



**PUBLIC UTILITY DISTRICT NO. 1 of CHELAN COUNTY**  
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February 12, 2014

**VIA ELECTRONIC FILING**

Honorable Kimberly D. Bose, Secretary  
Nathaniel J. Davis, Sr., Deputy Secretary  
FEDERAL ENERGY REGULATORY COMMISSION  
888 First Street, NE  
Washington, DC 20426

Re: **Lake Chelan Hydroelectric Project No. 637**  
**Article 405b – 2013 Annual Lake Level Report dated February 11, 2014**

Dear Secretary Bose and Deputy Secretary Davis:

The Federal Energy Regulatory Commission (Commission) issued the “Order Modifying and Approving Operations Compliance and Monitoring Plan (Plan), Article 405” on November 30, 2007. The Plan satisfied the License Article 405 requirement of the “Order on Offer of Settlement and Issuing New License”<sup>1</sup> (License) and “Order on Rehearing”<sup>2</sup> for the Lake Chelan Hydroelectric Project (Project) on November 6, 2006, and April 19, 2007, respectively.

Under Ordering Paragraph (C) modifying the Plan under Article 405, Chelan PUD is required to file the following report with the Commission.

(C) The licensee shall file annually with the Commission by February 28, beginning in 2009, their Annual Lake Level Report. The licensee shall allow the resource agencies, Tribes and non-governmental organizations specified under Article 405, 30 days to provide comments and/or recommendations on their report before filing with the Commission. The filing shall include comments and/or recommendations from the consulted entities and the licensee’s response to any comments. If the licensee does not adopt a recommendation, the report shall include the licensee’s reasons, based on project-specific information. Based on review of the report, the Commission reserves the right to require changes to the project to ensure compliance with the license.

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<sup>1</sup> 117 FERC ¶ 62,129


<sup>2</sup> 119 FERC ¶ 61,055

*Ms. Kimberly D. Bose, Secretary  
Mr. Nathaniel J. Davis, Sr., Deputy Secretary  
Federal Energy Regulatory Commission*

In accordance with the above Order requirement, Chelan PUD hereby files the 2013 Annual Lake Level Report dated February 12, 2014. This report compares monthly actual and minimum (target) lake levels; and runoff volume forecasts and other factors influencing achievement of targeted lake levels. A final draft of this report was provided to the resource agencies, Tribes and non-governmental organizations specified for 30-day review, which ended January 17, 2014 (see Section 7).

Please do not hesitate to contact me or Scott Buehn (509-661-4828) of my office regarding any questions or comments regarding this plan.

Sincerely,



Michelle Smith  
Licensing and Compliance Manager  
michelle.smith@chelanpud.org  
(509) 661-4180

Enclosure: Lake Chelan 2013 Annual Lake Level Report

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# **LAKE CHELAN ANNUAL LAKE LEVEL REPORT 2013**

**LICENSE ARTICLE 405**

**Final**

**LAKE CHELAN HYDROELECTRIC PROJECT  
FERC Project No. 637**

**February 12, 2014**



**Public Utility District No. 1 of Chelan County  
Wenatchee, Washington**

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## ***SECTION 2: EXECUTIVE SUMMARY***

Chelan PUD received a new license (License) from the Federal Energy Regulatory Commission (FERC)<sup>1</sup> on November 6, 2006, authorizing Chelan PUD to operate the Lake Chelan Project (Project) for a period of 50 years. License Article 405 requires Chelan PUD to annually file with FERC a report comparing monthly actual and target lake levels, runoff volume forecasts and other factors influencing achievement of target lake levels.

During 2013 Chelan PUD managed lake levels as runoff forecasts evolved through winter and spring. Runoff forecasts for the April 1 to July 31 time period were for 100% of average runoff on February 1, 92% of average runoff on March 1 and 93% of average runoff on April 1. Actual runoff for the April 1 – July 31 time period was 96% of average. Lake levels were successfully managed, as defined in Chapter 8 of the Lake Chelan Comprehensive Plan<sup>2</sup>, to meet all operating objectives and lake level targets for the year 2013.

