Dam Collapse

1976 Teton Dam Collapse

When the water hit the power plant below… "it just disintegrated. The water picked up a huge oil tank like a cork and away it went. There was a beautiful grove of cottonwood trees down below, and they were snapped off like matchsticks. Later I could see the water out on the plain. It was almost like a surrealist picture; as the water hit some of the farm fields, you could see an eerie cloud of dust and mist rise up three to five miles away."

-Dale Howard quoted in Time's "Teton: Eyewitness to Disaster"

Of the 23 presidentially declared disasters in Idaho, the Teton Dam's collapse remains the only man-made disaster. This engineering marvel meant to tame flooding along the Teton River and provide additional irrigation failed at 11:57 a.m. on June 5, 1976. The crumbing earthen dam sent a cascade of water rushing through downstream communities of the Teton and Snake River floodplains. President Ford declared the collapse and subsequent flooding a major disaster just one day later.

Official investigations into building a dam on the Teton River date back to 1932, and in 1962, after three decades of failed proposals, the Bureau of Reclamation recommended construction of the Teton Dam. In 1964, the U.S. Congress authorized the construction of the Teton Dam which commenced eight years later in February 1972 and was completed in November 1975. Operators began filling the reservoir on October 3, 1975. Regulations restricted the infill rate to 1 foot per day; however, on March 23, 1976, officials authorized a reservoir filling rate of 2 feet per day. After April 10, spring runoff from snowmelt caused the reservoir to fill at an even faster rate. On May 13, the infill rate was increased again and the water rose at an average rate of 3 feet per day with the maximum rate reaching 4.3 feet per day. After the dam collapsed, many argued that officials filled the reservoir too quickly, but after exhaustive research, investigators found that the rapid filling rate did not cause the collapse.

The Teton Dam appear to be progressing perfectly without any major problems, but trouble approached as the water neared the spillway. On June 3, an inspection team downstream of the dam found clear water seeping from the ground at two locations: one at 1300 feet and another at 1500 feet downstream. By next day another seep had formed 150 to 200 feet downstream. All three seeps formed downsteam of the north side of the dam, but none were considered serious hazards.

The final report to the Department of the Interior (DOI) entitled Failure of Teton Dam: A report of findings, noted that geologists "recognized early that the reservoir rim could transmit water in large quantities and that seepage from the reservoir could occur." The rock walls surrounding the dam formed from hot ash that fell and melted together after Yellowstone's Huckleberry Ridge supereruption 2.1 million years ago. As the welded ash cooled, the rocks fractured extensively, forming large open voids that would allow water seepage around the dam. Construction crews planned to fill in these fractures with grout, but as work continued, crews continually discovered larger and larger fractures. Original projections significantly underestimated the just over half a million cubic feet of grout needed for the fractures (Idaho Daily Statesman reports by Jerry Gilliland and Rod Cramer). Additionally, geologists noted that earthquakes might occur in the area given low levels of seismicity present in the past. In response, equipment was installed to monitor seismicity during construction of the dam and filling of the reservoir. Monitors showed that the collapse was not initiated by an earthquake.

Beginning at 7:00 a.m. on June 5, witnesses discovered the first seep on the dam itself and, shortly after, found a second seep. Turbid water flowed from both leaks on the north side of the dam. At 10:15 a.m., a wet spot formed and water began to leak out and erode the dam. Engineers recalled hearing a loud noise and rushing water at 10:30 a.m. Project Construction Engineer Robert Robison stated, "This leak developed almost instantaneous at about 10:30 a.m. and let loose with a loud roar" (DOI, 36). Within 10 to 15 minutes, two dozers began attempting to plug the hole and the County Sheriff was alerted to start downstream evacuations. Behind the dam, a whirlpool formed at 11:00 a.m. and grew rapidly despite efforts to dump rock in and seal the hole. At 11:30 a.m., drivers abandoned the two dozers on the front of the dam as the hole expanded and swallowed both dozers. One driver recalled running to get in another dozer to help with whirlpool efforts atop the dam. Fifteen minutes later these drivers were pulled back. At 11:57 a.m., the entire north embankment breached and the nearly full reservoir came crashing through the earthen wall. The final report to the DOI presents a detailed hourly account of the dam's failure.

