

# Nevada Irrigation District

## 2022 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 2022:

### 1. Inspections and Monitoring

In addition to the District's regular weekly and monthly inspections (as conditions permit) of the dams, DSOD and FERC performed their annual inspections in August 2022. 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 and provides an evaluation of general safety performance of the dams.

### 2. Evaluations and Assessments

- a. Scotts Flat Spillway Upgrades – Alternatives Development – Scotts Flat Spillway chute and the lower plunge pool cannot safely pass the PMF flows, and a physical hydraulic modeling study was conducted to generate optimal modifications of the spillway. The alternative report with one recommended alternative has been completed and submitted to DSOD and FERC for concurrence. The current favored alternative for the spillway upgrades is replacing the existing spillway chute with vertical walls, adding flow diversion and regulating walls, building a low-angled flip bucket, and armoring the lower plunge pool. The design phase is planned to start in early 2023.
- b. Dam Seismic Stabilities – Considering Bowman Lake Fault to be a seismic source as FERC required, the District has updated the design ground motions of the upper country dams and the seismic stability of Bowman North and Bowman South Dams, due to their proximity to the fault. There appears to be no significant change from the previous analyses. The reports have been submitted to DSOD and FERC for review and approval. In addition, evaluation of the seismic stability of the last FERC-jurisdiction dams Milton Main Dam and Milton South Dam are nearly complete.
- c. Scotts Flat Outlet Pipe Seismic Analysis Update – The District has completed the seismic stability analyses of the 36" outlet pipe in the right abutment tunnel. The analyses found that the outlet pipe is stable but it is recommended that the District add restrainers to keep the

pipe and the cradle supports together. The report has been submitted to DSOD and FERC for review and approval.

- d. Bowman South and Jackson Meadows Radial Gates 10-Year Inspections – Detailed inspection of the radial gates by consultants were performed in 2022 to meet the FERC engineering guidelines. All radial gates were found to perform normally with minor maintenance and adjustment recommended. The inspection reports have been submitted to FERC for review and approval.
- e. Combie South Penstock Corrosion Inspection – As part of Hydroelectric corrosion control program, Combie South Penstock was inspected and tested inside and outside by corrosion control engineers on November 15, 2022. It was found that the pipe coating has been deteriorated and corrosion control protection need to be installed to impede corrosion of the steel pipe.
- f. Jackson Meadows Spillway Radial Gates April Closure Operations Plan – The DSOD Certificate of Approval for Jackson Meadows, requires that the radial gates remain fully open until May 2 of every year. To meet such a requirement in a dry year, the District loses important water supply that could have otherwise been stored for environmental and municipal purposes later in the year. Based on results of the April flood analyses, the Hydroelectric Department prepared an Operations and Responses Plan that will ensure there is no chance that the closed radial gates or the dam will be overtopped. The plan has been submitted to DSOD for review and approval.

### **3. Emergency Action Plans (EAPs) and Annual Seminar**

The EAP outreach meeting was held on October 4, 2022, for the District's jurisdictional dams. Due to the continued COVID-19 pandemic conditions and recommended guidelines, this year's annual seminar was held via Zoom. The seminar was attended by 40 individuals from 21 emergency response agencies, including NID. The updated EAP was submitted to FERC for review and approval in December 2022.

### **4. Dam Safety Training**

The annual dam safety training was postponed from 12/2022 to 1/2023 due to added planned outage of the powerhouse at Camp Far West. Instead of the self-guided training completed during the COVID-19 pandemic, the training was moved to 1/18/2023 and conducted in-person. The training covered current issues at District Dams, tips and areas of attention for inspections, and planned improvements and upgrades.

### **5. Other Improvements and Activities**

In 2022, the District completed the following:

- a. Dutch Flat Forebay Dam Drain Outlet Valve Repair – During the annual outage of Dutch Flat Forebay No. 2 Powerhouse, repair of the faulty hydraulic operator of the outlet valve was attempted but was not successful mainly due to thick sediment and poor weather. In December, a repair using divers successfully restored the normal function of the valve operator.

