



MEMORANDUM

EUGENE WATER & ELECTRIC BOARD

Rely on us.

TO: Commissioners Brown, Carlson, Barofsky, McRae and Schlossberg
FROM: Lisa Krentz, Generation Manager; Laura Ohman, Dam Safety Program Supervisor/Chief Dam Safety Engineer
DATE: November 21, 2023
SUBJECT: Dam Safety Program Update
OBJECTIVE: Information

Issue

This memo provides an update on EWEB's Owner's Dam Safety Program (ODSP).

Background

EWEB owns and operates three hydroelectric projects that are licensed with the Federal Energy Regulatory Commission (FERC). The FERC mandates that licensees (owners) develop and implement an ODSP if any dam or other project work is classified as having a high or significant hazard potential in accordance with 18 CFR Part 12 Subpart F. Two of EWEB's hydroelectric projects, Carmen-Smith and Leaburg-Waltermville, are classified as high hazard, meaning a failure or mis-operation could result in loss of human life. As such, EWEB is required to have an ODSP to comply with the regulation and ensure that dam safety is of the highest priority within the organization.

EWEB's ODSP was formally established in 2019 with the creation of the Dam Safety Department within the Generation Division. The supervisor of the Dam Safety Department serves as the Chief Dam Safety Engineer (CDSE), in accordance with the FERC definition in 18 CFR 12.61. The department currently consists of two full time Professional Engineers and two Engineering Specialists/Planners. The addition of a Regulatory Specialist is included in the 2024 staffing plan.

Revised 18 CFR Part 12 dam safety regulations, which codified the previous FERC directive for the ODSP, took effect on April 11, 2022. The regulations now require that the licensees submit an ODSP to FERC; review the ODSP implementation and discuss with senior management at least once annually; and submit the results of the annual review, including findings, analysis, corrective measures, and/or revisions to the ODSP, to FERC.

Section 12.63 of the code listed the following six components as minimum requirements of the ODSP:

1. Dam safety policy, objectives, and expectations
2. Responsibilities for dam safety
3. Dam safety training program
4. Communication, coordination, reporting, and reports
5. Record keeping and databases
6. Continuous improvement

Additionally, the ODSP and its implementation shall be audited by an independent external auditor at least once every five years. This audit was completed in 2019 and is due to be completed again in 2024.

Discussion

Significant progress on goals and program improvements have been implemented since the ODSP was established in 2019. Highlights include:

- Board Policy SD21-Dam Safety was established and adopted in May 2020.
- EWEB's ODSP outlining dam safety expectations, roles, and responsibilities was formally submitted to FERC in October 2021.
- The ODSP is strongly supported by the Executive Team. On-going monthly meetings to apprise leadership of dam safety projects, operations, and risks are held with the Assistant General Manager and Chief Operations Officer.
- EWEB's working relationship and credibility with FERC regulators has significantly improved over the last four years. Success areas include: 1) clear communications with the FERC Division of Dam Safety and Inspection Portland Regional Office (D2SI-PRO) through a single EWEB point of contact; 2) high quality, accurate, products and submittals with achievable plans and schedules; 3) increased staff expertise for identifying and responding to dam safety issues; 4) dedicated dam safety staff that work cross-functionally on O&M and Capital Projects; and 5) D2SI-PRO acknowledged EWEB's ODSP achievement by removing the 2018 requirement to have routine mandatory meetings.
- All major recommendations resulting from the 2019 Association of State Dam Safety Officials (ASDSO) audit team have been successfully implemented. A few minor recommendations are still being implemented, such as on-going improvements and procedure documentation.
- EWEB's hydroelectric projects are fully compliant with FERC dam safety regulations.
- A Dam Safety Surveillance and Monitoring (DSSM) program has been implemented for each of the two high hazard projects and annual reports are submitted to FERC, as required. Risks associated with dams, reservoirs, and canals have been identified, and follow-up investigations are occurring as needed.

Project and Status Updates

Carmen-Smith Project Operations and Safety Status

The Carmen-Smith Hydroelectric Project consists of the Carmen Diversion dam and reservoir, Smith dam and reservoir, and Trail Bridge dam and reservoir. All are being operated safely and in compliance with regulations. The performance of the dams is monitored with instrumentation and inspected routinely following the approved DSSM plan. Several dam safety concerns exist at the Carmen-Smith project.

- PART 12D INDEPENDENT CONSULTANT INSPECTION – FERC Part 12D regulations require a periodic inspection of the Carmen-Smith Project by an independent dam safety consultant (IC) every five years. Originally scheduled for September 6-7, 2023, the periodic inspection was rescheduled and completed on November 2-3, 2023, because the project being was at the end of August due to the Lookout Fire. The IC's final report will be submitted to FERC by March 27, 2024. FERC performed its annual inspection in conjunction with the periodic inspection and found no conditions that require immediate remedial action to protect the safety of the project. FERC has provided nine initial items which require follow-up

actions by EWEB. These items include improvements to the dam safety surveillance and monitoring program (DSSMP), evaluation of the stability of the approach channel to Trail Bridge spillway and the rock cut slope above the Trail Bridge spillway gate house, condition assessment of the Trail Bridge Emergency Spillway, corrosion evaluation related to Smith spillway radial gate, and ground survey and evaluation of the Carmen Diversion embankment area for potential subsidence. EWEB is developing a plan and schedule to respond to FERC comments.

