EXH. JPH-1CT
DOCKETS UE-240004/UG-240005
2024 PSE GENERAL RATE CASE
WITNESS: JAMES P. HOGAN

BEFORE THE
WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION

WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION, **Complainant,** **v.** **PUGET SOUND ENERGY,** **Respondent.**	**Docket UE-240004** **Docket UG-240005**

PREFILED DIRECT TESTIMONY (CONFIDENTIAL) OF

JAMES P. HOGAN

ON BEHALF OF PUGET SOUND ENERGY

REDACTED VERSION

FEBRUARY 15, 2024

PUGET SOUND ENERGY

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PUGET SOUND ENERGY

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I. INTRODUCTION

Q. Please state your name, business address, and position with Puget Sound Energy.

A. My name is James P. Hogan, and my business address is 355 110th Ave. NE, Bellevue, WA 98004. I am the Director of Major Projects for Puget Sound Energy ("PSE").

Q. Have you prepared an exhibit describing your education, relevant employment experience, and other professional qualifications?

A. Yes, I have. It is Exh. JPH-2.

Q. What are your duties as Director of Major Projects?

A. I am responsible for the execution of PSE's large capital projects, specifically including new generation assets, electric transmission lines, and high pressure gas projects, as well as very large upgrade or modernization projects to existing facilities, such as upgrades to the Baker River Project discussed in this testimony.

Q. What topics are you covering in your testimony?

A. My testimony supports recovery of the costs PSE expects to incur to complete three projects, the Lower Baker Dam Seepage Reduction project, the Upper Baker Dam Spillway Stabilization project, and the acquisition of the Beaver Creek Wind project. My testimony also introduces the Lower Baker Dam Crest Improvement project which is under development and expected to be in-service in 2028. PSE is not seeking to recover costs of the Crest Improvement project in this two-year rate plan and is providing information at this time to support a later prudence review.

II. OVERVIEW OF PSE'S BAKER RIVER HYDROELECTRIC PROJECT AND SEEPAGE REDUCTION PROJECT

A. Overview of PSE's Baker River Hydroelectric Project

Q. Please describe the Baker River Hydroelectric Project.

A. The Baker River Hydroelectric Project ("BRH Project") is the largest hydroelectric facility in PSE's generation fleet. It is comprised of Upper Baker Dam and Lower Baker Dam, as well as their associated powerhouses and facilities. The BRH Project's reservoirs, Baker Lake and Lake Shannon, are fed by runoff from Mount Baker and Mount Shuksan, while the dams themselves sit on a tributary of the Skagit River in northwest Washington. The Upper Baker Dam, completed in 1959, is a concrete gravity dam with a height of 312 feet and power-generating capacity of 107 megawatts ("MW"). The Lower Baker Dam ("LBD"), completed in 1925, is a semi-gravity concrete arch dam with a height of

285 feet, crest length of 550 feet, and power-generating capacity of 111 MW. Leakage through LBD and through geologic features within the bedrock have occurred since original construction. Prior grouting programs were carried out on the dam in 1934, 1959, and 1982.

Q. How has hydroelectric power, and particularly the BRH Project, benefited PSE's customers?

A. Hydroelectric power, and the BRH Project in particular, continue to play a crucial role in PSE's generating fleet. The two dams that compose the BRH Project have been in operation since 1925 and 1959 and provide a combined 218 MW of clean, non-emitting power. For nearly a century the BRH Project has provided numerous and substantial benefits to Washington electric customers by reliably producing carbon-free energy, enhancing fuel diversity, and insulating customers from commodity price spikes. Into the future, the BRH Project will make a material contribution to PSE's achievement of mandates under the Clean Energy Transformation Act ("CETA").

Q. Please describe the 2012 inspection that resulted in establishment of an independent Board of Consultants to evaluate rock abutment stability at the BRH Project.

A. In terms of project operations, the BRH Project continues to run safely and efficiently, producing power at levels as would be expected. In 2012, during a regularly-scheduled comprehensive inspection by independent consultants (which

occurs every five years, as required by the Federal Energy Regulatory Commission ("FERC")), it was determined that the leakage through the Lower Baker Dam bedrock foundation was increasing with time, it could pose a threat to dam stability if left unmitigated, and that movement of blocks 18 and 19 under the spillway of the Upper Baker Dam created uncertainty regarding dam stability and required additional review.

In February 2013, FERC required PSE to establish a three-member independent Board of Consultants ("BOC") to assist FERC with assessing the ongoing investigations and the potential threat the Lower Baker Dam leakage and block movement under the Upper Baker Dam posed to dam stability. The second exhibit to my prefiled direct testimony, Exh. JPH-3, is a letter from FERC requiring establishment of the BOC. The members of the BOC have expertise in rock mechanics, geological engineering or geology, structural engineering, rock abutment wedge failures under dams, and abutment leakage.

