STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
PO Box 47775 • Olympia, Washington 98504-7775 • (360) 407-6300

July 24, 2009

REGISTERED MAIL RE 130 215 793 US

Mr. Dan L. Ross
Energy Northwest
Mail Drop: 1030
P.O. Box 968
Richland, WA 99352-0968

Re: 401 Certification of the Packwood Lake Hydropower Project

Dear Mr. Ross:

Enclosed is the Water Quality 401 Certification of the Packwood Lake Project. The Certification, Order number 6499, FERC license No. 2244, includes a couple of small changes from the draft presented to you. One change was suggested by you for the inspection of the transformer containment area and another change was suggested by the Washington Department of Fish and Wildlife to remove up-ramping, but retain criteria for down-ramping. The last section of the Certification, Section 6.0, discusses the procedures for appealing the order.

All correspondence relating to this document should be directed to Eric Schlorff at Department of Ecology, Southwest Regional Office, P.O. Box 47775, Olympia, Washington 98504-7775.

Sincerely,

for
Garin Schrieve, P.E.
Southwest Regional Manager
Water Quality Program

GS:ES:cc(6499)
Enclosure

cc: Ken Hogan, Federal Energy Regulatory Commission
Mark Hunter, WDFW
Carolyn Templeton, Federal Energy Regulatory Commission
Tom Young, ATG
Chris Maynard, Ecology Water Resources

401 Certification-Order

Packwood Lake Hydroelectric Project
Owned and Operated by
Energy Northwest

Certification-Order No. 6499

FERC License No. 2244

By
Water Quality Program Staff
Southwest Regional Office
P.O. Box 47775
Olympia, WA 98504-7775

July 2009

WASHINGTON STATE
DEPARTMENT OF
ECOLOGY

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ACRONYMS

401 Refers to section 401 of the Clean Water Act
BMP Best Management Practice
BOD Biochemical Oxygen Demand
BPA Bonneville Power Administration
CE-QUAL-W2 Water quality and hydrodynamic model
CFR Code of Federal Regulation
cfs Cubic feet per second
CWA Clean Water Act
DO Dissolved Oxygen
Ecology Refers to the Washington State Department of Ecology
EIS Environmental Impact Statement
EN Energy Northwest
EMD Emergency Management Division
ESHB Engrossed Substitute House Bill
FEIS Final Environmental Impact Statement
FERC Federal Energy Regulatory Commission
FWPCA Federal Water Pollution Control Act
HED Hydroelectric Development
HPA Hydrologic project approval
IWWPP In Water Work Pollutant Plan
NPDES National Pollution Discharge Elimination System
NRC National Response Center
NTU Nephelometric Turbidity Unit
PCB Polychlorinated Biphenyls
PHABSIM Physical Habitat simulation model
PM&E Protection, Mitigation and Enhancement
QAPP Quality assurance project plan
RCW Revised Code of Washington
RM River mile
SDCC Spill Deterrent Control & Countermeasure Plan
SPCC Spill Prevention Control & Countermeasure Plan
SWPPP Stormwater Pollution Prevention Plan
TDG Total Dissolved Gas
TMDL Total Maximum Daily Load
WAC Washington Administrative Code
WDFW Washington Department of Fish and Wildlife
WDOE Washington Department of Ecology
WQAP Water quality attainment plan
WQPP Water Quality Protection Plan
WRIA Water Resource Inventory Area

DEPARTMENT OF ECOLOGY

IN THE MATTER OF GRANTING A WATER QUALITY CERTIFICATION TO: Energy Northwest In accordance with 33 U.S.C. § 1341 FWPCA § 401, RCW 90.48.120, RCW 90.48.260, and WAC 173-201A	))))))	CERTIFICATION-ORDER NO. 6499 Licensing of the Packwood Lake Hydroelectric Project (FERC No. 2244), Lewis County, Washington

