Lessons-To-Be-Learned From Oroville Dam Spillway Incident

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1. Introduction

In early February 2017, the tallest dam in the United States made international news when its service spillway began to experience problems, and live video footage showing chunks of concrete from the spillway structure being hurled in the air as the spillway disintegrated from high velocity flows. In response to this emergency, an immediate decision was made to discontinue using the service spillway by shutting the crest gates and allowing the reservoir to rise and activate the adjacent auxiliary (emergency) spillway for the first time in the project’s 50-year history. This action led to unexpected severe and rapid erosion and deep head-cutting of the terrain immediately downstream of the emergency spillway control structure, threatening control structure stability, and resulting in the precautionary evacuation of approximately 188,000 downstream residents.

Since the occurrence of this event, hundreds of millions of dollars have been spent to implement emergency repairs to both spillways. The repairs to the spillways involve the implementation of state-of-the-practice fast-tracked designs using physical and numerical model studies and extensive onsite investigations. Cutting-edge construction techniques are being employed on a massive scale including the use of secant pile cutoff walls and high-strength roller-compacted concrete.

Concurrent with the emergency spillway repairs, an Independent Forensic Team (IFT) of expert engineers was engaged to complete a thorough investigation of the incident and report on the chain of conditions, actions, and inactions for various stages of the project (pre-design, design, construction, operations and maintenance) that resulted in the damage to the spillways. The IFT’s report was released on January 5, 2018 and provides important insights and lessons to be learned from this incident, with an emphasis on understanding the human factors and several important industry-level lessons that apply to dam safety practice in the United States.

2. Lessons-to-be-learned

This presentation will provide an overview of the incident with a brief explanation of the chronology of events that led to the evacuation of downstream residents. The root causes of the damage to the spillways will be explained. Key lessons-to-be-learned from the incident will discussed. The presentation will conclude with a discussion of the main design and construction features for the emergency recovery of the spillways.

Two primary lessons learned that will be discussed and emphasized during the presentations include:

“An extended period of apparently successful operation does not indicate an equally successful operation in the future.”, and

“Comprehensive periodic reviews of original design and construction, taking into account comparison with the current state of the practice, are needed for all components of dam projects.”

Key Reference

Independent Forensic Team Report – Oroville Dam Spillway Incident, January 5, 2018;

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