification System intended to provide consistent and systematic guidelines for appropriate actions to address the dam safety issues and deficiencies. Corps dams are placed into five Dam Safety Action Classes (DSAC) based on their individual dam safety risk considered as probability of failure and potential failure consequences. DSAC I is the rating assigned for the highest risk dams, and DSAC V are dams which are considered safe and in compliance with current criteria. Consequences considered include lives lost, economic, environmental and other impacts.

The Corps of Engineers has identified six DSAC I flood damage reduction projects based on the risk analysis screenings to date. None of Pittsburgh District's flood damage reduction dams were identified as DSAC I, and one flood damage reduction dam, East Branch Dam, was identified as DSAC II.



East Branch Dam Constructed 1947-1952

East Branch Dam

East Branch Dam is located on the East Branch Clarion River in Elk County, Pennsylvania. Construction began in June 1948 and was completed in October 1952. Impoundment of water began in November 1950 with full operation in June 1952. Normal summer pool is elevation 1670. The pool of record is elevation 1685.6, reached on June 24, 1972 as a result of Hurricane Agnes. This pool level was .6 feet above the spillway crest elevation and was the only time the spillway carried flow. The dam functioned safely during this event.

The dam is a rolled earth fill embankment with outlet works located at the right abutment and an emergency spillway located in the left abutment. The embankment is 1,725 feet long and has a height of 184 feet. The width is 20 feet at the top of the dam with a maximum width of 1,115 feet at the base. The project purposes are reduction of flood stages on the Clarion River, water conservation, water quality, supplementary low-flow, recreation and conservation of fish and wildlife.

The dam experienced a serious seepage related incident in 1957. In May, muddy water appeared at the toe of the dam near the right abutment. The pool was drawn down a total of 110 feet in three stages and exploratory drilling was conducted. The exploratory drilling revealed internal erosion that created a cavity in the impervious core of the embankment. Repairs consisting of drilling and grouting sealed the cavity and surrounding area. Grouting was completed in November 1957. There have been no observed changes in seepage conditions or performance of the dam in the time since repairs were completed; however, the repair is now more than 50 years old.



1957 Emergency Repairs Filling the Void with Grout

East Branch Dam is inspected and monitored closely. The dam is instrumented to monitor seepage, piezometric levels (internal seepage pressure) and horizontal and vertical movements of the dam crest. The dam is staffed seven days a week, 24-hours a day and is regularly inspected by project staff as well as engineers from the Pittsburgh District Office. Project staff inspects the dam daily during normal operating conditions and more frequently during high pool levels. Engineers inspect the dam at least annually, with more intensive team inspections every five years through the Dam Safety Program.

East Branch Dam was screened in 2006 as part of the Screening Portfolio Risk Analysis process. As a result of the screening assessment, the dam was classified as DSAC II. East Branch Dam is considered to have unconfirmed (potentially unsafe) issues which merit further study and analysis.

East Branch Dam Safety Study

East Branch Dam has been given priority funding to implement Interim Risk Reduction Measures and study alternatives for long-term remedial measures, if needed. The steps following initial classification and leading to approval of long-term remediation are considered a Dam Safety Study.

Step 1. The first step in the East Branch Dam Safety Study is to prepare an Interim Risk Reduction Measures Plan and implement the proposed measures. Interim risk reduction measures are not long-term solutions; they are designed to minimize risk to public safety in the short-term while pursuing long-term permanent fixes. They are an important step to minimize the probability of failure and/or consequence until a permanent fix can be implemented or investigations have determined that a potential failure mode is not probable. It is the most responsible way to manage a project's risk to public safety. As we take action to reduce risk to public safety, which is our first priority, we recognize that other project benefits, such as recreation, water supply and water quality may be impacted.

The Pittsburgh District has implemented, or will implement, the following Interim Risk Reduction Measures for East Branch Dam:

- Operate at a reduced operating pool level
- Update the existing dam safety emergency action plan
- Conduct emergency exercises
- Provide 24/7 staffing
- Update inundation mapping
- Enhance inspection and monitoring
- Pre-position contracts and stockpile materials
- Improve reliability of the outlet gates and machinery
- Perform a more detailed risk assessment

A key interim risk reduction measure is to operate East Branch Dam at a reduced pool level. This action will both reduce the probability of failure due to internal erosion and reduce potential consequences if a failure were to occur.

Step 2. Preliminary Dam Safety Studies are the next step in evaluation of dam safety issues. These studies include a more in-depth review of available data and a more detailed risk analysis of all potential failure modes in order to better define and confirm the dam safety issues. The Dam Safety Action Classification will be reviewed and modified as appropriate. The Interim Risk Reduction Measures will be reviewed and modified based on the detailed risk analysis.

Step 3. Dam Safety Modification Studies will follow if justified by the confirmed dam safety issues. Modification studies include additional data gathering, studies and detailed engineering analyses. A full range of alternatives are evaluated with detailed cost estimates as well as assessments of other impacts. Modification studies will lead to a decision document with a comparison of alternatives and a recommended plan.

Conclusion

Public safety is the number one priority of the U.S. Army Corps of Engineers. The primary objective of our Dam Safety Program is to maintain public safety by making sure the dams we own and operate are safe and risks to the public are minimized.

An integral part of the Corps of Engineers Dam Safety Program is its risk-informed screening process, Screening Portfolio Risk Analysis. The Corps is focusing on projects with the most compelling dam safety issues first, as identified by this risk-informed screening process.

Screening Portfolio Risk Analysis screened dams are classified based upon confirmed or unconfirmed dam safety issues, the combination of life or economic consequences should failure occur and the probability of failure. This enables the Corps to prioritize dam safety actions to correct deficiencies, which includes interim risk reduction measures to be undertaken while further investigations are conducted and/or remedial actions are implemented.

East Branch Dam has a history of seepage related problems, including a serious episode in 1957 that required draining the lake until repairs could be made. There have been no observed changes in seepage conditions or performance of the dam in the time since repairs were completed. The dam functioned safely during the record pool event in 1972.

Our screening and classification of East Branch Dam identified this project as having unconfirmed (potentially unsafe) issues which merit further analysis and evaluation. We are taking a number of interim risk reduction measures in order to reduce the probability and consequences of dam failure while long term remedial measures are pursued. As a key interim risk reduction measure the dam will be operated at a reduced pool level.

Interim risk reduction measures are not long term solutions. They are designed to buy down or minimize risk to public safety in the short-term while pursuing long-term permanent modifications to a dam. They are an important step to minimize the probability of failure and/or consequence until a permanent fix can be implemented or investigations have determined that a potential failure mode is not probable.

East Branch Dam has received priority for further studies to better define and confirm the dam safety issues. Through this process, the Corps will determine whether or not the dam is in need of repairs and evaluate alternatives for permanent repair. The process of evaluation is expected to take about two years. We will continue to work with our stakeholders to keep them informed of the dam safety issues related to East Branch Dam.

The Pittsburgh District operates and maintains East Branch Dam in such a way as to minimize risk to the public. East Branch Dam is inspected and monitored closely. The dam is staffed seven days a week, 24 hours per day and is regularly inspected by project staff as well as engineers from the Pittsburgh District Office.

For more information:

Website: www.lrp.usace.army.mil/rec/lakes/ebdam_safety.htm

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