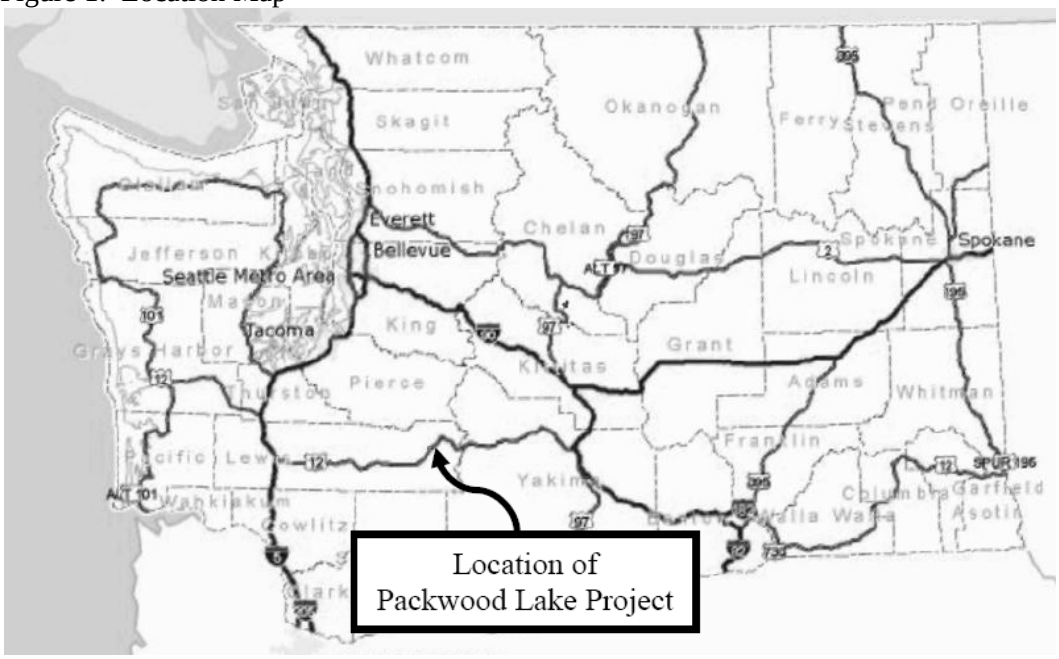
TO: Dan Ross, Packwood Project License Manager
Energy Northwest
P.O. Box 968, MD 1030
Richland, Washington 99352-0968

On August 8, 2008, the Department of Ecology (Ecology) received an application for Section 401 Certification filed by Energy Northwest (EN) for the Packwood Lake diversion and hydropower project; Federal Energy Regulatory Commission (FERC) License No. 2244, which started commercial operation in 1964. EN requested a 401 Certification for the Packwood Lake hydroelectric project from Ecology pursuant to the provisions of 33 USC § 1341 (§401 of the Clean Water Act) and must submit the 401 Certification to FERC as part of their license application. EN published notices of the application in the Chronicle and the Highway Shopper for two weeks commencing on September 24, 2008, and ending on October 1, 2008.

1.0 NATURE OF THE PROJECT

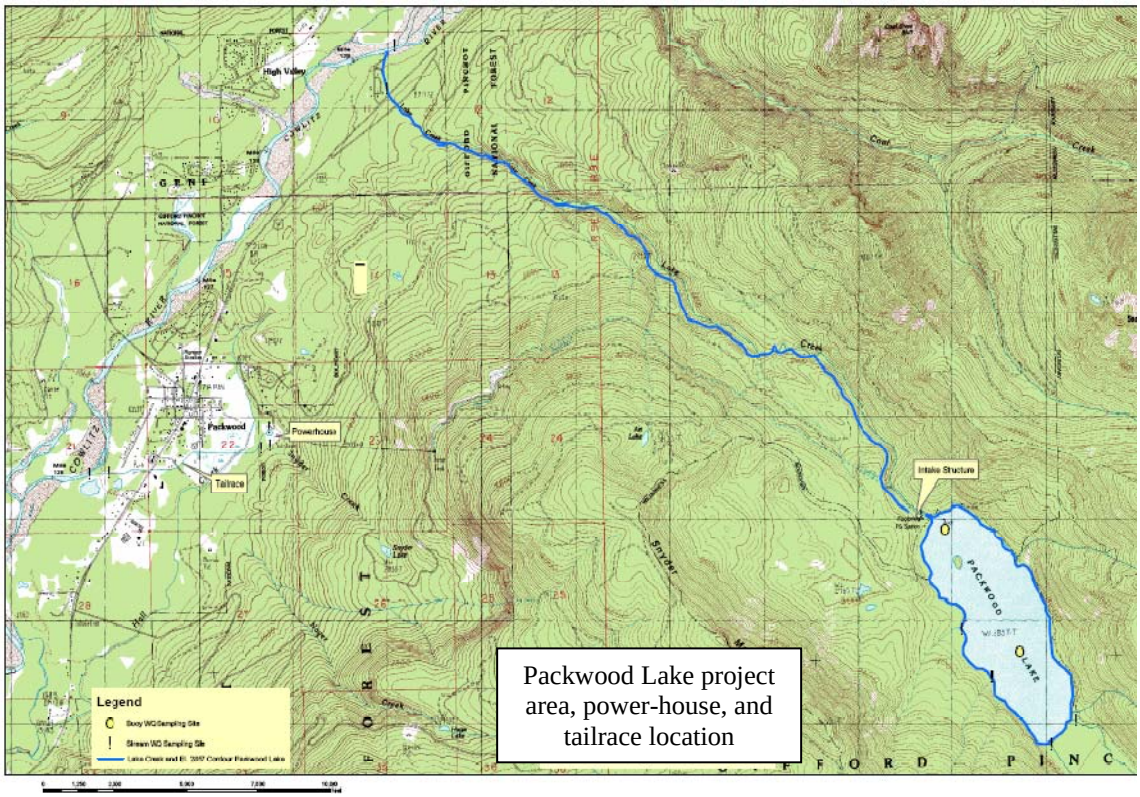
The Packwood Lake Project is owned and managed by EN which operates under a license issued by FERC as Project Number 2244. The project consists of an intake channel; a concrete drop structure (shallow dam at RM 5.4) and intake building on Lake Creek, located about 424 feet downstream from the outlet of Packwood Lake; a 21,691-foot system of concrete pipe and tunnels; a 5,621-foot penstock, a surge tank; and a powerhouse with a 26,125 kW turbine generator. The powerhouse is located near Packwood, Washington, near highway 12. See Figure 1: Packwood location map below.

