

13: Quarterly Dam Safety Report

Executive summary

The purpose of this report is to update the Operations, Planning, Safety and Information Technology Committee of the Board of Directors on key dam risk management activities during the period from July 1 to September 30, 2024 (F2025 Q2) and to provide reasonable assurance that the safety of dams operated by BC Hydro continues to be managed to the established guidelines and criteria of the Dam Safety Program. To keep the Committee as fully abreast of the Dam Safety Program as possible, some notable developments that took place after September 30, 2024, but before the completion of this report have also been included.

The key highlights from F2025 Q2 and the beginning of F2025 Q3 documented in this report are:

- Removal of rockfall from the spillway chute at Terzaghi Dam was completed on August 13, 2024, well ahead of the earliest expected date. Inspections revealed no significant, new damage to the chute, which has since been returned to service. See page 6.
- The British Columbia Utilities Commission accepted the schedule of capital expenditures for the Ladore Spillway Seismic Upgrade Project as being in the public interest. See page 7.
- The Site C reservoir has filled to reach an elevation just below what will be the minimum normal operating elevation of 460 metres, and to date the dam, abutments, and ancillary structures are all performing as expected. See page 13.
- Maintenance and testing of dam safety assets was effectively performed through Q2. For condition-based civil maintenance, in particular, both spend and work order completion conformed precisely to plan.
- The first season of construction started on the Comox-Puntledge Flow Control Improvements was completed in in October. Most planned work was completed but welding deformations from on-site assembly of the new spillway gate must be remediated before installation. In the interim, the existing spillway gate has been put back into service. See page 14.
- The flood routing capacity of Elko Dam has been improved by permanent removal of the flashboards and piers from the dam's west spillway.
- The work to decommission and plug the low level outlets on the W.A.C. Bennett Dam commenced with environmental risk mitigation measures (fish fence installation and fish and amphibian salvage) and rock scaling on the slope above the tunnel portal to provide safe access to the work areas

Presenter: Bob Schubak (Director, Dam Safety)

Dam Safety Program Dashboard

The following dashboard provides an overview of the status of the Dam Safety Program. "Traffic lights" provide a qualitative indication of the status of each of five elements of the Program and trend arrows identify whether the status is improving, deteriorating or unchanged. As referenced, these indicators are supported by more detailed metrics and narratives in the report.

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Risk Profile and Issues Management



- **Vulnerability Index (pp. 3-6):** The aggregated Vulnerability Index increased slightly by 4.8 through F2025 Q2 due to deteriorated condition of the spillway boom at Stave Falls, accumulation of sediment and loading on the face of Wilsey Dam, and recharacterization and re-rating of previously identified issues, partially offset by the return to service of the Terzaghi Dam spillway.
- **New and Current Issues (pp. 6):** Work to clear the rockfall from the Terzaghi Dam spillway was completed. Personnel and equipment have been mobilized to site to prepare for salvage of the sunken pontoons for the navigation lock guidewall at Keenleyside Dam.

Regulatory Compliance



- **British Columbia Utilities Commission (p. 7):** The Commission accepted, as filed, the schedule of capital expenditures for the Ladore Spillway Seismic Upgrade Project.
- **Operation, Maintenance and Surveillance Manual Updates and Dam Safety Reviews (p. 7):** Progressed according to the work plan.
- **Dam Safety Program Management System (p. 8):** Stations Business Rules were updated in alignment with Dam Safety Program objectives; Director, Dam Safety now listed as co-Business Owner.

Surveillance



- **Dam Inspections (pp. 8-9):** Field work and report completion on formal dam inspections continued to progress ahead of the work plan. All of the 440 scheduled routine inspections were completed in Q2.
- **Reservoir Slopes (p. 9):** Field work and report completion on reservoir slopes inspections lagged the work plan through Q2, but three more inspections were completed in October and all inspection reports are forecast to be completed as required.

Maintenance and Testing



- **Civil Maintenance (pp. 9-10):** Condition-based civil maintenance was fully to plan. Preventive civil maintenance saw further improvement and year-to-date completion approached 90 percent.
- **Spillway Gates (pp. 11-13):** 99% of scheduled gate tests were performed through the first two quarters of F2025. Two gates failed to operate on demand during testing. Annual review of maintenance tasks identified 32 additional tasks that are related to gate reliability so, offset by completed work, the number of outstanding maintenance tasks has increased by 16 over the first half of F2025.

Projects and Investigations



- **Capital Projects (pp. 14-16):** The first construction season concluded on the Comox-Puntledge Flow Control Improvements Project; good progress continued on the John Hart Dam Seismic Upgrade Project; decommissioning of the Durack Brook Dam and the low level outlets at W.A.C. Bennett Dam commenced; and permanent removal of flashboards and piers to improve flood routing capacity of Elko Dam was completed.
- **Dam Safety Investigations (pp. 16-17):** Investigations added to the F2025 program include assessment of public safety warning devices and development of vegetation management plans.

Legend:



All areas within the Program element are being implemented to a satisfactory level. Minor, isolated issues may exist but are not deemed to be indicative of deteriorating performance.



One or more areas within the Program element exhibit or are at risk of underperformance and are being monitored.



One or more areas within the Program element exhibit unsatisfactory performance and require correction.



Status of the Program element has improved over the quarter.



Status of the Program element was unchanged over the quarter.



Status of the Program element deteriorated over the quarter.

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Risk Profile of BC Hydro's Dams

Dam Safety Contribution to Enterprise Risk

Dam Safety is assigned a high "risk priority" within BC Hydro's Enterprise Risk report. Please refer to that report for additional details.

Vulnerability Index Update

Identified physical deficiencies in BC Hydro's dams and the degree of concern that exists with respect to their impact on the integrity and performance of the dam are characterized by the Vulnerability Index. The higher the value of the Vulnerability Index (scale of 0-10), the higher the likelihood of that deficiency leading to poor performance. The Vulnerability Index for each identified issue at each dam site is shown in Figure 1. Vulnerability Indices for the individual deficiencies are aggregated into stacked bars for each dam, and dams are sequenced from left to right in order of increasing downstream consequences per the BC Dam Safety Regulation. Changes in Vulnerability Index for actual and potential deficiencies (including those related to spillway reliability), aggregated across the entire fleet of dams, are tracked on a quarterly basis and shown in Figure 2. Notable changes in Vulnerability Index in F2025 Q2 are identified in Figure 1 and described below.