- b. Bowman North Upstream Concrete Lining Underwater Inspections – Likely due to long-duration and extensive exposure of the upstream lining, Bowman North Dam leakage increased to over 27 CFS. A diver inspection and patching of leakage was performed in June and again in August. As a result, the leakage flow was successfully reduced to below 2 CFS. These underwater patches are a temporary repair and evaluation of improving long-term lining performance is in progress.
- c. French Dam Tunnel Inspections – During the annual toe leakage test in July, District Hydrographers observed a significant decrease in the low-level outlet gate leakage compared to previous years. The gate leakage is measured at the downstream opening of the outlet tunnel. The District performed a structural inspection of the entire length of the outlet tunnel in August. A deepened area on the floor of the tunnel, just downstream of the low-level outlet gate, was observed, and could be the source of the gate leakage reduction. The leakage from the gate made the area difficult to fully inspect, and the deepened area could only be inspected manually, by feel.
- d. Full Cycling of Drain Valves and Radial Gates. The radial gates at Bowman South and Jackson Meadows were exercised in 2022. Annual drain valve exercises were successfully completed for all the dams except French, Dutch Flat Forebay, Dutch Flat Afterbay, and Deer Creek Diversion. The low-level outlet hydraulic gate control system at French Dam has become increasingly difficult to operate, and the District has planned for underwater inspection, repair, and/or replacement in 2023 if the reservoir level gets low enough for the work. The valve operator at Dutch Flat Forebay was replaced in 2022, but it was not fully exercised. The low-level outlet for Dutch Flat Afterbay was operated in 2022, but it was not fully exercised. The District has scheduled to exercise the low-level outlets at Dutch Flat Forebay and Dutch Flat Afterbay in the presence of DSOD in 2023. The manually operated gate on the downstream face of Deer Creek Diversion dam was not operated in 2022. Operators can only safety access the gate operator platform, located near the base at the center of the dam, when the reservoir is low enough not to spill or splash over the spillway portion of the dam crest. The low-level outlet gate at Deer Creek Diversion dam is scheduled to be cycled in the presence of DSOD in 2023, when the reservoir stops spilling.
- e. Advanced Outlet Pipe Inspections were performed for the outlet pipes at Sawmill, Jackson Lake, and Dutch Flat Forebay. In addition to the conventional CCTV camera, the inspections used LiDAR to scan the pipe interior and ultrasonic thickness testing to take measurements of the steel pipe wall thicknesses. It was found that active corrosion control measures are desirable for the outlet steel pipes at Sawmill and Jackson Lake dams.

**6. Summary of Significant Modifications and Studies (>\$100,000) Completed in 2022**

Dam	Component	Summary of Work
Jackson Lake Dam Toe and Channel Bank Protection	Rehabilitation	The dam toe and the channel banks downstream of Jackson Lake Dam has experienced gradual and continuing erosion since their construction in the

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		1940s. Design of their rehabilitation has been completed and submitted to FERC and environmental agency for review and approval. The rehabilitation construction is planned for the dry seasons in 2023.
Supporting Technical Information Documents (STIDs) Digital Project Archives (DPAs)	Regulatory Compliance	The STIDs and DPAs serve as a compendium of knowledge and information about a project and are essential for the review and evaluation of the safety and performance of project works by licensees, consultants, and the FERC. Updates of the STIDs and DPAs for 12 FERC-jurisdictional dams are in progress and expected to complete in 2023.
Scotts Flat	Spillway Upgrades Alternatives and Physical Hydraulic Modeling Study	Scotts Flat Spillway chute and the lower plunge pool cannot safely pass the PMF flows, and a physical modeling study was conducted to generate optimal modifications of the spillway. The alternative report with the recommended alternative has been completed and submitted to DSOD and FERC for concurrence. The current District-favored alternative for the spillway upgrades is replacing the existing spillway chute with vertical walls, adding flow diversion and regulating walls, building a low-angled flip bucket, and armoring the lower plunge pool. The design phase is planned to start in early 2023.