Figure 1: Location Map



Packwood Lake formed naturally following a landslide over 1000 years ago. The lake is located at approximately 2,857-foot elevation. Lake Creek, a tributary to the Cowlitz River, drains the Lake. Lake Creek is a high gradient, stair-step type creek with a long series of cascades and plunge pools. There are two natural barriers to anadromous fish: A chute/falls complex at RM 1.03, determined to be a barrier to upstream migration for Chinook, Coho salmon, and coastal cutthroat trout; and a falls at RM 1.95, determined to be an upstream barrier to steelhead trout. Resident rainbow trout existed in the lake and predate human influences (Lucas and Chilcote, 1982). There were also attempts to stock the Lake with trout. However, the original strains of rainbow trout predominate. The resident trout and amphibians can use most of the length of Lake Creek for habitat and spawning, as well as tributaries to Lake Creek. See Figure 2, which shows the area of the project. This Certification will provide regular instream flows to Lake Creek. The Project has a water right of 260 cfs; it can divert up to 260 cfs at the drop structure and modify the hydrology of lower Lake Creek. An instream flow study and report was completed in October 2007 and submitted with the application (EES, 2007/10).

Figure 2: Project Area Map



See Figure 2 in Appendix A for a more detailed view of the pipeline and tailrace.

1.1 Packwood Lake Diversion Structure, Powerhouse, and Reservoir Description

- The concrete drop structure extends 85 feet in width and is tied into impervious earth fill cutoff walls on each side extending to the natural embankment.
- Drop structure crest elevation of 2,858.50 ft MSL.
- 19.2 square miles of total drainage area for Lake Creek and Packwood Lake.
- Summer lake elevation is 2,857.0 feet MSL ±0.50 ft and drawn down to no lower than 2,849 feet MSL. The facility is operated to achieve the 2,857-foot level by May 1st of each year and maintained until September 15th when drawdown may begin.
- Minimum winter lake elevation is 2,849.0 feet MSL.
- The lake surface area is 452 acres at lake elevation of 2,857 feet MSL.
- Typical usable storage is 4,162 acre-feet between minimum allowed pool of 2,849 feet MSL and 2,858.5 feet MSL top of spillway.
- 9.5 feet of vertical storage usable by the Project between September 15th and April 30th and 2 feet of usable storage the remainder of the year.

- The power house generator capacity is 26.1 MW.

- Began commercial operations in 1964.

2.0 AUTHORITIES

In exercising authority under Section 401 of the Clean Water Act (33 USC § 1341) and Revised Code of Washington (RCW) 90.48.120 and 90.48.260, Ecology has investigated this proposal for:

> Conformance with all applicable water quality based, technology based, toxic or pretreatment effluent limitations as provided under the Federal Water Pollution Control Act Sections 301, 302, 303, 306 and 307 and 33 USC §§ 1311, 1312, 1313, 1316, and 1317.
>
> Conformance with the state water quality standards as provided for in Chapter 173-201A Washington Administrative Code (WAC) and by Chapter 90.48 RCW, and with other appropriate requirements of state law; and, Conformance with all known, available and reasonable methods to prevent and control pollution of state waters as required by RCW 90.48.010.

3.0 CONDITIONS

In view of the foregoing and in accordance with Section 401 of the Clean Water Act (33 USC 1341), RCW 90.48.260, and WAC Chapter 173-201A, Ecology finds reasonable assurance that implementation of the compliance schedule and adaptive management strategy contained in the proposed license will result in the attainment and compliance with state and federal water quality standards and other appropriate requirements of state law provided the following conditions are met. Accordingly, through this Certification, Administrative Order (Order), issued and enforceable under RCW 90.48, Ecology grants a Section 401 water quality certification to the Licensee, Energy Northwest (EN) for the Packwood Lake Hydroelectric Project (FERC No. 2244) subject to the following conditions. This Order will hereafter be referred to as the "Certification-Order."