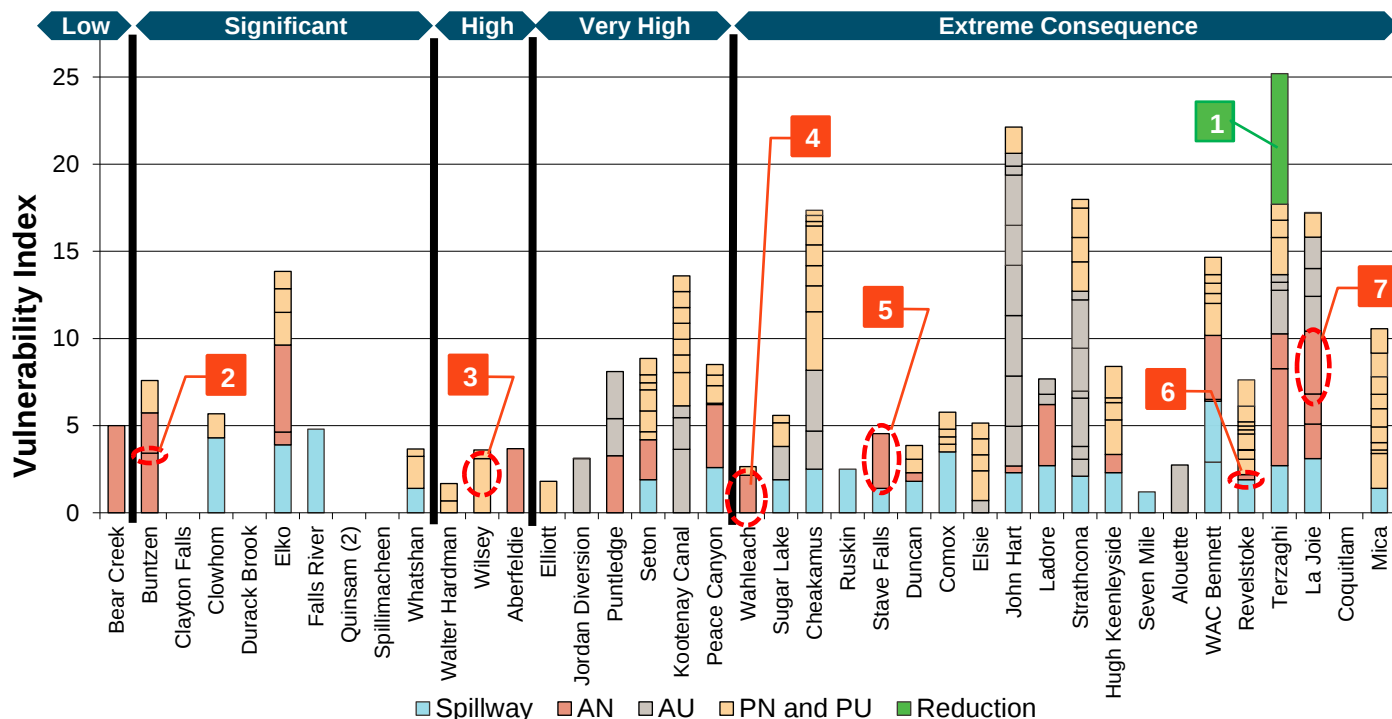


Figure 1 Dam Safety overall risk profile at the end of F2025 Q2, as represented by the Vulnerability Index. Changes this quarter are indicated by the numbered boxes.

AN	Actual deficiency (demonstrated to exist) under normal load conditions.
AU	Actual deficiency (demonstrated to exist) under unusual load conditions.
PN and PU	Potential deficiency (requiring further investigation to demonstrate existence) under either normal or unusual conditions.
Spillway Reliability	Deficiency related to operational reliability or serviceability of the dam's spillway and/or other flood discharge systems.

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- 1** A **reduction** of 7.5 (Actual Normal deficiency) at **Terzaghi Dam**.
The rockfall into the Terzaghi Dam spillway reported in F2024 Q4 has been cleared and no significant damage was observed during the recent inspection. See “Update on Existing Issues” on page 6 for additional information.
- 2** An **addition** of 0.29 (Actual Normal deficiency) at **Buntzen Dam**.
The penstock at Buntzen may be damaged if flood flows enter the penstock corridor from either a spillway breach or overtopping of the dam. This issue is not new but has been reassessed and rerated as part of an annual review of database issues.
- 3** An **addition** of 2.85 (Potential Normal deficiency) at **Wilsey Dam**.
Dredging to remove sediments from headpond and upstream face of Wilsey Dam was performed in August 2019. (See the F2020 Q2 Quarterly Dam Safety Report.) During the most recent formal inspection, however, it was observed that sediments had again accumulated on the dam face to an elevation that now exceeds the level for adequate sliding stability (*i.e.*, with a desired factor of safety) of the so-called “plug dam” at the arch dam’s base. This elevation was calculated by a simplified analysis that neglects some stabilizing features for the plug dam. Due to the expected conservatism of the calculations, this deficiency is characterized as a potential rather than an actual deficiency.
- 4** An **addition** of 2.15 (Actual Normal deficiency) at **Wahleach Dam**.
Ongoing, slow displacements of the slope above the Wahleach powerhouse have been monitored and recorded since construction of the power tunnel through the slope in 1952. This issue has been newly entered as part of an annual review of database issues.
- 5** An **addition** of 3.15 (Actual Normal deficiency) at **Blind Slough Dam (Stave Falls)**.
The spillway boom has deteriorated to the point where it would not be expected to effectively prevent debris from blocking the spillway during a large inflow event. While it performed satisfactorily during the atmospheric river event of November 2021 (about a one-in 30-year event), it might not withstand a larger event with higher debris load. The boom is scheduled to be replaced under the GM-0344 Reservoir Booms Replacement project, with a target in-service date in the spring of 2025.
- 6** An **addition** of 0.3 (Actual Normal deficiency) at **Revelstoke Dam**.
The facility is currently operated using the Outlet Works Maintenance Gates as the normal water barrier, degrading gate reliability since both the Maintenance Gates and Operating Gates must be operated to discharge flow. This issue is not new but has been reassessed and rerated as part of a review of spillway gate database issues.
- 7** An **addition** of 3.6 (Actual Normal deficiency) at **La Joie Dam**.
Intake Operating Gates 3 and 4 are in poor condition, are not able to be used as Single Device Isolation equipment and are unable to close under flow. Their condition has been previously noted in several Quarterly Dam Safety Reports, beginning in F2022 Q1. Replacement of these gates is planned to be completed in F2026 under the La Joie Dam Intake Operating Gate and Follower Replacement project.