- BOARD OF CONSULTANTS FOR CARMEN-SMITH PROJECT – In 2021, as required by FERC, the Chief Dam Safety Engineer worked in coordination with FERC D2SI to assemble a team of four nationally recognized dam safety experts, known as a Board of Consultants (BOC). The BOC reviews infrastructure project designs, dam safety issues, and provides recommendations. The BOC functions independently from EWEB and FERC to review technically challenging matters and designs affecting dam safety, including probable maximum flood routing, hydraulic performance of emergency spillways, embankment erodibility, sinkhole investigations, spillway modifications, and FERC license required designs for fish passage facilities and water release structures. The BOC review meetings are conducted periodically following FERC protocols and guidelines. EWEB’s 4th BOC Meeting was held on October 23-25, 2023.
- TRAIL BRIDGE RESERVOIR SINKHOLES AND INVESTIGATION – Three active sinkholes were discovered in the Trail Bridge reservoir during a periodic bathymetric survey in 2021. The results of the 2022 follow-up survey indicated that one sinkhole had increased slightly in size over the past year. The results of the 2023 survey indicate very little change since 2022. EWEB staff are actively investigating the root cause and potential failure modes with a consultant team, FERC, and the BOC. As of this correspondence, the subsurface geotechnical drilling program has been completed. The results are being evaluated and were reviewed during BOC Meeting #4 in October. The sinkhole evaluation report is being finalized to incorporate BOC discussions and recommendations, and will be submitted to FERC for review in the first half of 2024. The consultant team’s initial conclusion is that the reservoir sinkholes are unlikely to progress in a way that would undermine the structural integrity of Trail Bridge Dam. Progression could lead to increased loss of reservoir water into the subsurface which might result in operational impacts but would not be expected to result in dam safety hazards. The BOC generally concurred with the consultant’s initial conclusions and recommended follow-up activities to boost confidence in this understanding of the sinkhole situation. Other investigations conducted since sinkhole discovery include geophysical surveys, dye tracing, diving inspections, and chemical tests. EWEB has taken several measures to mitigate the public safety risk, including significantly lowering the reservoir operation level, increasing surveillance and monitoring, and communicating risks with Emergency Action Plan stakeholders and the Carmen-Smith Fish Working Group.
- TRAIL BRIDGE FISH PASSAGE AND HABITAT PROJECTS AND IMPACTS – The Carmen-Smith License requires the construction of fish passage and habitat improvement projects at Trail Bridge Dam and reservoir. These include modifying the spillway and gates for downstream fish passage, construction of a trap and haul facility adjacent to the powerhouse, surface regrading upstream of the emergency spillway, and installation of fish habitat structures in the reservoirs and bypass reaches. All of these projects have significant dam safety considerations and require extensive engineering studies. Dam Safety staff are working directly with project managers and consultant experts to ensure all dam safety concerns are addressed and FERC requirements are met.
- SMITH DAM SPILLWAY MODIFICATION – The existing Smith Dam spillway must be modified to increase its capacity to mitigate the risk of dam overtopping in the event of a probable maximum flood. The design will also meet the FERC License’s fish flow release requirement and will minimize scour

downstream of the spillway. A subsurface geotechnical investigation has been completed and EWEB will be starting the 60% design in 2024.

- CARMEN DIVERSION RESERVOIR SINKHOLES AND FISH FLOW RELEASE STRUCTURES – Several dam safety issues exist at Carmen Diversion Reservoir, including sinkholes, operation of the diversion tunnel gate during a flood condition, spillway degradation, and the proposed fish flow release structure required by the FERC License. Sinkhole investigations were concluded in 2020. A remediation proposal was submitted to FERC, but EWEB has not yet received comments. To ensure safety, the reservoir is currently operated at a lower-than-normal elevation, which does not significantly affect power generation, and EWEB has implemented increased monitoring. Dam safety staff are working closely with consultants, project managers, and FERC engineers on the spillway condition investigation, tunnel gate operation, and design of the flow release control structures.

Leaburg-Waltermville Project Operations and Safety Status

The Leaburg-Waltermville Hydroelectric Project consists of the Leaburg canal development and the Waltermville canal development. Although the Leaburg canal has been out of service for power generation since 2018, the canal is used for stormwater management and is required to meet all dam safety rules and regulations. Although the Waltermville canal continues to operate for power generation, several engineering issues have been identified. Dam safety and operations staff work closely to surveille and monitor canal embankments and control systems following the DSSM procedures and FERC requirements.