3.1 General Conditions and Requirements

A. The project must comply with all water quality standards approved by the Environmental Protection Agency (currently codified in chapter 173-201A WAC), ground water quality standards (currently codified in chapter 173-200 WAC), and sediment quality standards (currently codified in chapter 173-204 WAC) and other appropriate requirements of state law. Certification of this project does not authorize the Licensee to exceed applicable state water quality standards (chapter 173-201A WAC).

Furthermore, nothing in this Certification-Order absolves the Licensee from liability for contamination and any subsequent cleanup of surface waters, ground waters, or sediments occurring as a result of activities associated with Project operations and FERC license conditions.

B. In the event of changes or amendments to the state water quality, ground water quality, or sediment standards, or changes in or amendments to the state Water

Pollution Control Act (RCW 90.48), or changes in or amendments to the Clean Water Act, such provisions, standards, criteria, or requirements shall apply to this project and any attendant agreements, orders or permits. Ecology will notify the Licensee through an Administrative Order of any such changes or amendments applicable to its project.

C. Discharge of any solid or liquid waste to the waters of the state of Washington without prior approval from Ecology is prohibited.

D. The Licensee must obtain Ecology review and approval before undertaking any change to the project or project operations that might violate water quality or affect compliance with any applicable water quality standard (including designated uses) or other appropriate requirement of state law.

E. This Certification-Order does not exempt the Licensee from compliance with other statutes and codes administered by federal, state, and local agencies.

F. The Licensee must acquire a Hydraulic Project Approval (HPA) (under 77.55 RCW) from the Washington State Department of Fish and Wildlife (WDFW) if required prior to any work in waters of the state.

G. Ecology retains the right, by further Order, to modify schedules or deadlines provided under this Certification-Order or provisions it incorporates.

H. Ecology retains the right by Administrative Order to require additional monitoring studies or measures if it determines there is likelihood that violations of water quality standards or other appropriate requirements of state law have occurred or may occur, or insufficient information exists to make such determination.

I. This Certification-Order is based on the currently available data and analysis for different parameters of concerns. Ecology specifically reserves the right to make any further modifications to this order based upon any future total maximum daily loading study (TMDL) findings, allocations of pollutant load or water quality studies conducted by the Licensee or its consultants.

J. Ecology reserves the right to amend this Certification-Order if it determines that the provisions hereof are no longer adequate to provide reasonable assurance of compliance with applicable water quality standards or other appropriate requirements of state law. Any such amended Order shall take effect immediately upon issuance, unless otherwise provided in the amended Order, and may be appealed to the Pollution Control Hearings Board (PCHB) under chapter 43.21B RCW.

K. Ecology reserves the right to issue orders, assess or seek penalties, and to initiate legal actions in any court or forum of competent jurisdiction for the purposes of enforcing the requirements of this Certification-Order.

L. The conditions of this Certification-Order shall not be construed to prevent or prohibit the Licensee from either voluntarily or in response to legal requirements

imposed by a court, the FERC, or any other body with competent jurisdiction, taking actions which will provide a greater level of protection, mitigation, or enhancement of water quality or of existing or designated uses.

M. Copies of this Certification-Order and associated permits, licenses, approvals and other documents must be kept on the Project site and made readily available for reference by the Licensee, its contractors and consultants, and by Ecology.

N. The Licensee must allow Ecology access to inspect the project and project records required by this Certification-Order for the purpose of monitoring compliance with its conditions. Access shall occur after reasonable notice, except in emergency circumstances.

O. The Licensee must, upon request by Ecology, fully respond to requests for materials to assist Ecology in making determinations under this Certification-Order and any resulting rulemaking or other process.

P. Any work that is out of compliance with the provisions of this Certification-Order, or conditions that result in distressed, dying or dead fish, or any discharge of oil, fuel, or chemicals into state waters, or onto land with a potential for entry into state waters, or violation of turbidity criteria is prohibited. If these conditions occur, the Licensee must immediately take the following actions:

1. Cease operations at the location of the violation to the extent such operations may reasonably be causing or contributing to the problem.

2. Assess the cause of the water quality problem and take appropriate measures to correct the problem and/or prevent further environmental damage.

3. Notify Ecology of the failure to comply with water quality standards. Oil or chemical spill events must be reported immediately to Ecology's 24-Hour Spill Response Team at 360-407-6300 within 24 hours. Other non-compliance events must be reported to Ecology's Federal Permit Manager at 800-424-8802.