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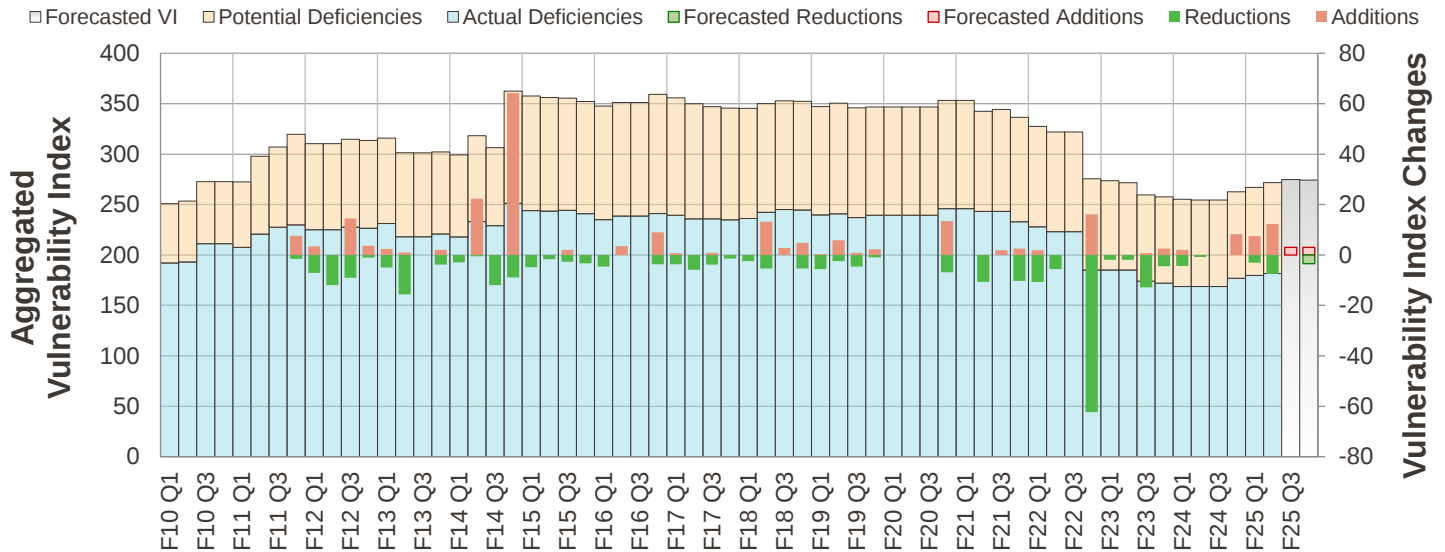


Figure 2 Historical and forecast changes and trends in the Vulnerability Index aggregated across the BC Hydro system.

Over the last several years, new issues have added to the aggregated Vulnerability Index at a rate of approximately 12 per year. To prevent deterioration of the overall risk position, reductions in Vulnerability Index through resolved issues should occur at the same pace or faster. As evident in Table 1, below, and primarily due to the timing of the Program's portfolio of risk reduction projects, Vulnerability Index reductions have lagged behind additions and have not met the target pace over the past four quarters but are anticipated to meet the target over the current fiscal year.

Table 1 Trends and forecasts for Vulnerability Index changes in F2025.

		Actual / Forecast	Target	
Dam Safety Vulnerability Index	Reductions – Last 4 quarters	10.6	12	✗
	Reductions – Fiscal Year Forecast	14.0	12	✓
	Additions - Last 4 quarters	27.9		

Non-Conformances in the Dam Safety Program

Non-Conformance issues arise where the established procedures, systems and instructions of the Dam Safety Program Management System are not being followed at a particular dam, or where procedures that form part of established and generally accepted good practices have not been implemented within the Dam Safety Program Management System or at a particular dam.

Activities to identify, review, resolve and close Non-Conformance issues continued through F2025 Q2. As a result, 14 Non-Conformance issues were resolved and 11 new issues were identified, leaving 246 issues outstanding. Since the start of F2019, when resolution of such issues was made a priority within the Dam Safety Program, the number of Non-Conformance issues has been reduced by more than 55 percent. Figure 3 below shows the continuing progress in reducing the number of Non-Conformance issues.

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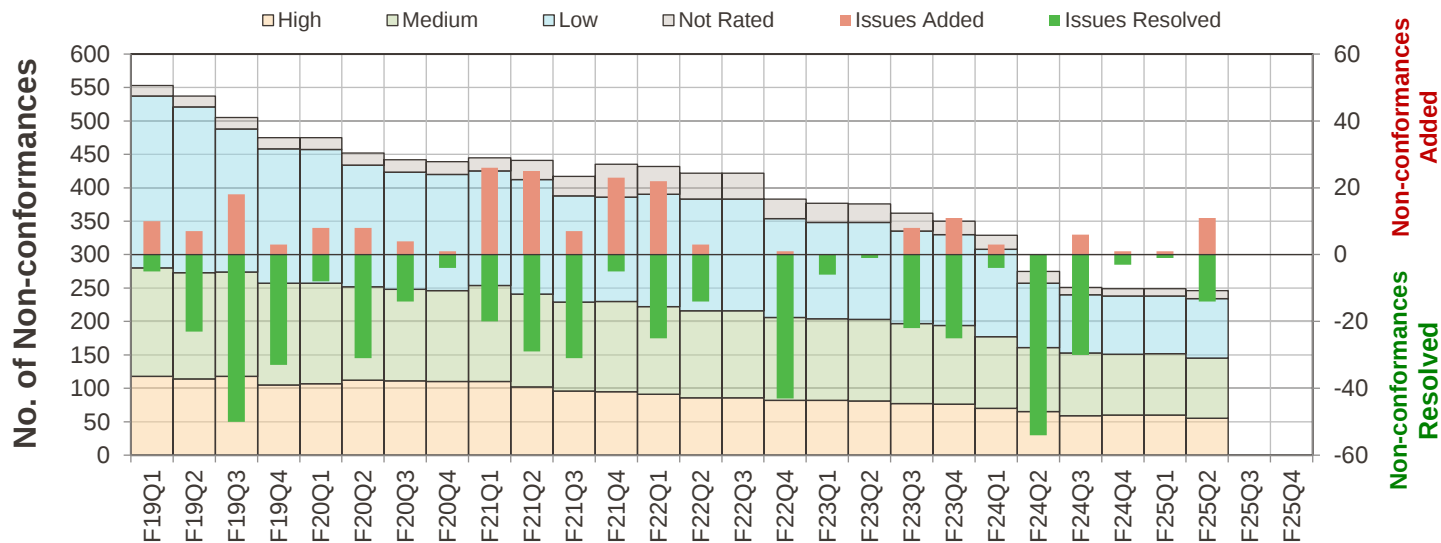


