



**PUBLIC UTILITY DISTRICT NO. 1 *of* CHELAN COUNTY**

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January 28, 2010

P-637-WA

NATDAM-WA00004

Mr. Patrick Regan, P.E., Regional Engineer  
Portland Regional Office  
Federal Energy Regulatory Commission  
805 SW Broadway, Suite 550  
Portland, OR 97205

Re: Chelan River Project Final Report

Dear Mr. Regan:

In accordance with your letter of June 19, 2008, enclosed herewith are an original and two copies of the seventeenth and final report for the Chelan River Project. In addition, copies of this letter and the report will be sent to Mr. Jon Merz and Ms. Pat Irle of Washington Department of Ecology.

Construction of the Chelan River Project has been successfully completed following the plans and specifications, and in accordance with the intent of the design. The project will allow Chelan County PUD to fulfill some key license requirements for the Lake Chelan Project.

If you would like to discuss this work or if additional information would be helpful, please call me at the number listed below, or call Michelle Smith, Licensing & Compliance Manager, at (509) 661-4180.

Sincerely,  
Engineering Services

M. Gene Yow, P.E.  
Dam Safety Manager  
(509) 661-4305  
[gene.yow@chelanpud.org](mailto:gene.yow@chelanpud.org)

Enclosures: Original and two copies

cc: Jon Merz, WaDOE  
Pat Irle, WaDOE

Chelan River Project – Monthly Report  
Lake Chelan Hydroelectric Project – FERC No. 637  
Public Utility District No. 1 of Chelan County

January 29<sup>th</sup>, 2010

**1. Progress of Work**

The work was completed, on schedule and in conformance with the plans, specifications, and permits. No environmental incidents occurred. No safety incidents occurred.

Work on the new habitat channel, pump station, and conveyance canal (including the outlet structure), was completed on schedule. The habitat channel is complete, including the plantings. The pump station start-up and testing phase is complete.

The hydraulic control structure (boulder weir) was completed on schedule. Based on observation of its performance during October and November 2009, the final adjustments were made in the crest elevation so that it will perform in accordance with the intent of the design during operation of the pump station. This work is now complete.

Work at Lake Chelan Dam for the Low Level Outlet is complete. The start-up and testing phase is complete with the exception of making final adjustments in calibration of the flow meter.

Progress on the site includes:

- The hydraulic control structure is complete.
- Reach 4 spill channel is complete.
- The conveyance canal is complete.
- Conveyance canal outlet structure is complete.
- All of the boulders are in place in Reach 4.
- Pump station concrete placements are complete.
- The pump tubes are set and the supports grouted into the drilled pier casings.
- Electrical work at the pump station is complete. Pumps have been installed.
- Air burst piping is complete.
- The two pump station transformers are set and powered up.
- Habitat channel is complete.

## **2. Status of Construction**

The lower tailrace habitat work began July 1, 2008, on schedule, and is complete.

Canal outlet structure concrete construction is complete, on schedule, and slide gates and diffusion gratings are in place. Installation of miscellaneous metals (e.g. walkway grating and handrails) is complete.

Pump station work is complete. The control buildings are set, transformers are set, and conductor installation is complete. The retaining wall handrail has been installed as well as the junction boxes. The 42-inch diameter discharge pipes have been installed, and the afterbay concrete is complete.

The start-up and testing phase of the entire project, is complete.

Civil and mechanical work at the Low Level Outlet is complete. The 60-inch gate valves and sluice gates have been installed.

Placement of the 84-inch LLO pipe is complete. The 60-inch piping has been installed. Concrete placement for the bulkhead is complete.

## **3. Construction Difficulties**

Construction is complete.

## **4. Contract Status**

Goodfellow Brothers, Inc. (GBI) of Wenatchee, WA, is the general contractor and performed the majority of the work themselves. Subcontracted work included:

Malcolm Drilling of Kent, WA, a specialty foundation contractor, installed the foundation piers to support the pump tubes and pumps.

Sharples Construction of Kent, WA built the concrete outlet structure for the conveyance canal. They also constructed the retaining wall for the pump station, including the footing slab and grade beams.

McCandlish Electric, Wenatchee, WA performed the electrical work.

Harbor Offshore, Ventura, CA, performed the diving work for installation of the tee screens and pump tubes.

Lampson International, Kennewick, WA, supplied the cranes and riggers for installation of the pump tube assemblies.

DDJ Construction Welding, Inc., Enumclaw, WA, performed the demolition work on the sheet pile wall and bulkhead at the 17-foot penstock at Chelan Dam. They also welded the pipe sections of the LLO piping.

The work was completed on schedule.

## 5. Critical Events and Dates

### 2008

- May 5 Notice to Proceed
- May 12 Begin Mobilization
- May 27 Begin work on site
- June 5 Set temporary bridge across Reach 4 spill channel
- June 5 Lake Chelan spill begins
- July 1 In-water construction work window begins
- July 15 Delivery of pump station pumps
- August 7 Delivery of T-Screens
- September 2 Delivery of pump tubes
- September 5 Completion of Tailrace Habitat construction
- November 17 Completion of Hydraulic Control Structure
- December 5 Begin work at Chelan Dam for the Low Level Outlet
- December 12 Completion of Canal Outlet Structure Concrete

