Nevada Irrigation District

2020 Dam Safety Activities Report

Nevada Irrigation District (NID) owns and operates 15 dams under the jurisdiction of the California Division of Safety of Dams (DSOD). All of these dams, except two, are also under the jurisdiction of the Federal Energy Regulatory Commission (FERC). These regulatory agencies enforce their respective comprehensive dam safety programs on their jurisdictional dams. The Hydroelectric Department is the District's lead in ensuring the safety of the jurisdictional dams, with support from the Engineering, Water Operations, and Water Maintenance Departments. In addition to satisfying the regulatory requirements, the Hydroelectric Department engages in additional activities that support on-going improvements to the dam safety program. The following summarizes the dam safety activities performed by the District in 2020:

1. **Inspections and Monitoring**
   In addition to the District's regular weekly and monthly (as conditions permit) inspections of the dams, DSOD performed their annual inspections in September, October, and November 2020. Due the COVID-19 pandemic, FERC requested that the District's Dam Safety staff perform the annual field dam safety inspections for them. During the times of year when access roads are not passable by a highway vehicle, the upper-division dams are inspected remotely using a helicopter or, when conditions permit, using equipment designed for over snow travel. The District prepared and submitted to FERC and DSOD the annual Dam Safety Surveillance Monitoring Reports (DSSMR), which details dam safety findings, issues, maintenance activities, inspection records, and instrumentation readings then provides a self-evaluation of dam performance.

2. **Evaluations and Assessments**
   a. Combie Dam Protection Against Scour Under Probable Maximum Flood (PMF) – In response to DSOD requirements, the District conducted the Alternatives Analyses and Conceptual Design for protection against scour in the abutment groins during PMF flows. A draft of the report was received in late 2020. The final report is expected in early 2021. The report will be submitted to DSOD and FERC for review and approval prior to further efforts on the project. The District plans to start the design phase of the project in late 2021.

   b. Scotts Flat Spillway Upgrades – During development of the alternatives to upgrade the spillway to meet regulatory requirements, it was determined that the existing lower plunge pool cannot safely pass the PMF flow. Modifications to the lower plunge pool are necessary. A physical hydraulic modeling study is necessary to analyze the effects of the flow and to modify the spillway and lower plunge pool design. The modeling is in progress and is anticipated to be completed in mid-2021. The District will then propose the favored alternative for the spillway upgrade to DSOD and FERC for approval.

   c. Seismic Stability Re-evaluation of Loma Rica Dam, Scotts Flat Dam, and Rollins Dams. Following the screening-level analyses of the seismic stability of the eleven jurisdictional embankment dams, more advanced evaluations were performed for the 3 dams. It was found that Scotts Flat Dam might have a localized weakness in the alluvial foundation, but the general seismic performance is acceptable. Loma Rica Dam is likely subject to foundation

failure during a large earthquake. The seismic stability of Rollins Dam is unclear due to unknown characteristics of the natural alluvial foundation left in place during construction. The District is developing alternatives for a seismic stability retrofit for Loma Rica Dam and is planning to investigate the alluvial foundation of Rollins Dam.

d. Bowman South Arch Dam Seismic Stability. The seismic stability evaluation was completed in 2020 using the advanced modeling method LS-Dyna. It was found that the dam will be stable under the PMF loading or under the design earthquake. It is recommended that preventive measures be taken to protect the weak joint materials that can be progressively eroded by the spillway flow over time and possibly weaken the right abutment bedrock.

e. Scotts Flat Spillway Crest Stability. The stability was analyzed as part of the Spillway Upgrades. The results indicate that the crest structure is stable under both design seismic and PMF events.

3. Emergency Action Plans (EAPs) and Annual Seminar

NID prepared a comprehensive update to its EAP for dam facilities in 2019 to meet new requirements from DSOD and CalOES. The December 2020 EAP Update is a full reprint of the (Part 1 and Part 2) document, which includes current contact information and addresses additional comments received from CalOES. A FERC-mandated Annual Emergency Action Plan Seminar was performed (via Zoom) at the District Hydroelectric Field Office on October 29, 2020 with 29 attendants from 14 authorities and emergency response agencies.

4. Dam Safety Training

The annual dam safety training was provided using a video training course on "Intervention During Dam Safety Emergencies" provided by Association of State Dam Safety Officials. The training course covers the DOs and DON'Ts of interventions during dam safety emergencies, and is mandatory for selected staff members.

5. Other Improvements and Activities

In 2020, the District completed the following:

a. Jackson Lake Spillway Improvements. Improvements include extending and raising the training, replacing the spillway apron, and strengthening erosion resistance at the spillway approach. Regulatory permits and inspections from DSOD and FERC were obtained before modifications of the structures.

b. Scotts Flat Toe Area Drain Replacement. Staff replaced the deteriorated corrugated metal pipes with polyvinyl chloride pipes and constructed a new flow measurement device to ensure accurate measurement of flow from underneath and from the right groin of the dam.

c. Topography of Loma Rica Dam and Reservoir. Staff completed the topography to be used for the Loma Rica seismic upgrades conceptual design.

d. Chicago Park Flume Intake Leakage Flow Diversion. Staff designed and constructed a portable blockade to divert intake gate leakage out of the flume through a 12" drain valve.

Such a diversion makes it possible to keep the floor of the 3-mile flume dry for necessary maintenance inside the flume structure.

e. Chicago Park Powerhouse Tailrace Underwater Inspection. The inspection discovered long-term erosion damage at the tailrace shotcrete lining under the river water level. Further evaluation of the hydraulics are needed to develop a reliable design to ensure adequate long term performance of the tailrace.

f. Full Cycling of Drain Valves and Radial Gates. Staff completed all of the exercises of drain valves and spillway radial gates to satisfy the requirements of DSOD and FERC.

g. Underwater Remotely Operated Vehicle (ROV). The Hydroelectric Department purchased one ROV to enable in-house underwater inspection of facilities including dams, intakes, reservoirs, waterways, etc.

h. French Lake Dam Upgrades. Staff completed design of the upgrades at French Lake Dam including strengthening the spillway training walls, repairing the upstream slope lining, and adding one flow measurement weir for measurement of all flows through the dam to satisfy FERC dam safety and relicensing requirements. The design has been submitted to FERC for review and approval and the construction is scheduled for August through October 2021.

6. Summary of Significant Modifications and Studies (>$100,000) Completed in 2020

Dam	Component	Summary of Work
Jackson Lake	Spillway Improvements	Completed construction of improvements of the training wall, spillway apron, and protection against erosion on spillway approach.
Scotts Flat	Spillway Upgrades Alternatives and Physical Hydraulic Modeling Study	The lower plunge pool cannot safely pass PMF flows and a physical modeling study is necessary to analyze modifications. The modeling study along with upgrade alternative development will be completed in 2021.
Combie Dam	Alternative Development for Protection against Scour under PMF flows	Preliminary findings suggest preventing spilling at the abutments by raising the dam heights in specific locations. Armoring of the central spill channel is necessary to protect the dam against scouring from PMF flows. The design of the upgrades is scheduled for 2021.
Bowman South Arch Dam	Seismic Stability Evaluation	Completed the study of seismic stability under design earthquakes. The dam is found to be safe with some weak bedrock joints to be protected to resist erosion from spillway flows.