Figure 3 Changes and trends in the total number of Non-Conformance issues (characterized by level of importance) within the Dam Safety Program.

New Issues

No new issues arose in F2025 Q2.

Update on Existing Issues

Rockfall in Terzaghi Dam Spillway Chute

As described in the F2024 Q3 Quarterly Dam Safety report, at some time between January 11 and January 15, 2024, several hundred cubic metres of rock fell from the steep slope adjacent to the spillway at Terzaghi Dam, blocking the spillway. Using remotely controlled equipment so that no workers were exposed to the rockfall hazard, the work to remove the rock from the spillway was completed on August 13, 2024. The spillway was subsequently inspected by drone, again so that no workers would be exposed to the hazard, and no significant damage was found to have resulted. The spillway was returned to service, operating restrictions on the spillway gates were removed, and, per item 1 under "Vulnerability Index Update" on page 3, Dam Safety Issue BR124-1 was closed.

The project to stabilize the rock face and provide safe access to the spillway chute is progressing through Definition Phase and a Request for Proposals for construction has been issued. Early Contractor Involvement is scheduled for March of 2025, with start of construction in spring of 2026.

Hugh Keenleyside Dam – Navigation Lock Floating Guidewall

The F2020 Q4 Dam Safety Quarterly Report described the January 2020 sinking of two pontoons of the upstream floating guidewall that directs marine traffic safely into the navigation lock. The project to salvage the sunken pontoons and move them to another location – where the pontoons can be safely inspected and potentially rehabilitated for return to service in an upgraded guidewall – was initiated in F2024. Personnel and equipment have been mobilized to site to prepare for recovery. After preparations are complete, a decision to proceed with salvage or postpone will be made based on readiness, reservoir levels, and flow conditions.

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Compliance with Processes and Regulations

Regulatory Communications – British Columbia Utilities Commission

On October 22, 2024, the Commission issued its Final Order regarding BC Hydro's application for acceptance of the schedule of capital expenditures for the Ladore Spillway Seismic Upgrade Project. The Commission has accepted that the expenditure schedule as filed is in the public interest in that: the project addresses dam safety risks; the project is appropriately identified as the preferred alternative to address the risks; appropriate mitigation measures are in place for the risks related to the project; the project cost estimate and cumulative rate impacts are reasonable, and; consultation on the project has been adequate to date.

The application for acceptance of the schedule of capital expenditures for the Strathcona Discharge Upgrade Project is presently adjourned while BC Hydro assesses the need for an updated project cost estimate. On October 29, 2024, BC Hydro requested that the regulatory process for the application remain adjourned until January 31, 2025, when BC Hydro expects to have completed the bid evaluation process.

Regulatory Communications – Comptroller of Water Rights

Authorizations to alter Elko Dam (permanent removal of stoplogs and piers in the west spillway) and to alter WAC Bennett Dam (decommissioning of the low level outlets) were received in August. (See "Capital Projects", pages 14 and 16, respectively.) The Comptroller's Office was informed of the successful clearing of the Terzaghi Dam spillway in August. (See "Update on Existing Issues", page 6.) Acceptance of investigation work at La Joie Dam was also received in Q2.

Operation, Maintenance and Surveillance Manuals

Each dam has an Operation, Maintenance and Surveillance Manual ("Manual") for Dam Safety that identifies responsibilities and expectations within BC Hydro for maintaining the safety of the dam. These Manuals are required by the Dam Safety Regulation and must be updated every seven to ten years, depending upon the dam's failure consequences classification. Updates for the Aberfeldie, Falls River, Terzaghi and Jordan Diversion Manuals progressed.

Dam Safety Reviews

Dam Safety Reviews are independent, systematic reviews and evaluations of all aspects of a dam's physical condition, design, construction, operation, maintenance, processes, and other systems affecting the safety of the dam. Performed by external consultants, they are carried out at minimum intervals of every five to ten years for dams that are classified in accordance with the Dam Safety Regulation as High, Very High, and Extreme consequence dams.

In F2025, BC Hydro has modified its procedures at completion of a Dam Safety Review; now submitting the hard copy of the report to the Office of the Comptroller of Water Rights along with a sealed engineering memorandum from the dam's assigned Dam Safety Engineer that describes how the findings, identified issues and recommendations from the Dam Safety Review have been entered, characterized and rated in the Dam Safety Issues Database.

Five Dam Safety Reviews that are due at the end of 2024 were originally targeted for early completion in Q4 of F2024. The final reports for Wilsey Dam and WAC Bennett Dam – and their accompanying BC Hydro memoranda described above – were submitted to the Comptroller in Q2. The final reports for Cheakamus Dam and Comox Dam were received from the Dam Safety Review Engineers in Q2. The John Hart Dam report was finalized in Q2, but the sealed report has not yet been received. All these reports will be submitted to the Comptroller along with the BC Hydro memoranda in Q3.

Four other Dam Safety Reviews at Duncan, Elliott, Revelstoke, and Seven Mile Dams are currently underway.

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Dam Safety Program Management System

In F2025 Q2, the following actions to support, improve, or further develop the Dam Safety Program Management System were completed.