B. The Baker River Hydro Seepage Reduction Project

Q. Please explain why PSE initiated the Baker River Hydro Seepage Reduction Project.

A. In 2012, the same year as the comprehensive inspection, PSE requested that Tetra Tech Inc. conduct several investigations into the nature of the leakage through the Lower Baker Dam foundation, potential erosion below the Lower Baker Dam apron, and the presence of sub-channel flow pathways. These investigations were

not definitive, and Tetra Tech, and later Shannon & Wilson, performed subsequent further studies and testing.

Based on extensive studies conducted through 2017, PSE determined that the ongoing leakage through the Lower Baker Dam foundation did indeed present a potential dam safety issue. PSE presented the results of these studies to the BOC in December 2017 and solicited its opinion on whether the ongoing leakage presented a dam safety issue. Specifically, PSE asked the BOC if it was necessary to mitigate the leakage to maintain dam safety. The BOC responded in the affirmative, and its response is captured in a BOC Report, which is included as the third exhibit to my prefiled direct testimony, Exh. JPH-4.

On January 29, 2018, PSE submitted to FERC the BOC Report, plus a plan and schedule to comply with the BOC's recommendations. PSE's letter to FERC is provided as the fourth exhibit to my prefiled direct testimony, Exh. JPH-5. FERC responded to PSE's letter on March 12, 2018, and did not dispute the BOC's conclusion that the leakage at Lower Baker Dam posed a dam safety issue if left unmitigated. The FERC response is included as the fifth exhibit to my prefiled direct testimony, Exh. JPH-6.

Q. What are PSE's plans to address the leakage at the Lower Baker Dam foundation?

A. PSE plans to treat the Lower Baker Dam foundation with a modern, comprehensive grout curtain as part of the Seepage Reduction Project ("SRP").

This grout curtain will treat a much wider and deeper area than previous grouting projects and will result in longer flow pathways that will decrease flow velocities and thus lower the potential for foundation erosion and degradation. Debris upstream of the Lower Baker Dam will also be grouted to increase the effectiveness of the grout curtain. Such activity will not only address the current leakage but will also minimize the potential for future leakage.

Q. What are the estimated costs for the SRP?

A. The total construction costs for the SRP from 2021 forward were estimated to be $341 million. This amount included the construction itself, a construction management contract, the engagement of an engineer of record, PSE labor associated with the SRP and its oversight, PSE overhead costs that are typical for construction projects of this nature, and a contingency allowance to account for unexpected scope elements that are often discovered through the course of a project of this scale.

The actual costs including allowance for funds used during construction ("AFUDC") for the SRP prior to 2024 are:

- Prior to 2021 – $21,339,263
- 2021 - $37,736,121
- 2022 - $85,018,763
- 2023 – $99,190,264

The projected spend not including AFUDC for the SRP for 2024 and 2025 are:

- 2024 - $102,474,295
- 2025 - $36,632,153

Please see the corporate spending authorization for the SRP which is included as the sixth exhibit to my testimony, Exh. JPH-7. The SRP base scope of work is expected to be completed by July 2025 but does not include schedule and cost risks associated with higher order holes that may be required to meet the SRP objectives. PSE actively monitors the schedule and budget for the SRP.

Q. Why is it in the public interest to make these investments in the Lower Baker Dam at the BRH Project?

A. First and foremost, this is a dam safety issue that must be resolved to retain PSE's operating license for the facility from FERC. Also, the SRP will enable the BRH Project to continue to generate carbon-free electricity for another five decades or more. The clean power the BRH Project provides to PSE's customers is stable and predictable, and the investment will help PSE meet its objectives related to environmental stewardship.

In addition, maintaining diversity in PSE's generating fleet, through pursuit of the SRP, is particularly important in light of its ability to mitigate exposure to fuel price volatility that would exist with a fleet concentrated on one specific generating fuel.

C. PSE's Approach to the SRP

Q. Please describe how PSE identified the method for accomplishing the SRP.

A. PSE convened a team of subject matter experts, including the FERC-required BOC and engineering experts from Shannon & Wilson, Hatch, GeoHydros, and PSE. This team participated in a comprehensive alternatives analysis workshop in July 2017 to evaluate six methods that had been identified and determined to be suitable for consideration to mitigate leakage at the BRH Project. The team of experts considered the following criteria for evaluation: fatal flaws; relative cost; constructability; schedule; environmental issues; licensing; reliability; and dam safety during construction.

Q. What did this team of experts determine?

A. The team of experts determined that the combination of a grout curtain of significant depth and width, including grouting of the debris upstream of the Lower Baker Dam, was the most effective method for reducing the seepage and resolving the dam safety concerns. The BOC's support for this determination is memorialized in its BOC report for meeting no. 6. *See* Exh. JPH-4 at 2.