4. Submit a detailed written report to Ecology within five days that describes the nature of the event, corrective action taken and/or planned, steps to be taken to prevent a recurrence, results of any samples taken, and any other pertinent information.

5. Observed violations at the project must be highlighted in the annual monitoring report.

Compliance with these requirements does not relieve the Licensee from responsibility to maintain continuous compliance with the terms and conditions of this Certification-Order or the resulting liability from failure to comply.

4.0 CURRENT STANDARDS

4.1 Washington State Water Pollution Control Act

Waters of the state are assigned designated uses under WAC 173-201A. Designated uses for this section of the Cowlitz River and tributary to the Cowlitz River include, but are not limited to the uses described in Table 3-1 below.

For aquatic life uses, it is also required that all indigenous fish and non-fish aquatic species be protected in waters of the state in addition to the key species described below (WAC 173-201A- 200(1).

Table 3-1 Designated Uses

River Reach Description	Designated Uses
Packwood Lake and all feeder streams	• Aquatic Life Uses – Core summer salmonid habitat. The key identifying characteristics of this use are summer (June 15 – September 15) salmonid spawning or emergence, or adult holding; use as important summer rearing habitat by one or more salmonids; or foraging by adult and sub-adult native char. • Other common characteristic aquatic life uses for waters in this category include spawning outside of summer season, rearing, and migration by salmonids. • Recreation – Extraordinary primary contact. • Water Supply – Wildlife Habitat, Harvesting, • Commerce and Navigation, boating and Aesthetics.
Lake Creek	Same as above
Cowlitz River where tailrace enters	Same as above

4.2 Compliance with Standards

EN conducted several water quality studies to assess the existing water quality of Packwood Lake, Lake Creek and the Cowlitz River. Lake Creek discharges to the Cowlitz River above the town of Packwood and the tailrace discharges to the Cowlitz River just downstream of the town of Packwood.

Table 4-2: Existing Water Quality[1]

Parameter	Location	Existing Water Quality
Total Dissolved Gas (TDG)	Tailrace stilling basin (below power house)	98%-103% (range 2004) 98%-102% (range 2005)

Parameter	Location	Existing Water Quality
Dissolved Oxygen (DO)	Packwood Lake	Surface 8.0-10.5 mg/L; Depth 5.1-10.2 mg/L (range 2004) Surface 8.3-10.6 mg/L; Depth 4.9-9.1 mg/L (range 2005)
	Lake Creek (near mouth)	9.4-14.1 mg/L (range 2004) 7.8-12.1 mg/L (range 2005)
	Tailrace stilling basin	8.7-14.7 mg/L (range 2004) 8.6-13 mg/L (range 2005)
	Cowlitz River (upstream of Lake Creek)	9.0-13.8 mg/L (range 2004) 8.4-12.3 mg/L (range 2005)
Turbidity	Lake Creek (below drop structure)[2]	1.2-18.5 NTU (range 2004); 5.5 NTU (mean 2004) 0.1-2.9 NTU (range 2005); 1.4 NTU (mean 2005)
	Lake Creek (near mouth)	0.3-18.5 NTU (range 2004); 3.1 NTU (mean 2004) 1.7 NTU (mean 2005)
	Tailrace stilling basin (below power house)	0.9-7.0 NTU (range 2004); 3.2 NTU (2004 mean) 1.5 NTU (2005 mean)
	Cowlitz River (upstream of Lake Creek)	1.0-54.5 NTU (range 2004); 25.9 NTU (2004 mean) 13.8 NTU (mean 2005)
pH	Packwood Lake	6.7-7.8 S.U. (range 2004); 7.5 S.U. (mean at 1m 2004) 6.6-7.9 S.U. (range 2005); 7.6 S.U. (mean at 1m 2005)
	Lake Creek (below drop structure)	7.0-7.7 S.U. (range 2004); 7.5 S.U. (mean 2004) 7.4-7.9 S.U. (range 2005); 7.6 S.U. (mean 2005)
	Lake Creek (near mouth)	6.9-7.9 S.U. (range 2004); 7.4 S.U. (mean 2004) 6.9-7.8 S.U. (range 2005); 7.3 S.U. (mean 2005)
	Cowlitz River (upstream of Lake Creek)	6.3-7.8 S.U. (range 2004); 7.1 S.U. (mean 2004) 7.0-7.9 S.U. (range 2005), 7.4 S.U. (mean 2005)
	Tailrace (below power house)	6.7-7.9 S.U. (range 2004); 7.3 S.U. (mean 2004) 5.5-7.8 S.U. (range 2005); 7.3 S.U. (mean 2005)
Temperature	Lake Creek (below drop structure)	20.95°C (7-DADmax 2004) 20.81ºC (7-DADmax 2005)
	Lake Creek (near mouth)	14.36°C (7-DADmax 2004) 13.51ºC (7-DADmax 2005) 19.09 ºC (Modeled temperature for the creek without-the-project condition)
	Tailrace Stilling Basin (below powerhouse)	20.67°C (7-DADmax 2004) 21.82ºC (7-DADmax 2005)