- Procedures for providing and reviewing access of BC Hydro personnel to the Dam Safety Issues Database were documented, and access was provided to employees in Security & Emergency Management.
- The Stations Business Rules – a set of rules and guidelines to facilitate stations maintenance and minor capital work – were updated in alignment with Dam Safety Program objectives and with the Director, Dam Safety added as a Business Owner of the document. As a part of this update, a formal approval process for extension of preventative maintenance work orders was established.

Surveillance

Key activities comprising dam safety surveillance include inspections, monitoring of instrumentation and quality control of data, and characterization of dam performance. Table 2 below provides key metrics regarding these activities, which are described in the following sub-sections of the report.

Table 2 Dam safety inspections and surveillance activities.

		Quarter Q2		Year-to-date	
		Actual	Target	Actual	Target
Routine dam inspections	Completed	440/440 = 100%	100%	848/851 = 99.6%	99.5% ✓
	Missed	0		3	
Formal (annual and semi-annual) dam inspections	Field work completed	25	35	57	55 ✓
	Reports issued	0	0	16	10 ✓
Instrumentation data checks		195/195 = 100%	97%	385/390 = 97%	99% ✓
Reservoir slopes inspections	Field work completed	10	15	16	19 ✗
	Reports issued	3	7	3	7 ✗

Routine Dam Inspections

Routine weekly and monthly inspections are a regulatory requirement. These visual inspections are carried out by trained inspectors within Dam Safety or Stations Field Operations using checklists prepared by the Dam Safety Engineer. The purpose of these inspections is to identify changing conditions at a dam, reservoir or appurtenant structure that could threaten the safety of the dam. None of the 440 scheduled routine inspections were missed in Q2.

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Formal Dam Inspections

Formal inspections of the dams are regulatory inspections completed by Dam Safety Engineers on a semi-annual or annual frequency, as dictated by each dam's Consequence Classification. These inspections include a comprehensive visual inspection, a review of the monitoring data and an assessment of the condition of the water containment and conveyance structures. At the end of Q2, both the field work and number of issued reports for formal dam inspections were ahead of the planned targets.

Instrumentation and Monitoring

Dam Safety Surveillance collects, checks, and assesses about two million data points a month. A vast majority of the data is collected and checked against threshold values automatically by the Automated Data Acquisition System. Even though most of the data is checked automatically it is essential that qualified staff review the data regularly to ensure the systems are functioning as expected. The Dam Safety Technologists in each region regularly check instrumentation data plots for all dams to ensure the Automated Data Acquisition System is functioning as expected, identify any unusual trends, and ensure continued accuracy of the data being for ongoing engineering assessment. They are tasked to perform three such checks per week. All 195 data checks were completed in Q2.

Reservoir Slopes

Reservoir Slopes inspections are completed on a frequency ranging from semi-annually to once every 10 years depending on the assessed hazard of the slope. They are typically carried out by the Reservoir Slopes Geologist and the Specialist Dam Safety Engineer for the Upper Columbia Region. Each inspection generally consists of a review of all monitoring data, a visual inspection completed from helicopter with boots-on-ground assessment of identified areas of concern, and documentation by a sealed engineering report. Field work and report completion for the slopes inspections was lagging the work plan at the end of Q2, but three more inspections were completed in October and all inspection reports are forecast to be completed as required.

Unusual Events or Observations

The Dam Safety on Call Person responded to 75 calls in Q2, which typically includes instrumentation alarms, operational inquiries, operations notifications during high inflows and earthquake notifications. This number of calls and responses is considered normal for this time of year.

Civil Maintenance

Results for the Preventive and Condition-Based Civil Maintenance programs are summarized in Table 3, below.

Table 3 Dam Safety and Generation Civil Maintenance for F2025.

		Quarter Q2		Year-to-date	
		Actual	Target	Actual	Target
Corrective and Condition-Based Maintenance	Spend (\$k)	1243	1134	2218	2218
	Work Orders Completed	2	5	7	7
Preventive Maintenance	Tasks Completed	289	325	415/476 = 87%	

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Preventive Maintenance

In Q2 of F2025, Stations Field Operations and Engineering Services completed 289 work orders out of a planned 325 for the Civil Preventative Maintenance plan, slightly improving the completion rate compared to Q1. This brings the total completed work orders for the first two quarters to 415 out of a planned 476. For 39 additional work orders, the field work had been completed and reports were in preparation.

Corrective and Condition-Based Maintenance

As of the end of Q2, the Corrective and Condition-Based Civil Maintenance Program was on track, having completed all seven planned projects and being right on budget.

In response to higher-than-anticipated contractor estimates and reprioritization, however, projects to install tie-downs, lock blocks and barriers along the Aberfeldie Dam penstock and to repair the road at Sugar Lake Dam have been deferred to F2026. These deferrals were discussed with the facilities' Dam Safety Engineers, who agreed that this work could be deferred until F2026 without significant concern.

The two projects completed in Q2 were spillway repairs at Alouette Dam and at Revelstoke Dam. The work at Revelstoke, which included repairs on steeply sloping chute sections and on the sloped face below the flip bucket and above the plunge pool, was performed by the Construction Services Vernon team and a rope access contractor. See figure 4, below.

Work commenced on access road repairs at Jordan River, underwater inspections at the Jordan Diversion Dam, and inspection of the Bear Creek Dam's plugged Low Level Outlet.



Figure 4 Concrete repairs underway on the downstream slope section of the spillway at Revelstoke Dam, directly above the plunge pool.

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Spillway Gate Testing and Maintenance

Spillway Gate Testing

During Q2 of F2025, 228 of 235 scheduled gate tests were completed, including annual gate tests of 19 gates. Table 4 below provides key metrics related to spillway gate testing.

Table 4 Spillway gate testing results for F2025 Q2.