The table below compares monthly actual and lake level targets May through October 2013. Chelan PUD manages lake levels following an annual draft and refill cycle, generally beginning in August, which starts to release water from Lake Chelan to meet operating objectives and for power generation from September through March, and then refills Lake Chelan from April through July.

**Table 1: Comparison of Actual and Target Lake Levels**

<b>Date</b>	<b>License Target Lake Level (feet)</b>	<b>2013 Actual Lake Level (end of day)* (feet)</b>	<b>Difference between Actual and Target Lake Level</b>
May 1, 2013	1087.6	1087.85	+0.25
June 1, 2013	1094.0	1095.26	+1.26
July 1, 2013	1098.0	1099.20	+1.20
August 1, 2013	1099.0	1099.50	+0.50
September 7, 2013	1098.7	1099.26	+0.56
October 1, 2013	1097.2	1097.43	+0.23

\* USGS Gage #12452000 Lake Chelan at Chelan

<sup>1</sup> Federal Energy Regulatory Commission Order on Offer of Settlement and Issuing New License and Order on Rehearing for the Lake Chelan Hydroelectric Project No. 637 were issued November 6, 2006, and April 19, 2007, respectively, to the Public Utility District No. 1 of Chelan County.

<sup>2</sup> Final Lake Chelan Comprehensive Settlement Agreement for the Lake Chelan Project No. 637, dated October 8, 2003.

### ***SECTION 3: INTRODUCTION***

Chelan PUD received a new license (License) from the Federal Energy Regulatory Commission (FERC)<sup>3</sup> on November 6, 2006, authorizing Chelan PUD to operate the Lake Chelan Project (Project) for a period of 50 years. The License sets a minimum lake level of 1,079 feet and a maximum lake level at 1,100 feet. Chelan PUD manages lake levels within the minimum and maximum elevations according to license operating objectives and for power generation.

The License establishes monthly target lake levels for the period from May 1 through October 1 that Chelan PUD will try to attain consistent with the license operating objectives for flood control, protection of fish resources, recreation, and prevention of erosion. Chelan PUD monitors snowpack in the Lake Chelan runoff basin and predicts snowmelt runoff volume from December through August. Chelan PUD manages power generation and spill to reach lake level targets by using runoff volume and precipitation forecasts, past experience with runoff timing and actual lake levels.

License Article 405 requires Chelan PUD to annually file with FERC a report comparing monthly actual and target lake levels, runoff volume forecasts and other factors influencing achievement of lake level targets. This Lake Level Report documents decisions and other information regarding achievement of monthly target lake levels beginning May 2013 through October 2013.

Chelan PUD is using a hydropower system simulation model (CHEOPS) developed specifically to assist with lake level management decisions. The CHEOPS computer model uses historical information, a target curve, and operational constraints to provide a predictive tool for making operational decisions. Historical information includes a data set of Lake Chelan hydrologic variables which Chelan PUD began collecting in 1952. A target curve is a collection of elevations with corresponding dates, which is used to guide the computer model and subsequent operating decisions. Operational constraints include minimum and maximum generation limits and spill requirements or limitations. The use of a target curve, in conjunction with professional experience and actual hydrologic behavior of the lake environment, provides the best available basis for balancing license objectives and the likelihood of being within reasonable predictive probability of meeting monthly lake level targets<sup>4</sup>. In some years, late runoff may affect the ability to meet lake level targets, and therefore lake level targets would be met as soon as practicable.

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<sup>3</sup> Federal Energy Regulatory Commission Order on Offer of Settlement and Issuing New License and Order on Rehearing for the Lake Chelan Hydroelectric Project No. 637 were issued November 6, 2006, and April 19, 2007, respectively, to the Public Utility District No. 1 of Chelan County.