Q. What alternatives were considered, and why were those approaches rejected?

A. PSE considered five alternatives to the BRH SRP:

1. Low hydraulic conductivity blanket over the reservoir bottom upstream of the dam. The team considered several variations on this alternative, with differing features such as the blanket material (synthetic fabrics versus low permeability sediments) and extent of the treatment area (extensive blanket versus targeting the known leakage paths). Ultimately, the team concluded this option would be challenging to construct and only an effective solution for a limited period (days to months, versus decades). This option was originally included in the request for proposals ("RFP") as a measure to assist with the grout curtain installation. It was eventually removed due to the uncertainty in effectiveness and its price of approximately $50 million. A more localized geosynthetic blanket is still being used to control localized flows in the rock face on the right side of the reservoir.

2. A continuous, positive cutoff wall. The team considered several permutations of this alternative, including variations in location (upstream of the dam versus through the dam) and construction methodology (hydromill versus secant pile). Ultimately, this option was not the preferred option due to a number of factors, including: 1) the larger equipment necessary to construct a cutoff wall would necessitate a larger

platform, which would ultimately need to be free standing and therefore significantly more expensive than the grout curtain platform; 2) cutoff walls constructed with slurries require the ground to be pretreated by grouting to prevent slurry loss during construction and would therefore be more expensive; and 3) the site is quite confined, and execution of cutoff walls requires a working area much larger than that available at the site.

3. Grouting debris and soil just above its contact with bedrock in the reservoir upstream of the dam. This alternative was ultimately rejected as a stand-alone option because of leakage occurring through the bedrock at elevations above the top of the debris. However, this alternative has been incorporated into the larger grout curtain program. PSE anticipates that this will improve the ability to execute the grout curtain and ultimately reduce grouting time and materials and reduce overall project cost.

4. Injecting gravel and sand through the debris upstream of the reservoir to partially fill joints and fractures. This option was also originally included in the suite of proposals and presented lower costs than other options considered. However, historic reports indicate that similar measures had not proven effective in the past. At other areas within the forebay, after placing material in the debris, the seepage paths simply migrated elsewhere within a period of hours or days. This option was subsequently removed as a standalone option.

5. Construction of a new dam downstream of the existing dam. This option was considered but relatively quickly dismissed as the most expensive and least timely of the options considered. Construction of a new dam would require decades of study and design and would be significantly more costly than the preferred alternative. And, if this alternative was approved by FERC, it would still require some form of interim safety measures that would be nearly as costly as the preferred alternative.

Although not officially considered as a mitigation measure for the ongoing seepage, removal of the dam was informally considered. As with the construction of a new dam, dam removal would require decades of environmental studies and relicensing and would ultimately be as costly, or more costly, than the preferred alternative. All the alternatives, including the preferred alternative, are discussed in the Shannon & Wilson report dated July 7, 2017, which is included as the seventh exhibit to my prefiled direct testimony, Exh. JPH-8.

Q. Please describe how PSE selected the contractor for the SRP.

A. Once the preferred method for accomplishing the SRP was identified, PSE worked with Shannon & Wilson and experts in the field of ground treatment to identify specialty contractors to execute the project. These contractors are leaders in drilling and grouting, heavy civil construction, marine construction, geotechnical engineering, and instrumentation. The contractors were invited to submit statements of interest and qualifications in June 2018. They were also invited to an industry day at Lower Baker Dam on July 18, 2018, to review the

SRP. Thirty-four individuals from sixteen contractors participated. Four prospective contractor teams ultimately submitted statements of interest and qualifications and three were found to be qualified and responsive and were selected to receive the formal RFP.

The three prequalified teams received the RFP on March 18, 2019 and all three responded on August 22, 2019. Teams were evaluated by a panel of four engineering experts based on technical approach, management plan, schedule, experience, past performance, proposed monitoring system, and proposed temporary structures. Once teams were ranked for technical ability, the proposed bid prices were reviewed and all three were found to be within ten percent of the mean. Based on proposal evaluation and price, Lower Baker Constructors, LLC ("LB Constructors") was identified as the team that provided the best value. However, their total price proposal was higher than PSE had anticipated, and the decision was made to work with them in an "early contractor involvement" ("ECI") relationship to lower the overall project cost while still achieving the desired SRP outcome. Following a successful ECI period, the construction contract was awarded to LB Constructors on October 22, 2021. A copy of the construction contract with LB Constructors is included as the eighth exhibit to my prefiled direct testimony, Exh. JPH-9C.

Q. Please briefly describe the LB Constructors' team and the work each member will perform on the SRP.

A. LB Constructors is a joint venture of Traylor Bros. Inc. (heavy civil construction), Ballard Marine (marine construction), and Advanced Construction Techniques (drilling and grouting specialist). The joint venture team members are supported by WSP (formerly Golder Associates), Schnabel Engineering, Gannett Fleming, and VAK Engineering.