Parameter	Location	Existing Water Quality
	Tailrace (near the Cowlitz)	21.25°C (7-DADmax 2004) 20.83ºC (7-DADmax 2005)
	Cowlitz River (upstream of Lake Creek)	14.90°C (7-DADmax 2004) 15.10ºC (7-DADmax 2005)
	Cowlitz (downstream of tailrace)	21.91°C (7-DADmax 2004) 18.41ºC (7-DADmax 2005)
[1]Data from three reports: the EN Water Quality 2nd year report (2005 data), February 2007; EN Water Quality Interim Report: 1st Year Study Results (2004 data); and EN Final Water Temperature Report for 2005 submitted February 2007 (EES, 2007). Note that most of the 2004 and 2005 data sets include three months of the following year (January – March).		
[2]The Lake Creek site was labeled LCDS (Lake Creek Drop Structure) in the EN studies.		

4.3 Numeric Criteria

Numeric criteria for the designated uses are found in WAC 173-201A. These include criteria for TDG, pH, dissolved oxygen (DO), fecal coliform, turbidity and temperature.

4.4 Total Dissolved Gas (TDG)

This project does not appear to have a problem with generating total dissolved gas (TDG). The TDG in the stilling basin stayed below the criterion of 110 percent of saturation.

However, if changes are made to the turbines or other parts of the project that have the potential to produce TDG, the Licensee must monitor water quality and make physical and operational changes to meet water quality standards if the water exceeds the criterion.

The project must not cause any exceedance of the TDG water quality criteria as specified in WAC 173-201A-200 (1)(f). The Licensee must manage spill and power production to limit TDG production to 110 percent or less saturation.

4.5 Temperature

The action of this project does appear to raise the temperature by more than 0.3ºC, when Packwood lake outlet temperature is compared to the tailrace outlet temperature (EES 2008; 2007/9; 2007; See Appendix A). This appears to occur during a short period of time in middle to late August. The water quality standards require that temperature data be statistically reduced to one number using a series of calculations. This final temperature for any fresh water body is a yearly maximum of the seven-day running averages of daily maximum temperatures (7-DADmax).

The Packwood Lake project must not cause any violation of the temperature water quality criterion as specified for Core Summer Salmonid Habitat in WAC 173-201A-200 (1)(c). This criterion is specified as16ºC for the waters of the Cowlitz River and Lake

Creek. There is also a supplemental spawning criterion of 13ºC from September 1st to May 15th. However WAC 173-201A-200(c)(i) states:

> "(i) When a water body's temperature is warmer than the criteria in Table 200 (1)(c) (or within 0.3ºC (0.54ºF) of the criteria) and that condition is due to natural conditions, then human actions considered cumulatively may not cause the 7-DADMax temperature of that water body to increase more than 0.3ºC (0.54ºF)."

EN modeled the pre-project water temperature in Lake Creek using the QUAL2Kw model (EES, 2007/9; 2008; see Appendix A for details). Because the natural condition of Packwood Lake and Lake Creek were warmer than the criterion, these temperatures constitute the criterion. This natural condition temperature supersedes the 16ºC and the supplemental spawning criterion of 13ºC as described in the following paragraph.

Packwood Lake had a 7-DADMax of 20.81ºC, some cooling and ground water inputs naturally occur in Lake Creek which brings the temperature near the mouth of the creek down to a 7-DADMax of 19.09ºC. The temperature near the point where the project tailrace enters the Cowlitz River had a 7-DADMax of 21.25ºC. The difference between these temperatures is 2.16ºC. Because the water quality standards only allows an increase above the natural condition of 0.3ºC, the tailrace temperature is 01.86ºC warmer than allowed

Under WAC 173-201A-510(5), for dams that cause or contribute to a violation of water quality standards, the dam owner is required to provide a detailed strategy for compliance with state water quality standards. The dam owners must develop a water quality attainment plan that provides a detailed strategy to achieve compliance.

EN has proposed a water quality attainment plan in accordance with the compliance schedule requirements, shown in Appendix A and WAC 173-201A-510(5). A major part of the attainment plan is a proposed operation change to shut down the project during the warmest period of the summer (August 15th to September 15th). The project currently shuts down operating in October for annual maintenance. However, to provide benefits to public resources, EN will move the annual outage forward to August. Moving the outage to August should have a beneficial effect on water temperature in the Cowlitz River at the confluence with the tailrace.