		Quarter Q2		Year-to-date	
		Actual	Target	Actual	Target
Monthly Tests	Completed	229/230 = 99.6%	100% ✖	462/467 = 99%	98% ✔
	Missed tests	1		6	
Gates Failing to Operate on Demand during Testing	No. of failures	2		7	
	Failure rate	2/229 = 0.9%		7/462 = 1.5%	

Two gates failed to operate on demand in Q2:

- At Cheakamus Dam, Low Level Outlet Gate 1 would not open during the monthly test and subsequent troubleshooting in July. In early August, the gate was inspected by remotely operated vehicle and no obvious issues were found. The Field Maintenance Engineer increased the operating pressure of the hydraulic system, and the gate was successfully tested in August. The operating pressure was then returned to the original setting, and the gate was successfully tested in September. Field Maintenance Engineering is planning a dimensional inspection of the gate and gate slot to investigate the cause.
- At Strathcona Dam, in September, the Spillway Gate 3 low level limit protection needed to be blocked to lower the gate. Troubleshooting will be performed during the planned annual outage in October.

One gate test was classified as having been missed in July. Outlet Works Operating Gate 2 at Sugar Lake Dam was operated for a planned flow transfer on the day that the crew attended site and would ordinarily have performed the test. The gate was successfully operated and would have fulfilled the requirements for testing had the remainder of the Maintenance Instruction been completed which, unfortunately, the crew did not understand and failed to do. The crew has since been made aware of this option for future occurrences.

Exemptions to gate testing scopes (e.g., to exclude gate movements) are authorized in circumstances where: there would be the potential to cause harm to species at risk or other deleterious environmental consequences; there would be the potential to cause damage to the gate system or other infrastructure; or gates are locked out to support the safe performance of downstream or adjacent construction activities and returning the gate(s) to service for testing would be impracticable. Authorization for such exemptions is either provided for in Maintenance Instructions, where those circumstances occur routinely, or by the Director of Dam Safety or delegate in unusual circumstances. In Q2, gate testing scopes were reduced to exclude gate movements on 21 of the tests completed. Further, exemptions to forego tests altogether were authorized at Comox, where Spillway Gate 1 was out of service in July, August and September for upgrades (see below and “Capital Projects”, page 14), and at Elko Dam, where neither of the two spillway gates were tested in September due to the work to permanently remove the flashboards and reduce the height of the concrete piers on the dam’s west overflow spillway (see “Capital Projects”, page 16).

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Gates Out of Service or Under Restricted Service

The availability of flood passage devices is a key measure of our ability to pass high inflows and manage reservoir levels. At the time of writing this report, all spillway gates and flood passage devices were in service except:

- One of the two spillway gates at the Comox Dam out of service for the Comox-Puntledge Flow Control Improvements Project (Page 14); work on the gate started in July 2024 and is planned to be returned to service in the fall.

Spillway Gate Maintenance

Spillway gate maintenance results for F2025 Q2 are shown in Table 5.

Table 5 Spillway gate maintenance results for F2025.

Corrective and Condition-Based Maintenance Tasks	Quarter Q2		Year-to-date
	Completed	Planned	
Planned Tasks	9	12	15/27 = 56%
Emergent Tasks	8		10

As reported in Q1, Dam Safety prioritized a total of 38 gate maintenance tasks for completion in F2025. Due to an administrative error, an additional 12 tasks were added into the plan, erroneously raising the total to 50. The planned tasks in Table 5 are reported based on the erroneous figure of 50. A change notice has been prepared to reset the target planned gate maintenance tasks to 43, which includes the prioritized 38 tasks, plus five additional tasks that have already been completed by Stations Field Operations. The planned task figures in Table 5 will be reconciled with this change notice for next quarter's report.

The number of outstanding gate maintenance tasks is shown in the chart in Figure 5. In F2025 Q2, an annual review of maintenance tasks identified an additional 32 existing tasks that are related to gate reliability and weren't previously identified as such. With the addition of newly identified maintenance tasks and the completion of planned and emergent tasks (Table 5), the overall number of outstanding gate maintenance tasks has increased from 100 to 116 year-to-date, and the number of high priority tasks has decreased by two to a total of ten.

Emergency Preparedness and Public Safety

Emergency Preparedness is managed by Security & Emergency Management. Dam Safety reports on the updating of emergency plans for compliance with the Dam Safety Regulation as part of annual reporting to the Comptroller of Water Rights. Public safety near dams and reservoirs is managed by the Public Safety team in Safety Programs. Dam Safety reports on Public Safety activities related to dams during the Dam Safety Reviews. Please refer to the Quarterly Safety & Emergency Management Report, submitted to the Operations, Planning, Safety & Information Technology Committee, for updates on emergency preparedness and public safety.

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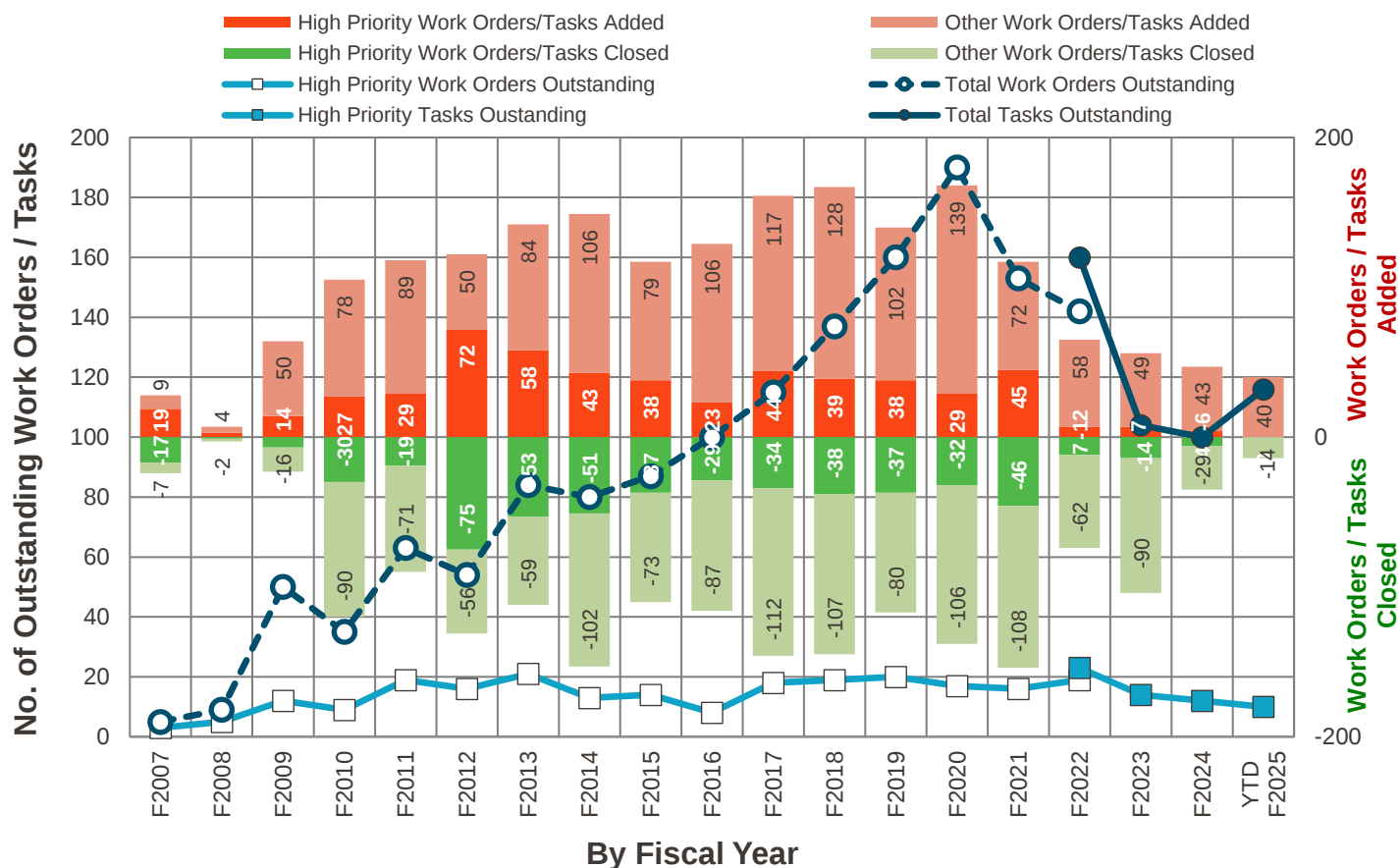