Traylor Bros. Inc. will perform site preparation and construction of the temporary access/working platform. Ballard Marine will execute the marine construction to include installation of all underwater features and any required diving support. Advanced Construction Techniques will be performing all of the onsite drilling, drill hole washing and surveying, and grout preparation and injection. WSP and Gannet Fleming will be supporting Advanced Construction Techniques in the interpretation of the geologic features and grouting results and will make real-time adjustments to grout mixes and injection rates, when appropriate. Schnabel Engineering will be providing geotechnical and dam safety engineering support. VAK Engineering will provide structural engineering support.

Q. How did PSE estimate the costs for this work?

A. Project cost estimates at the conceptual stage were based on scaling of the 1983 grouting project costs. As the SRP progressed, costs were estimated by PSE

personnel with considerable drilling and grouting experience, as well as by representatives from Shannon & Wilson.

Q. How did PSE validate the cost of the proposals?

A. PSE hired Jim Cockburn, a recognized expert in the industry, to review PSE's and the contractors' cost estimates. Mr. Cockburn's reviews indicate that the estimates were accurate, and that conclusion is supported by the close spread in the three proposals received in 2019. As stated above, all three proposals fell within ten percent of the mean projected cost. During the ECI phase, PSE hired HDR, Inc., a construction management firm, as another means to validate cost proposals being provided by LB Constructors.

In addition, PSE asked HDR to perform a Monte Carlo simulation on the SRP costs with many of the design and execution variables in hand. This resulted in a Cost and Schedule Risk Analysis Report, which is provided as the ninth exhibit to my prefiled direct testimony, Exh. JPH-10C.

Q. How did PSE prepare for the possibility of higher costs?

A. PSE incorporated both contingency reserves and management reserves into the cost estimates for the SRP.

Q. What is a contingency reserve, and why is it included in the SRP cost?

A. A contingency reserve is incorporated into a project to account for known and measurable risks, as identified through a risk assessment process (i.e., "known

unknowns"). Contingency reserve can apply to both the project budget and project schedule, which are often correlated. Contingency reserve is particularly important for projects similar in profile to the SRP. Geotechnical projects in general, and grouting projects in particular are subject to moderate to large swings in costs associated with unknown conditions below the surface. Contingency reserves are under the purview of the Project Manager.

Q. What is a management reserve, and why is it applicable for the SRP?

A. In contrast to contingency reserves, management reserves are set aside to account for unidentified risks (i.e., "unknown unknowns"). With a project of the scale and complexity of the SRP, it is difficult to identify every risk at the outset. The work that must be done is somewhat comparable to projects that have been completed in the North American hydro generation industry, but aspects of the engineering are unique, the river flow dynamics are specific to the BRH Project, and other project elements can be considered "first-of-a-kind" challenges. It is reasonable to expect that conditions will appear that have not been considered, despite the rigorous risk inventory and management activities that PSE has completed with its vendors. This type of project management challenge is not uncommon in the power construction industry. Such uncertainty is managed, mitigated, and accounted for through a management reserve.

Q. Did PSE utilize contingency reserves or management reserves to offset higher costs than were budgeted for the SRP?

A. PSE's initial budget did not include sales tax for the work to be completed. Including sales tax as part of the SRP cost had a significant increase in actual costs as compared to the SRP budget and used most of the dollars that were in the contingency reserves. Change orders have been executed to secure timely receipt of long lead time materials and address adjustments in grouting methodologies to improve expected performance of the grout curtain to mitigate potential for additional grout holes. These cost increases used dollars in the management reserves.

Q. Has PSE's Board of Directors been apprised of plans related to the SRP?

A. Yes. Because the SRP is part of PSE's strategic project portfolio ("SPP"), the Asset Management Committee ("AMC") of the PSE Board of Directors has been receiving, and continues to receive, formal monthly updates on the SRP (scope, schedule, budget, resources). Excerpts of the information presented in monthly reports to the AMC from November 2022 through October 2023 are included as the tenth exhibit to my prefiled direct testimony, Exh. JPH-11C. The PSE Board of Directors also received regular updates on the SRP status during its quarterly meetings as part of the AMC meeting. Excerpts from the quarterly reports to the AMC concerning the SRP are included as the eleventh exhibit to my prefiled direct testimony, Exh. JPH-12. On September 27, 2021, the SRP was formally presented to the PSE Board of Directors' AMC. The twelfth exhibit to my prefiled

direct testimony, Exh. JPH-13C provides a copy of the AMC presentation. The AMC recommended project approval and the full Board of Directors concurred. The PSE Board of Directors' resolution is included as the thirteenth exhibit to my prefiled direct testimony, Exh. JPH-14.

D. PSE's Project Management and Oversight Plans for the SRP

Q. Does PSE have a Project Implementation Plan that will guide execution of the SRP?

A. Yes. The SRP is being executed in a manner generally consistent with PSE's approach to all large capital projects. The requirement to incorporate the FERC mandated BOC into the SRP has resulted in some deviation from a standard construction project in that studies and design often progressed concurrently. A Project Implementation Plan has been maintained during the SRP development and is considered a living document that will continue to be updated as the SRP moves forward. Detailed execution plans are developed for individual phases of the project and will be captured in the construction management system being maintained by PSE's construction management contractor. Schedule and project costs have been closely monitored and tracked throughout the life of the project.