- LEABURG CANAL – In January 2023, the Board approved Management’s recommendation to move towards decommissioning the Leaburg project. Dam safety staff are responsible for the DSSM and work with operations staff to ensure the canal remains safe to the public. Since it was taken out of service, several ongoing dam safety issues have been investigated, including embankment sinkholes, instabilities, and excessive seepage. The 2020 semi-quantitative risk analysis identified the need for near-term risk reduction measures to reduce hydraulic loading that must be implemented prior to a long-term solution. Work progresses on these measures, including creating a low-level outlet at the powerhouse to pass additional flows. The Board approved a contract with Wildish Building Company at the November meeting to modify one of the generating units at the Leaburg Plant to serve as a high flow, low-level outlet. The contractor is currently removing one turbine runner so that the modified unit can pass flow without spinning the generator and expects to be substantially complete with the work prior to the end of the year. In addition, a drilling program plan has been developed and submitted to FERC that will provide subsurface information necessary to move forward with near term risk reduction designs. Pending FERC approval, drilling is expected to start in spring 2024.
- WALTERVILLE CANAL – The Waltermville Canal has been operating safely, although several dam safety investigations are underway. EWEB is currently assessing the stability of canal embankments and concrete structures under extreme seismic loading conditions, and has completed a probable maximum flood analysis, both of which were recommended by an independent consultant and required by FERC. Erosion in the vicinity of the siphon spillway has been mitigated with both temporary repairs and changes in spillway operations while staff develop alternatives for longer term corrective measures. Excessive seepage has been observed from an embankment drainage pipe near the powerhouse and remains under investigation. EWEB is managing the seepage condition by operating the canal at a lower water elevation than normal and may lower the canal elevation further to reduce seepage, if needed. The seepage flow rate is monitored in real time and there is an automated alarming system available. The dam safety engineering team has established alarm thresholds and alert procedures to ensure that staff are notified if seepage changes rapidly. A subsurface investigation drilling plan for the forebay area and upstream high

hazard canal embankments was implemented in March 2023. The geotechnical report presenting results from the work was submitted to the FERC in October 2023.

- PART 12D INDEPENDENT CONSULTANT INSPECTION – FERC Part 12D regulations require a periodic inspection of the Leaburg-Waltermville Project by an independent dam safety consultant every five years. The process is extensive, including potential failure modes analyses (PFMA) workshops and reviews of construction history, engineering records, and current operations. A total of eight full day workshops were conducted in August and September of 2022. The inspection, review process, and findings report were completed and submitted to FERC in March of 2023. The report concludes that the project is well maintained, in good condition overall, and no conditions require emergency response. The dewatered state of the Leaburg Canal significantly decreases the potential for a catastrophic release of water. The report includes 59 recommendations, mostly pertaining to updating and completing missing data and records. EWEB submitted a proposed plan and schedule in July to address the recommendations.
- ANNUAL FERC INSPECTION – EWEB staff hosted the FERC for the annual inspection of the Leaburg-Waltermville Project on September 27-28, 2023. No conditions were found that would require immediate remedial action to protect public safety. FERC has provided ten initial items which require follow-up actions by EWEB. These items are related to using the emergency generator to operate the three roll gates at Leaburg Dam, investigation of one sinkhole and two depressions along the Leaburg Canal, and improvements in vegetation management, rodent management, and dam safety surveillance and monitoring programs. EWEB staff are developing a plan and schedule to respond to these items.

Upcoming Projects

- FURTHER ODSP DEVELOPMENT – EWEB’s ODSP is still a relatively young program that will continue to mature over the next few years. EWEB will focus program development efforts on 1) skill development for staff; 2) dam safety awareness education for all EWEB staff working on projects that could affect dams and reservoirs; and 3) enhancing relationships with FERC. The CDSE will continue to serve as a liaison for FERC D2SI and will provide technical and regulatory advice to project managers.
- EMERGENCY ACTION PLAN (EAP) and EXERCISE – EAP drills are conducted annually. In addition, an EAP Functional Exercise is required by FERC every five years. The last EAP Functional Exercise for the Carmen-Smith Project was conducted in December 2021, and all EAP stakeholders, including county, city, and local emergency management agencies, participated. The next EAP Functional Exercise will take place in 2026. The next EAP Functional Exercise for the Leaburg-Waltermville Project will take place in 2024.
- CARMEN-SMITH –Trail Bridge sinkhole investigations will continue, with guidance from the BOC process, as will work on flood routing and spillway investigations.
- LEABURG-WALTERVILLE – EWEB staff will follow up on recommendations identified in the Leaburg-Waltermville FERC Part 12D inspection that was completed in spring 2023, implement near term risk reduction measures at Leaburg, and continue assessment of embankment, forebay, and spillway stability at Waltermville.

Requested Board Action

No Board action is requested at this time. This memo is for information only.