Figure 5 Number of outstanding corrective and condition-based spillway gate maintenance work orders and tasks, new work orders and tasks added, and work orders and tasks closed as at the end of each previous fiscal year.

Notes:

1. At the conclusion of F2022 moving forward into F2023, figures were restated as outstanding tasks instead of outstanding work orders to align with Operations reporting.
2. The number of tasks added and closed does not include any reclassified or cancelled tasks. As such, the net change in the number of tasks will not always equal the difference between tasks added and closed.

Site C Clean Energy Project

Filling of the Site C reservoir commenced on August 25, 2024, and, at the time of preparing this report, had risen by more than 40 metres to reach an elevation just below what will be the minimum normal operating elevation of 460 metres. To date, the dam, abutments, and ancillary structures are all performing well, as indicated by visual observations, measurements and instrumentation readings. The slopes along the reservoir shoreline are performing as expected, with areas of instability contained within the established impact lines and deformation rates within expected ranges. The spillway and low level outlet gates continue to be operated under temporary power and controls by project staff at site, with no reported misoperation. Dam Safety Surveillance is engaged with the project's Resident Engineering Team to coordinate surveillance activities at site and Dam Safety Regulatory & Asset Planning is coordinating with the project team to review and accept the documents required for completion of the Generation Project Acceptance Checklist in preparation for handover of the facility in F2026.

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Capital Projects

Summaries of Dam Safety Capital projects are available for reference in the Dam Safety “book” in Diligent. This section of the report describes newly launched projects and provides updates for projects where significant developments occurred, or where milestones were achieved.

Comox-Puntledge Flow Control Improvements

The objective of this project is to improve control of water conveyance at Comox and Puntledge dams, with specific consideration to flows and risks to public safety downstream of Puntledge Dam. The project will improve the Puntledge generation water conveyance by upgrading or replacing existing components of the flow control system at the Puntledge Diversion dam and in the powerhouse. It will also replace the Comox Dam spillway gates and improve their reliability.

The first construction outage has now concluded. Upgrades to the first of two spillway gates and the hoist structure commenced, and new hoist machinery, power, communications and controls were installed. The new gate body was assembled at site, but deformations arising from welding will have to be repaired prior to it being installed in F2026. In the interim, the old gate has been modified to function with the new hoist.



Figure 6 Construction scaffolding surrounds the spillway gate hoist structure at the Comox Dam in September.

Upgrades to the first of two intake operating gates at Puntledge Dam, including new hoist, gate, controls, and commissioning were completed, as were upgrades to the fish screens at that same location. Planned works in the powerhouse to prevent sudden flow changes into the river at Puntledge Dam are also mostly completed, with some non-critical scope deferred to F2026.

Durack Brook Dam Decommissioning

The Durack Brook Dam is a small earthfill structure, about 6 m high by 45 m long, that was constructed in the 1960's to service the W.A.C. Bennett Dam construction camp and later served as the water source for the Visitor Centre and some shops on site. With those facilities now receiving water from a new well, the Durack Brook Dam can now be removed from service. The dam has now been breached and earthworks, geotextile and riprap placement for site restoration are in progress. Substantial completion is forecast for F2025 Q3.

Elko Dam Water Conveyance Improvements

Elko Generating Station is no longer in service. A final decision on whether to redevelop or permanently decommission the facility has not been made, pending additional studies by BC Hydro. In the interim, the Elko Dam must nevertheless be maintained in a safe state and in good operating condition. The dam and its abutments are susceptible to overtopping under flood and debris events, and there are other deficiencies pertaining to spillway gate reliability and worker safety. This project will improve flow conveyance through the dam to reduce the risk of overtopping while improving worker safety and equipment reliability, with the goal of safely managing the dam until it's redeveloped or decommissioned.

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Previously, flashboards on the top of the east overflow spillway were removed, permanently lowering the dam's headpond. Implementation of new work to permanently remove the flashboards and reduce the height of the concrete piers on the west overflow spillway was completed in September 2024. The next stage of work, comprising worker safety and equipment upgrades, will begin in 2025.

John Hart Dam Seismic Upgrade Project

Good progress continued on the main civil works portion of the John Hart Dam Seismic Upgrade project through F2025 Q2.

As reported last quarter, the placement of the upstream berm on the North Earthfill Dam is complete. Work on the downstream stabilizing berm has now been deferred until spring of 2025, however, in order to undertake that work in drier, more favourable conditions.