Q. In addition to PSE's Board of Directors, what internal organizations have been and will continue to be involved in planning and execution of the SRP?

A. PSE has engaged subject matter experts from across a range of its operating teams to plan and execute the SRP, including: Dam Safety, Resource Sciences and Asset

Management, Project Management, Project Controls, Procurement, Financial Planning and Analysis, Internal Legal, Internal Audit, Environmental Services, and Licensing and Permitting.

Each of these functions will be critical to successful execution of the SRP. Please see Table 1 below for an explanation of how each internal function will contribute to cost-effective SRP execution.

Table 1. PSE Internal Organizations

Function	Description
Dam Safety	This project has been developed in response to a potential dam safety issue, and the Dam Safety team has been intimately involved to make sure it can be executed without causing harm to the existing dam and appurtenant structures.
Project Management	The Project Manager is an experienced industry professional with 27 years of heavy construction experience. The Project Manager is part of the Dam Safety team and will be responsible for managing of the project's budget, scope, and schedule. PSE has contracted with an outside construction management firm to assist the Project Manager.
Project Controls	PSE has engaged an external construction management firm to conduct all project controls so that the project is executed in a manner consistent with the project design and contract terms. PSE personnel will provide technical oversight of the construction management firm and provide guidance when needed.

Table 1. PSE Internal Organizations

Function	Description
Procurement	The Procurement team has been instrumental in all phases of the project, including issuing RFPs and awarding contracts for engineering services, construction management services, and construction. The procurement team will remain a core function to certify that all resources are procured in a manner consistent with PSE's corporate procurement processes and regulatory obligations.
Quality Assurance/ Quality Control	PSE's QA/QC organization will see that project execution, including assembly of safety-related equipment, is consistent with industry best practices.
Internal Audit	The Internal Audit function conducts assessments of the budgeting and invoicing practices and will ascertain that project costs are appropriate and properly allocated to PSE's cost centers. Also, PSE's project management staff will review all invoices with the external construction management firm.
Resource Sciences and Asset Management and Environmental Services	The Resource Sciences and Asset Management and Environmental Services teams work collaboratively so the planning and execution of the SRP is completed in a manner consistent with PSE's environmental obligations related to migratory fish pathways and other environmental and wildlife-related concerns. PSE has contracted with an expert environmental and engineering firm to confirm compliance with all project regulated activities.
Licensing & Permitting	The Licensing and Permitting group will obtain and maintain all necessary permits for the project period and the period of the SRP's continued operations after grouting is completed. PSE is working with two external firms to make sure PSE complies with all permit conditions.

Q. Please describe how PSE plans to manage the SRP in the planning, execution, and commissioning phases of work.

A. PSE has designated a full-time senior project manager to oversee the SRP. To assist PSE during the execution phase, PSE has hired HDR, for its extensive experience in complex and high-risk hydroelectric projects. HDR will provide industry experts to conduct the following services: assist in managing day-to-day construction activities; inspect on-site activities to conform with project plans and specifications; monitor conformance with environmental permits/conditions; oversee administrative process (i.e. document management); evaluate contractor's schedule (including critical-path items); and perform cost evaluations and contractual validity assessment for all proposed change orders. Other team members include:

Table 2. Other Team Members

Firm Name	Roles & Responsibilities
Shannon & Wilson	Engineer of Record. Will be onsite during all drilling and grouting operations. Their role will be to oversee construction activities so they conform with the project design documents and support construction management activities.
GeoEngineers, Inc.	Will assist PSE in environmental compliance, including monthly reporting to Dept of Ecology, spill response and reporting and on-site erosion and sediment control inspection and reporting.
Sixenses, Inc.	Will assist PSE in development and maintenance of instrumentation and monitoring program for both construction and dam safety operations.

Q. What mechanisms does PSE have in place to prudently manage the SRP throughout its planning and implementation?

A. PSE will continue to require monthly reporting to PSE executives for the SRP. PSE's senior project manager assigned to the SRP will develop these reports. Items captured in each report include: status (progress); budget (anticipated versus actual costs); schedule (anticipated versus actual durations); and on-going risk identification and assessment.

E. Project Milestones Completed and Expected During the Rate Plan

Q. What major milestones for the SRP have been completed to date?

A. Initiation, planning, and permitting phases have been completed. The early contractor involvement stage was completed in the fall of 2021. The SRP construction contract at Lower Baker Dam was awarded to LB Constructors on October 22, 2021. The seepage cutoff will be constructed as a grout curtain using balanced stable grout, state-of-the-art equipment and methods, and an automated grouting control and data management system.