A vacationing professor from Minot State College, Dale Howard and his family witnessed the sequence of events from 10:15 a.m. onward. Located on a nearby observation platform, Howard photographed the progression of the dam's collapse. Local radio stations sent reporters to the scene as they broadcasted warnings of the collapse to downstream residents. Listener's heard the reaction and warnings from a local KRXK reporter as he watched the dam crumble to pieces. As the morning wore on, more and more people flocked to the dam, which introduced a new problem: crowd control.

Downstream, the Madison and Fremont County Sheriffs and their officers responded to calls from the dam operators warning them of the imminent collapse. The sheriffs' offices warned local resident's largely by word-of-mouth. Officers called people who they knew lived in the path of the floodwaters and drove to homes in threatened towns warning residents to evacuate. This method effectively evacuated local towns, preventing a much more devastating loss of live; however, the collapse still claimed the lives of 11 people.

Ultimately, the collapse displaced thousands of people, mainly from the towns of Rexburg and Sugar City. In the immediate aftermath, the Church of Latter Day Saints (LDS) and Ricks College worked to provide for the basic needs of flood victims. Ricks College opened its dormitories and apartments and, in conjunction with the LDS church, provided food to the displaced. According to Idaho's Director of Disaster Services at the time, "The church organization functioned marvelously under these kinds of conditions, and I'd have to say more effectively than most anything I've seen" (Peterson, 19).

With basic needs such as food and shelter provided by the LDS church and Ricks College, incoming government entities such as the Federal Disaster Assistance Administration, Idaho National Guard, Small Business Administration, Housing and Urban Development (HUD), Army Corps of Engineers, and relevant state agencies could focus on larger infrastructure problems. They worked to reestablish transportation, electricity, and communication networks (Peterson, 19). Additionally, around 40,000 volunteers came to aid in the clean-up, many were friends and family of the flood victims, members of affiliated LDS churches in Idaho, Utah, and Wyoming, or members of

other religious groups from as far away as Canada. Near the end of the summer, those still living in Ricks College housing were relocated to HUD trailers for temporary housing. LDS leadership helped facilitate communication between HUD and flood victims to ease and quicken the housing process (Blumell, 38).

All in all, the floodwaters unleashed by the Teton Dam inundated an 80 mile long region of the Teton and Snake River valleys that stretched to the American Falls Reservoir. Water touched nearly 300 square miles of land, impacting up to 100,000 acres of agricultural land and 32 miles of rail lines. Numbers of livestock lost range from 13,000 to 20,000. Peterson notes the destruction of 250 businesses and 733 homes and additional damage sustained by another 3,000 homes. Some estimates place the total damage at $2 billion and initial reports estimated that the Bureau of Reclamation would pay $400 million.

As the communities responded to the disaster, a flurry of questions and accusations arose as to the cause of the collapse. According to a 1976 Time Magazine article, "Idaho Governor Cecil Andrus [said] that 'liability is clearly at the door of the Federal Government.'" Extensive reviews of the Teton Project revealed that the dam failed due to a combination of the extensive fracturing in the surrounding wall rock and cracking in the internal, fine-grained sediment core of the dam. The final report to the DOI also argued that "a safe dam could have been built at the site utilizing [state-of-the-art] design concepts that were know at the time." The collapse provided a cautionary tale for future dam construction and heavily influenced subsequent dam reviews and regulations.

Today, the remnants of the Teton Dam linger as a visible reminder of one of the largest engineering disasters in U.S. history.

Bibliography:

- Blumell, Bruce D. "The Lds Response to the Teton Dam Disaster in Idaho." Sunstone. 5.2 (1980): 35-42.
- Eikenberry, F W. Failure of Teton Dam: Final Report. Washington, D.C: For sale by the Supt. of Docs., U.S. Govt. Print. Off, 1980.
- Peterson, F R. The Teton Dam Disaster: Tragedy or Triumph?Logan, Utah: Utah State University Press, 1982.

For more information:

- (https://www.presidency.ucsb.edu/ws/index.php?pid=6308#axzz1zyGqxHzT) regarding compensation legislation for flood victims
- U.S. Bureau of Reclamation's (https://www.usbr.gov/pn/about/Teton.html)
- The Idaho Statesman's (https://www.idahostatesman.com/news/northwest/idaho/article81898907.html)
- BYU Library's (https://www.flickr.com/photos/byui_library/sets/72157623364635347/)
- The History Channel's Teton Dam Disaster (https://www.history.com/topics/us-states/idaho/videos/engineering-disasters-teton-dam)

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