<sup>4</sup> Section 3.1, Final Lake Chelan Comprehensive Settlement Agreement for the Lake Chelan Project No. 637, dated October 8, 2003.

## **SECTION 4: COMPARISON OF ACTUAL AND TARGET LAKE LEVELS**

The table below compares monthly actual and target lake levels May through October 2013. Lake levels are recorded at the end of the day, 2400 hours. Chelan PUD manages lake levels following an annual draft and refill cycle, generally beginning in August, which starts to release water from Lake Chelan to meet operating objectives, lake level targets, and for power generation from September through March, and then refills Lake Chelan from April through July.

**Table 2: Comparison of Actual and Target Lake Levels**

Date	License Target Lake Level (feet)	2013 Actual Lake Level (end of day)* (feet)	Difference between Actual and Target Lake Level
May 1, 2013	1087.6	1087.85	+0.25
June 1, 2013	1094.0	1095.26	+1.26
July 1, 2013	1098.0	1099.20	+1.20
August 1, 2013	1099.0	1099.50	+0.50
September 7, 2013	1098.7	1099.26	+0.56
October 1, 2013	1097.2	1097.43	+0.23

\* USGS Gage #12452000 Lake Chelan at Chelan

## **SECTION 5: ACTUAL AND FORECASTED RUNOFF**

April 1 through July 31, 2013 Runoff Forecasts for the Chelan Basin were produced on February 1, March 1, and April 1 of 2013. The February runoff forecast predicted average runoff volume, while the March and April forecasts predicted less than average runoff volume. Runoff volume forecasts and lake level are shown below in Table 3.

**Table 3: Runoff Volume Forecasts for April 1 – July 31, 2013**

Date	Forecasted Percent of Average Runoff	Forecasted Runoff Volume (SFD)
February 1	100%	525,100
March 1	92%	483,092
April 1	93%	488,343

Actual runoff for April 1 through July 31 was 96% of average, producing 506,230 SFD of water. Lake levels were successfully managed using generation and spill as defined in Chapter 8 of the Lake Chelan Comprehensive Plan.

## ***SECTION 6: DECISIONS RELATED TO LAKE LEVEL***

Chelan PUD manages Lake Chelan with the intent of meeting operating objectives, target lake levels (when practicable), and providing efficient operation of District generating resources. All operating objectives and monthly target lake levels were achieved in 2013.

During the 2012/13 draft and refill cycle, initial runoff forecasts indicated average runoff, while later runoff forecasts in the spring predicted less than average runoff. Generation was scheduled at maximum for most of October, November and December 2012 to draft the reservoir, create room for spring runoff, provide flood control, and generate electricity. Generation was reduced late January through late March 2013 to implement a Chelan Tailrace Dissolved Oxygen and Egg Survival Study, and to maintain adequate lake levels for refill. Inflows began to exceed powerhouse capacity in early April, the lake began to fill, and generation was again scheduled at maximum through the first half of April. Generation was reduced during the last half of April, primarily to meet the May 1 target lake level. Refill timing was slightly early during the spring, refill continued through May and June, and generation was again scheduled near maximum for most of May, June and July as the lake continued to fill.

Chelan PUD began spilling water for headwater control at the dam on June 26 for 18 days to manage the refill rate of Lake Chelan, in order to meet license objectives and lake level targets. Refill continued into July and a maximum daily lake level of 1099.89 was achieved on July 10, 2013. Inflows generally declined the remainder of July and through August, with some lake storage drafted for generation during the latter half of July. The reservoir was gradually drafted through August and early September, and was maintained above the September 7 lake level target. After September 7, the reservoir was gradually drafted to just above the October 1 lake level target.

One of the priority operating objectives is to reduce high flows in the Chelan River (below 6,000 cfs) to protect fish habitat in the Chelan River. Successful lake level management resulted in a 2013 peak hourly flow of 3,410 cfs in the Chelan River on July 5, and a maximum daily average flow of 2,988 cfs on July 3. Successful lake level management also provided adequate flood control and resulted in meeting minimum required flows in the Chelan River, both priority operating objectives.