The project schedule is broken into phases as follows:

- Phase 1A, Preconstruction and Submittals – completed February 6, 2022
- Phase 1B, Site Preparation – completed June 10, 2022
- Phase 2A, Work Access Construction – completed August 12, 2023

As part of Phase 2A, LB Constructors completed the test grout program. PSE provided an overview of the project execution to date to include the lessons learned during the test grouting program to the BOC and FERC on August 29, 2023. The presentation to the BOC is included as the fourteenth exhibit to my prefiled direct testimony, Exh. JPH-15.

Q. What are the key milestones for the SRP from 2024 through 2025?

A. The SRP base scope of work is expected to be completed by July 2025 but does not include schedule risks associated with higher order holes that may be required to meet the SRP's objectives. The total SRP construction is expected to take approximately 44 months.

- Phase 2B, Drilling & Grouting – started August 14, 2023; planned completion December 9, 2024
- Phase 2C, Work Access Removal – planned completion May 13, 2025
- Phase 3, Site Restoration & Demobilization – planned completion July 16, 2025

Q. Is PSE requesting a prudency determination for the SRP in this rate filing?

A. Yes. PSE is requesting the Commission determine that its development and implementation of the SRP were prudent and that PSE be allowed to include the costs of the SRP in rates in the second rate year of this multiyear rate plan.

III. THE UPPER BAKER DAM SPILLWAY STABILIZATION PROJECT

Q. Please describe the Upper Baker Dam Spillway Stabilization ("Spillway Stabilization") project.

A. The purpose of the Spillway Stabilization project is to add a buttress next to the Upper Baker Dam spillway to prevent failure of the spillway. A rock plane under the spillway could shift or move during a large extended flood or earthquake. Additionally, the Spillway Stabilization project removes rock debris in the tailrace that contributes to flooding of the powerhouse and uplift water pressure under the Upper Baker Dam during high spills.

Q. Please explain why PSE initiated the Spillway Stabilization project.

A. The Upper Baker Dam has experienced block movement over the years, most notably blocks 18 and 19. As described earlier in my testimony, the 2013 letter from FERC required the establishment of a BOC to evaluate the Potential Failure Modes ("PFMs") related to rock abutment stability of the Upper Baker Dam and Lower Baker Dam. Specifically, as shown in Exh. JPH-3, the BOC is to assess the movement of blocks 18 and 19 (blocks 18 and 19 are on the left abutment of Upper Baker Dam near the spillway). Field investigations by Shannon and Wilson located indications of geologic features in the spillway rock foundation that can lead to instability. Further analysis by Shannon and Wilson and results from the FERC Part 12 Potential Failure Modes Analysis made two PFMs for the stability of the spillway. The PFMs postulate a potential failure in the rock foundation of

the spillway due to overstressing of the spillway during a large flood for an extended period of time or a seismic event causing instability of the spillway. Safety of the Upper Baker Dam requires the spillway to be stabilized.

Q. Please describe the analysis of alternatives for stabilizing the Upper Baker Dam spillway.

A. PSE hired Shannon & Wilson to develop options for stabilizing the Upper Baker Dam spillway. Shannon & Wilson identified two alternatives for stabilizing the spillway, a rock anchor supported slope and a grouted rock buttress. The Shannon & Wilson Foundation Failure Modes Report, excluding the voluminous technical appendices, is included as the fifteenth exhibit to my prefiled direct testimony, Exh. JPH-16. The grouted rock buttress alternative was chosen for robust reliability, cost, and because it removes the debris from the tailrace that can contribute to instability of the Upper Baker Dam and flooding of the powerhouse. *See* Exh. JPH-16 at 4, 124-152.

Q. Please describe the buttress alternative PSE chose for the Spillway Stabilization project.

A. The Spillway Stabilization project is intended to stabilize the Upper Baker Dam spillway by adding a large concrete anchored buttress in the abandoned sluiceway next to the spillway. The sluiceway was used for original dam construction but has been unused since. The buttress will fill in the sluiceway with approximately 5,400 cubic yards of concrete. The buttress will have forty-eight vertical anchors

attaching the buttress to the bedrock below. Twelve drain holes will be drilled under the spillway to relieve water pressure. A 24-inch diameter drain pipe will run through the middle of the buttress to connect the existing dam foundation drains to the tailrace. An access gallery will be built in the buttress to allow access to the flow meter for the Upper Baker Dam foundation drains. To facilitate construction a large cofferdam will be installed on the sluiceway. The cofferdam, forms, and equipment will need to be brought in by barge. To allow barge access, debris in the tailrace will be removed which also reduces uplift pressure on the Upper Baker Dam and reduces downstream restrictions that cause powerhouse flooding during large spills. After removal of the cofferdam and forms, an inspection access platform will be added at the end of the 24-inch drain pipe.