Ecology agrees with the goals of the attainment plan except that monitoring must occur for three years from license issuance rather than the ten years set forth in Appendix A. Should the temperature in the tailrace continue to exceed standards as identified, following the three year monitoring period, the Licensee must identify adaptive management strategies to further improve the temperature, in accordance with the compliance schedule described in WAC 173-201A-510(5). Options under a compliance schedule, are described in WAC 173-201A-510(5)(g)(ii). This regulation includes site specific criteria (WAC 173-201A-430), a use attainability analysis (WAC 173-201A-440), or a water quality offset (WAC 173-201A-450).

If, however, the temperature criterion is met throughout the outage period and shown with three years of data collection (that is, the data shows no temperature exceedance), the Licensee does not need to consider further action.

If the water quality data does show there is a problem meeting the temperature criteria as stated above, the Licensee must develop a plan to achieve compliance with the water quality temperature criteria. The plan must be submitted by year four following the license issue date. The Licensee must continue to monitor temperature while submitting the plan. The plan must show how the Licensee will achieve compliance within ten years of license issuance. If the licensee cannot find operational or physical changes (that is, to lake withdrawal, facility, penstock, or tailrace), which will meet the temperature criterion, then the licensee must use adaptive management and options described in WAC 173-201A-(430, 440, or 450).

Because the highest temperatures occurred during the middle of the August to September time period, the new maintenance outage timing which will occur from August 15th to September 15th could prevent the warmer water from entering the Cowlitz. This outage will also be timed to occur with the beginning of the Chinook spawning. The maintenance outage used to begin in October. EN predicts the new outage period will result in the water temperature meeting the criterion. Therefore, the outage timed for August should prevent salmon from entering the tailrace waters and address the temperature exceedance.

To confirm the expected beneficial effect on water temperatures of the proposed change in the annual project outage schedule, EN must monitor water temperature at six sites and air temperatures at one site:

- In the tailrace (near the stilling basin, and near the outlet);
- In Lake Creek (near the mouth);
- In Packwood Lake (near the outlet);
- In two sites in the Cowlitz River (upstream of the tailrace discharge and in the main stem); and
- Ambient air temperature (located near the tailrace).

These monitoring locations are different from those shown in Appendix A. Monitoring will take place on an annual basis and at agreed to data recording frequencies between June 25th and October 5th for the first three years of the new license, or unless modified by Ecology.

4.6 Dissolved Oxygen (DO)

The DO in the stilling basin was well above the value seen in the Cowlitz River upstream of Lake Creek. Both the project and Lake Creek appear to add DO. The drop structure at Packwood Lake spills surface water and the bypass from the intake structure is also rather shallow. Therefore the water being spilled into Lake Creek is from the more oxygen rich surface waters of Packwood Lake and not from deep ports below the hypolimnion.

This project does not appear to produce conditions with low DO which could violate water quality standards in Lake Creek or in the Stilling Basin. However, if changes are made to the operations or lake withdrawals or other parts of the project that have the

potential to produce low DO, the Licensee must make physical and operational changes to meet water quality standards.

4.7 Turbidity

The project actions do not appear to have any effect on turbidity. The lake levels are maintained at nearly the same level. Tributaries to the lake are maintained in a fairly pristine condition with little development except that of the withdrawal structure and a few old cabins, which reduces the turbidity entering the lake. The Licensee must manage erosion from roads and the pipeline trail. Numeric criteria for the uses in the project area require that turbidity must not exceed 5 NTU over background turbidity when the background turbidity is 50 NTU or less, or have more than a 10 percent increase in turbidity when the background turbidity is more than 50 NTU.

4.8 pH

The pH above and below the project is fairly neutral. The project does not appear to raise or lower the pH beyond the criteria.

4.9 Narrative Criteria

Narrative criteria rely on the analysis of impacts to uses such as aquatic plants and animals, fish habitat (flow), wildlife habitat, recreation and aesthetics. These criteria are implemented on a case-by-case basis to protect water quality and beneficial uses and are used where numeric standards have not been developed or are not sufficient to protect an existing or designated use.

4.10 Anti-Degradation

Existing and designated uses must be maintained and protected in accordance with WAC 173-201A-300.

5.0 CONDITIONS RELATING TO FLOW AND RAMPING

5.1 Instream Flow

The Licensee must discharge at least the following continuous minimum instream flows from the Packwood Lake drop structure, for the protection of aquatic resources in Lake Creek:

Table 5-1: Instream Flows

Month	Hydro Operational Instream Flow (cfs)
January	4
February	4
March	4
April	7

Month	Hydro Operational Instream Flow (cfs)
May	15
June	10
July	15
August 1st – 15th	15
August 16th – September 15th	20
September 16th – 30th	15
October	10
November	7
December	4

The minimum flow may be temporarily modified if required because of operating emergencies beyond the control of the Licensee, or for short periods upon mutual agreement between the Licensee and Ecology. Ecology reserves the authority to require modification of the minimum flows and ramping rates if new information or analysis shows that the flows are inadequate to protect designated instream uses.