### 2009

- January 29 Completed setting pump tubes and grouting
- March 9 Begin tunnel stub work at Chelan Dam
- March 11 Set the two power transformers for the pump buildings
- March 17 Set the control buildings upon their foundations
- March 25 Set the 42-inch diameter discharge pipes at the pump station
- April 30 Powered up the transformers and control buildings
- May 1 Installed the 60-inch gate valves and sluice gates at the LLO
- May 28 Final inspection of LLO wet tunnel and piping
- June 2 Bump tested the pump station pumps
- June 3 Completed concrete placements for the afterbay
- June 3 Verified operation of outlet structure slide gates
- June 7 Removed temporary bridge across Reach 4 spill channel
- June 8 Installed sluice gate actuators at LLO
- June 8 Lake Chelan spill begins
- September 14 Commissioning of the pump station begins

- September 21 Commissioning of the LLO begins
- October 14 Begin Chinook Spawning Flow, 320 cfs
- December 30 Construction, Punchlist, Commissioning, completed

## 6. **Reservoir Filling**

N/A

## 7. **Foundations**

Drilling for pump station foundation piers did not encounter bedrock in any of the pier locations. This possibility was anticipated in the design so that an appropriate length for piers not reaching bedrock was calculated and shown on the design drawings. This length was used, as planned.

The foundation excavation for the conveyance canal outlet structure has been completed. The foundation material consists of alluvial boulders and cobbles in a matrix of gravel and sand. These are the conditions anticipated by the design.

The foundation excavation for the low level outlet has been completed. The foundation material consists of alluvial sand and gravel, with some cobbles and boulders. These are the conditions anticipated by the design.

## 8. **Sources of Major Construction Materials**

Material for “fish mix” and “riffle mix”, two gradations of gravel used to construct the fish habitat, was obtained from on-site sources. See drawing 0330-50GA-0028 (sheet R1) in the bid documents for borrow area locations. The material was regularly tested, inspected, and met the contract specifications.

Boulders were obtained from both on-site and off-site sources. The boulders are generally from alluvial sources along the Columbia River Valley.

The required Large Woody Debris (LWD) was delivered to the job site from various sources along the Columbia River Valley. The LWD includes 154 poplar trees for racking, 65 root balls, 85 conifer key logs, and approximately 100 conifer racking logs.

The concrete supplier is Chelan Concrete. The cement supplier is Lehigh Cement.

Gates and valves for the Low-Level Outlet are from J&S Valve and HydroGate. The equipment has been installed.

Pumping equipment and controls are being provided under separate contract by ITT Flygt, Inc. The pumps and major components were delivered to the job site, on schedule.

## **9. Materials Testing and Results**

Structural concrete has been placed and tested, and structural fill material for which density tests are required has been placed. Test results meet the contract specifications. Canal shotcrete lining has been placed, and tested to verify conformance with the contract specifications. No exceptions have been noted.

A sampling of concrete strength tests were provided in the August, 2009 report, for the following structures:

- Pump station foundations
- Pump tube drilled piers
- Pump station afterbay
- Conveyance canal shotcrete
- Canal outlet structure
- Hydraulic control structure
- Low level outlet structure
- Low level outlet pipe bulkhead

## **10. Instrumentation**

All instrumentation has been installed, including:

- Temperature sensor at Pump No. 1, TT-141, at the northern-most pump, near the T-screen
- Differential pressure bubbler line, ¼-inch copper line, sensing point is the bottom elevation of the T-screen for pump No. 3.
- Level switch LSH-151 in the main transformer's vault
- Level switch LSH-152 in the auxiliary transformer's vault
- Temperature sensor at the pumped water outlet structure, TT-142
- Level sensors LS-131-1 and LS-131-2 at the pumped water outlet structure, on either side of the northern-most slide gate.
- The pumped water conveyance canal velocity meter (Doppler unit).
- The temperature probe at the start of the low level outlet piping.
- The ambient air temperature probe through the valve house wall at the dam.
- The flow meter at the start of the low level outlet piping.

## 11. Photographs



This is a view in an easterly direction, across Reach 4 of the Chelan River. In this photo, the habitat channel and conveyance canal are dry. This photo was taken Oct 5, 2009. Full operation began on Wednesday, Oct 14, 2009.



This is a view of Chelan Dam, looking southwest. The Low Level Outlet ends with a concrete outlet structure just downstream of the dam's apron on the right bank (left side of photo). The flow in this photo is 80 cfs.

## **12. Erosion Control and Other Environmental Measures**

All work has been performed in accordance with the project's approved Water Quality Protection Plan and Erosion & Sediment Control Plan. This includes placement of silt fences and sediment curtains, and deployment of an oil boom. Washington Department of Ecology staff has visited the project site on several occasions. No water quality violations have occurred.

A sediment curtain was installed in the powerhouse tailrace channel around the temporary earth berm at the pump station, prior to placement of the berm. The sediment curtain, along with an oil boom, remained in place during drilling for pier installation. The steps taken have been effective at limiting sedimentation to permitted levels. The equipment has been removed since the temporary earth berm used for concrete pier construction staging has been removed.

The oil boom that was installed downstream of the confluence of the Chelan powerhouse tailrace channel and the new channel, has been removed.



### **13. Other Items of Interest**

Since October 14, 2009, 80 cfs has been discharged through the Low Level Outlet. Operation of the Pump Station is scheduled to resume on March 15, 2010. A minimum of 240 cfs will be pumped, beginning on March 14, 2010, which will combine with the 80 cfs LLO discharge, to meet the FERC-mandated minimum 320 cfs flow through the Habitat Channel. This condition will continue until May 15, when the pumped flow will be turned off. The 80 cfs LLO discharge will continue.

This report is the final report on the Chelan River Project. No other regular, monthly reports will be submitted, as construction is complete.