On the Concrete Main Dam, the construction of the upstream cofferdam is underway. This cofferdam will keep water off the upper part of the dam to facilitate concrete removal and conversion of the gravity dam blocks to a passive overflow spillway. Construction of the apron blocks for the new passive overflow spillway continues at the downstream toe of the dam. Dowel installation and water testing for the training wall in the spillway has begun. The upper photograph in Figure 7 shows an overview of the work on the Main Concrete Dam in progress.

On the Middle Earthfill Dam, excavation of material from the downstream face to improve stability was completed. The installation of more than 300 H-piles is underway on the downstream toe to further improve stability, as shown in the bottom two photos in Figure 7.

Upstream of the dam, the removal of stumps and dredging in the reservoir is progressing. This work is being performed to prepare a sound foundation for the dam's new upstream berm. Dredgate placement continues in the storage cells completed in F2025 Q1.



Figure 7 Construction on the John Hart Dam Seismic Upgrade Project. Top: Main Concrete Main Dam. Middle: H-Pile installation on the toe of the Middle Earthfill Dam. Bottom: Close-up of H-pile installation.

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Ruskin Dam Left Abutment Sinkhole Remediation

At Ruskin Dam on January 6, 2020, after an extended period of heavy precipitation, a small depression was observed in the filter blanket that was recently constructed on the left abutment behind the powerhouse. An investigation confirmed this to be a sinkhole. A second sinkhole was subsequently discovered in the same area, and both were found to be increasing in size. See the F2020 Q4 and the F2021 Q3 Quarterly Dam Safety Reports for additional information.

This project was released to develop and implement remedial solutions to the causes and impacts of the sinkholes. The F2025 Q1 Quarterly Dam Safety Report described the discovery of a void within the bedrock above the penstock and fractured bedrock underlying the soil overburden, necessitating design modification. The project team has completed the design modifications, and are proceeding with penstock grouting works, as well as the installation of piles and shoring that are required to support the excavation of the erodible sub-surface clays that led to the sinkholes. The grouting is proceeding well, and the installation of the piles and shoring is nearing completion. See Figure 8. Excavation of the erodible clays is expected to commence in Q3.



Figure 8 Pile shoring nearing completion on the left abutment of Ruskin Dam.

W.A.C. Bennett Dam – Seal Low Level Outlets

During construction of the W.A.C. Bennett Dam, three 14.9 m diameter, 790 m long diversion tunnels were used to pass flows around the construction site. At the end of diversion, these tunnels were permanently closed by 60 m long concrete plugs, but low level outlets were installed through the two of the plugs to maintain downstream riparian flows during the period from final closure of the river until sufficient discharge through the turbines could be maintained. During the last test of the low level outlets in 1974, severe vibrations were encountered. Testing has not been performed since and the low level outlets do not serve any operational function. As they are not deemed fit for use in their current configuration, do not provide any flow routing benefits, and long-term deterioration could lead to uncontrolled release of the reservoir, the decision was made to decommission and permanently seal the low level outlets.

Decommissioning activities started in August, beginning with environmental risk mitigation measures (fish fence installation and fish and amphibian salvage) and rock scaling on the slope above the tunnel portal to provide safe access to the work areas. Decommissioning is scheduled for completion in November 2025.

Dam Safety Investigations

Dam Safety Investigation Projects (“Investigations”) are generally performed to either refine knowledge regarding potential issues or non-conformances of information recorded in the Dam Safety Issue Database or to perform precursor work for planned capital upgrade projects. This section provides descriptions of newly launched Investigations and updates for those Investigations where significant developments have occurred or where milestones were achieved.

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Since the 2024 Q1 Board Report, which presented the F2025 program of Dam Safety Investigations, there have been some Investigations added to the program, described below.

Public Warning Systems Assessment

This Investigation will review the public warning systems installed at BC Hydro facilities to identify and characterize any deficiencies in their ability to perform their intended function, using the Canadian Dam Association's *Public Safety Management Guidelines* and *Technical Bulletin for Audible and Visual Signals for Public Safety Around Dams* as reference. The systems at Alouette, Jordan, Ladore, and Strathcona Dams will be reviewed in F2025.

Duncan Dam Three-Dimensional Models

This investigation will build three-dimensional, computer-aided design and Geographic Information System models of Duncan Dam for use in understanding, modeling and analysis of the dam structure, and for population of the Dam Safety Information System that was described in the F2023 Q3 Quarterly Dam Safety Report.

Sugar Lake Abutments Seepage

Deposition of silt and sand particles by sand boils on the upstream side of the Sugar Lake Dam's right abutment has been observed. These sand boils are believed to be formed by seepage gradients from the western mountain slope, which extends hundreds of meters above the dam, but current understanding of these seepage flow patterns and of their sources is limited. This Investigation is intended to improve that understanding, to identify potential deficiencies of existing seepage control measures, and to assess the resultant potential for internal erosion of the right abutment.

Vegetation Management Program Assessment

An annual budget for vegetation management at dams and generating stations exists, but this maintenance activity does not presently follow documented plans or standards to direct scoping, recurrence or budgeting for each facility. The goal of this project is to develop an integrated plan that includes the requirements, programs and operational capacity to ensure appropriate vegetation management at generating stations and dams. Given the importance of ensuring safe operation of the water conveyance and retention assets, dam safety requirements are considered the key driver for this project. A draft maintenance standard has been prepared and facility-specific vegetation management plans are being developed over time. In F2025, vegetation management plans for Revelstoke and Wahleach will be developed.

Survey Datums Standardization

Various and differing survey datums and benchmarks have been used at many of our dam sites through their lives by the original construction team, subsequent upgrade project teams, and various other contractors, and these historic survey datums have not always been properly documented and reconciled. Discrepancies in survey datums, especially the vertical control, could result in dam safety incidents due, for example, to misinterpretation of dam safety monitoring instruments or misoperation of water conveyance equipment. This Investigation will verify or establish local survey benchmarks and standardize local survey datum at the following dam sites: John Hart, Ladore, Strathcona, Wahleach, Buntzen, Coquitlam, Ruskin, Terzaghi, La Joie, Peace Canyon, Hugh Keenleyside, and Mica.