Q. How does PSE anticipate the Upper Baker Dam Spillway Stabilization project will be constructed?

A. The Upper Baker Dam Spillway Stabilization project will be constructed using the Design-Bid-Build process. PSE selected a competent construction contractor to build the Spillway Stabilization project through a competitive solicitation. PSE will provide construction management and oversight. Engineering during construction will be contracted with Shannon & Wilson, the design firm for the concrete anchored buttress.

Q. What are the total estimated costs for the Upper Baker Spillway Stabilization project?

A. The total estimated cost for the Upper Baker Spillway Stabilization project is approximately $25,800,000. This cost includes drilling investigations, piezometer installation, conceptual design, preliminary design, contracted design, cost estimates, permitting, construction, construction oversight, engineering during construction, water quality reporting, construction of the buttress, and PSE overhead. The bulk of the total estimated cost is the direct construction contract cost of approximately [redacted]. A copy of the statement of work contract between PSE and J.F. Brennan Company, Inc. ("Brennan") for the Spillway Stabilization project is included as the sixteenth exhibit to my prefiled direct testimony, Exh. JPH-17C.

Q. How did PSE estimate the construction costs for the Upper Baker Spillway Stabilization project?

A. PSE hired a construction firm, Knight Construction & Supply, to perform biddability and constructability review and develop an independent cost estimate and construction schedule for the project. The Knight Construction & Supply report is included as the seventeenth exhibit to my prefiled direct testimony, Exh. JPH-18C.

Q. What is the status of the Upper Baker Spillway Stabilization project?

A. The Upper Baker Spillway Stabilization project is in the execution phase. A Request for Proposal ("RFP") was sent to nine interested bidders on September 1, 2023. Responses to the RFP were received on November 20, 2023. PSE received four responsive proposals to the RFP and selected the lowest cost bid.

Q. What is the schedule for the Upper Baker Spillway Stabilization project?

A. PSE awarded the construction contract to Brennan in early 2024 (Exh. JPH-17C) and construction is expected to occur in 2024 and 2025. The BOC received the construction documents on November 24, 2023 and held a design in-brief meeting on November 29, 2023. The materials presented at the design in-brief meeting are included as the eighteenth exhibit to my prefiled direct testimony, Exh. JPH-19. The BOC review will be completed in January 2024. FERC received the updated one hundred percent design for review on December 13, 2023 and construction approval is expected by March 2024. Brennan is expected to mobilize in March 2024 and will drill drain holes, remove tailrace debris, install the cofferdam, and dewater the sluiceway from April through June 2024. In July, concrete construction for the buttress will begin and is expected to be completed in September 2024. If the schedule is maintained, Brennan will drill the buttress anchors, drain holes above the buttress, install final items, restore the barge landing area, and de-mobilize in October and November 2024. If Brennan does not finish in 2024 it will re-mobilize in March 2025 and is expected to de-mobilize in June 2025.

Q. Was PSE's management informed of plans and cost related to the Upper Baker Spillway Stabilization project?

A. Yes. PSE management was informed of the scope, schedule, and costs of the Spillway Stabilization project through the Enterprise Project Portfolio Management process (EPPM). The EPPM is an online database where projects are input, updated, and approved. As shown in the nineteenth exhibit to my prefiled direct testimony, Exh. JPH-20C, the Spillway Stabilization was approved by PSE management on March 29, 2023.

IV. THE BEAVER CREEK WIND PROJECT

Q. Please describe the Beaver Creek Wind Project.

A. The Beaver Creek Wind ("Beaver Creek") project is a greenfield wind turbine generation site in Stillwater County, Montana with a nameplate capacity of approximately 248 MW generated by eighty-eight General Electric 2.8 MW wind turbines. The Beaver Creek project is located on approximately 15,000 acres of high plains land that is primarily used for cattle grazing and hay production. The Beaver Creek project entails improvement of existing county roads, installation of new turbine access roads, installation of the wind turbines and construction of a substation, an operations & maintenance building, and approximately 4.5 miles of 230 kv transmission line to interconnect the project to the Northwestern Energy transmission system.

Q. How was the Beaver Creek project initiated?

A. The project was acquired from a private developer, Caithness Energy LLC ("Caithness"), through a membership interest purchase agreement in November 2023. Caithness had advanced the Beaver Creek project through initial design, real estate acquisition, land use permitting, and turbine selection prior to PSE acquiring the project. The establishment of need and evaluation of alternatives to the Beaver Creek project are more fully addressed in the Prefiled Direct Testimony of Colin P. Crowley, Exh. CPC-1HCT.

Q. What are the advantages of the Beaver Creek project over other new generation resources under consideration?

A. As discussed by Mr. Crowley, the Beaver Creek project is currently the only identified new build resource that can reach commercial operations in 2025. The Beaver Creek project will help PSE meet its CETA compliance targets for 2025 and 2030 at the lowest reasonable cost compared to other reviewed alternatives.