## **SECTION 7: CONSULTATION**

As required in Article 405, Chelan PUD distributed a copy of this report on Dec 16, 2013 to Jan 17, 2014 (30 days) to the following resource agencies, Tribes and non-governmental organizations for review and comment:

<b>Agency</b>	<b>Contact</b>
Washington Department of Ecology	Patricia Irlle, Charlie McKinney, Jim Pacheco
U.S. Geological Survey (USGS)	Nick Elwell
NOAA National Marine Fisheries Service	Justin Yeager
U.S. National Park Service	Annelise Lesmeister, Reed Glesne
U.S. Forest Service	Kari Grover-Wier, Alex Martinez, Paul Willard
U.S. Fish and Wildlife Service	Steve Lewis
Washington Department of Fish and Wildlife	Graham Simon
Washington State Parks and Recreation Commission	Tom Ernsberger, Jamie Van De Vanter
Washington Interagency Committee for Outdoor Recreation	Nona Snell
Confederated Tribes of the Colville Reservation	Jerry Marco
The Yakama Nation	Bob Rose
The Confederated Tribes of the Umatilla Indian Reservation	Carl Merkle
City of Chelan	Bob Goedde, Charles Sablan, Paul Schmidt
Lake Chelan Sportsman's Association	Phil Archibald
Manson Parks and Recreation Department	Wai Petersen
Lake Chelan Recreation Association	Richard Uhlhorn, Jim Urness
American Whitewater	Tom O'Keefe

The following comments were received:

<b>Commenting Agency</b>	<b>Agency Comment</b>	<b>Chelan PUD Response</b>
USGS, Nick Elwell, Jan 14, 2014 (email)	I have reviewed the 2013 Lake Chelan Lake level report with the USGS data from station Nos. 12452000 Lake Chelan at Chelan, WA, and 12452500 Chelan R. at Chelan, WA (spill channel). Table 1 and 2 in the report are consistent with USGS collected data at 12452000. The USGS gage 12452500 in the Chelan R. spill channel recorded a instantaneous peak discharge of 3,120 cfs on July 5, 2013; in comparison with the 3,000 cfs peak hourly average flow in the report, occurring on July 3, 2013. Furthermore, the USGS maximum mean daily flow in the spill channel was 2,580 cfs on July 3, and the maximum daily average published in the PUD report is 2,990 cfs for July 3. These differences are likely a product of hourly PUD averages based on gate ratings and lake level vs. the USGS 15 minute instantaneous stage discharge rating computations.	Hi Nick,  I went back and checked our data and am now showing a peak hourly discharge of 3,410 cfs on July 5, 2013, and a maximum daily avg flow of 2,988 cfs occurring on July 3 (was rounded up to 2,990 in the report). I will correct the report.  Thank you for the thorough review.  Scott Buehn (Chelan PUD)

Commenting Agency	Agency Comment	Chelan PUD Response
	<p>Overall the report is accurate when compared to collected USGS data. Thanks, Nick Elwell</p> <p>Nicholas F. Elwell USGS Hydrologic Technician Spokane, WA <a href="mailto:nelwell@usgs.gov">nelwell@usgs.gov</a> 509-353-2660</p>	
<p>Lake Chelan Sportsman's Association, Phil Archibald, Dec 18, 2013 (email)</p>	<p>Hi Michelle, I reviewed the 2013 Chelan Lake Level Report on behalf of the Lake Chelan Sportsmen's Association. Thank you for the concise format and congratulations on managing the lake level successfully for the benefit of all affected users and resources (not an easy task). Phil Archibald LCSA</p>	<p>Thank you Phil. Appreciate you taking time to review and give us feedback. Happy holidays to you.</p> <p>Michelle Smith (Chelan PUD)</p>