Q. What future expansion opportunities are presented by the Beaver Creek project?

A. The Beaver Creek project is fully permitted through a conditional use permit in Stillwater County for the addition of a future battery energy storage system with an assumed capacity of 100 MW for planning purposes. The Beaver Creek project also includes real estate rights in the adjacent Sweet Grass County with a footprint that can accommodate an additional 60 to 70 MW of wind turbines.

Q. What is the schedule for completing construction of the Beaver Creek project?

A. Engineering and material procurement activities began after Board of Director approval in November 2023 and will continue into the first quarter of 2024. Construction will begin in April 2024, with commercial operation expected in the first quarter of 2025.

Q. How will construction of the Beaver Creek Wind project be completed?

A. Construction of the Beaver Creek project will be executed through two major contracts, the turbine supply agreement ("TSA") and the balance of plant ("BOP") contract.

Q. Please describe the TSA.

A. The TSA covers the manufacture, transportation, and commissioning of the wind turbine generators for the Beaver Creek project. The TSA is included as the twentieth exhibit to my prefiled direct testimony, Exh. JPH-21C.

Q. Please describe the BOP contract.

A. The BOP contract covers the erection of the wind turbine generators, the electrical collection system, the project substation, a transmission line to connect to the local utility, an operations and maintenance building, and all associated civil work (roads, foundations, etc.). The BOP contract is included as the twenty-second exhibit to my prefiled direct testimony, Exh. JPH-23C.

Q. How will construction of the Beaver Creek project be managed?

A. The construction of the Beaver Creek project will be managed by the PSE Major Projects organization using dedicated staff including a project manager, quality assurance personnel, and support personnel for document management and scheduling.

V. THE LOWER BAKER DAM CREST IMPROVEMENT PROJECT

Q. Please describe the Lower Baker Dam Crest Improvement project.

A. The Lower Baker Dam Crest Improvement project was initiated to prevent flows over the dam abutments and provide for safe and reliable dam operations. PSE will perform design and analysis during the term of this multiyear rate plan and expects to begin construction upon completion of the Seepage Reduction Project that was described earlier in this testimony. PSE anticipates seeking cost recovery for the Crest Improvement project in its next multiyear rate plan.

Q. Please explain why PSE initiated the Lower Baker Dam Crest Improvement project.

A. FERC recommendations from the 2004 Potential Failure Mode Analysis included a directive for PSE to review overtopping at the Lower Baker Dam during the Probable Maximum Flood. A primary concern raised by FERC is that overtopping of the facility could result in flows over the Lower Baker Dam's abutments that may cause erosion and subsequently affect their integrity. Other FERC concerns

with the Lower Baker Dam relate to the safe and reliable operation of the gate systems and the ability to pass debris during flood events.

Q. What are PSE's plans for improving Lower Baker Dam through the Crest Improvement project?

A. The Lower Baker Dam Crest Improvement project is intended to rehabilitate and upgrade the 1925-era Lower Baker Dam and mitigate potential dam failure modes to comply with FERC dam safety standards and extend the life of the Lower Baker Dam. A copy of PSE's presentation concerning the Crest Improvement project to the FERC is included as the twenty-first exhibit to my prefiled direct testimony, Exh. JPH-22. The non-overflow sections (floodwalls) are needed on the abutments to prevent overtopping in major floods. The piers, crest, and bridge deck need to be removed and rebuilt to accommodate wider spillway gates and raise the bridge deck so the spillway can handle major floods and pass debris. The access road needs to be raised so the Lower Baker Dam can be accessed during floods. Additionally, the gate hoist equipment is past its design life; it will be replaced and upgraded to provide for remote operation. A gantry crane and a maintenance pit will be added to improve spillway gate maintenance.

Q. What are the estimated costs for the Crest Improvement project?

A. The total estimated cost of the Crest Improvement project is approximately [redacted] most of which is direct construction costs estimated between [redacted]. Additional project costs include, conceptual

design, preliminary design, contracted design, hydraulic modeling, structural computer modeling, scour analysis, cost estimates, permitting, construction oversight, and PSE overhead.

Q. What is the projected schedule for the Crest Improvement project?

A. PSE anticipates design and scour analysis to be complete in 2024. PSE plans to hire a construction contractor in 2025 for biddability review, constructability review, detailed cost estimates, schedules, and plan development. The Crest Improvement project construction will begin after the Seepage Reduction project is completed. PSE anticipates it will take approximately three years to construct the Crest Improvement project.

Q. How does PSE anticipate the Crest Improvement project being constructed?

A. The Lower Baker Dam Crest Improvement project will be constructed using the Design-Bid-Build process. PSE will select a competent construction contractor to build the project through a competitive solicitation. PSE will provide construction management and oversight along with an outside construction management firm. Engineering during construction will likely be contracted with the design firm.

VI. CONCLUSION

Q. Does that conclude your prefiled direct testimony?

A. Yes, it does.