The Licensee (EN) must record and document the quantity of water (in cfs), bypassed through the intake structure (bypass flow), water used for power production (plant flows), and changes in lake level elevation.

The project flow instrumentation automatically sums the plant and bypass flows measured at the intake building and are recorded in acre feet. Habitat forming flows are calculated using a conversion formula based on lake elevation and are recorded.

The information noted above will be provided in the annual project reports.

5.2 Ramping Rates

The licensee must not exceed the following ramping rates in the anadromous portion of Lake Creek:

Table 5-2 Ramping Rates

Season	Daylight Rates[3]	Night Rate
February 16 to June 15[1]	No Ramping	2 inches/hour
June 16 to October 31[2]	1 inch/hour	1 inch/hour
November 1 to February 15	2 inches/hour	2 inches/hour
[1]Salmon fry are present [2]Steelhead fry are present [3]Daylight is defined as one hour before sunrise to one hour after sunset		

The Licensee must measure the Lake Creek flows at the gaging station upstream of the confluence with the Cowlitz River at the Thompson Road (Lake Creek Road) bridge. These ramping rates apply only to changes in Creek height as a result of hydropower withdrawals (down-ramping in the creek). The ramping rates do not apply to changes in Creek height due to storm events which are not tied to ramping and therefore are out of the control of the Licensee.

5.3 Habitat Forming Flows

Researchers found very little small to medium gravel substrate and woody debris in lower Lake Creek to provide for proper fish habitat (EES, 2007/10). These habitat forming flows will aid in the recruitment, mobilization, and deposition of sediment, wood and other organic material. Therefore, EN agreed with the resource agencies to provide pulses of high flows which could distribute gravel added to the system. These habitat forming flows in lower Lake Creek must meet the following restrictions:

- Be greater than or equal to 285 cfs for
  - as long as lake inflows can sustain that flow, or
  - for a maximum of 24 hours every other water year[1],
  - or three out of six water years;
- These flows must start in the first water year following the issuance of the new license; and
- Continue for the life of the permit.

[1]Water year is defined as an annual precipitation cycle, October 1st through September 30th.

The magnitude of the habitat forming flows must be calculated by adding the measured bypass flows to the spilled flow over the drop structure, using lake elevation and the stage/discharge relationship established at the drop structure.

EN must report annually the attempts and activities of the habitat forming flows, including the magnitude, duration and frequency of the flows and associated power generation throughout each previous year.

5.4 Construction Projects, Miscellaneous Discharges, and Habitat Modifications

The following applies to all over-water or near-water work related to the Project that can impact surface or ground water quality. This includes, but is not limited to, construction, operation, and maintenance of fish collection structures, generation turbines, penstocks, transportation facilities, portable toilets, boat ramps, transmission corridors, structures, and staging areas. This also includes emergencies for all activities related to Project operation.

A. A Water Quality Protection Plan (WQPP) must be prepared, and followed for all Project related work that is in or near water that has the potential to impact surface and/or ground water quality. The WQPP must include control measures

to prevent contaminants from entering surface water and groundwaters, and must include, but not be limited to, the following elements:

1. A Stormwater Pollution Prevention Plan (SWPPP) must specify the Best Management Practices (BMPs) and other control measures to prevent contaminants entering the Project's surface water and groundwaters. The SWPPP must address the pollution control measures for the Licensee's activities that could lead to the discharge of stormwater or other contaminated water from upland areas. The SWPPP must also specify the management of chemicals, hazardous materials and petroleum (spill prevention and containment procedures), including refueling procedures, the measures to take in the event of a spill, and reporting and training requirements.

2. An In Water Work Protection Plan (IWWPP) must be consistent with the SWPPP and must specifically address the BMPs and other control measures for the Licensee activities that require work within surface waters. Turbidity and dissolved oxygen must be monitored upstream of the location where in-water construction is taking place and at the point of compliance (as defined in WAC 173-201A-110) during construction. Samples must be taken at a minimum of once each day during construction in or adjacent to any water bodies within the Project area that may be affected by the construction. The IWWPP must include all water quality protection measures consistent with a Hydraulics Project Approval (HPA) for the Project.

3. The WQPP must include procedures for monitoring water quality, actions to implement should water quality exceedances occur, and procedures for reporting any water quality violations to Ecology. The WQPP must include all water quality protection measures consistent with a HPA for the Project. The WQPP shall be submitted to Ecology for review and approval at least three months prior to Project initiation and a copy of the WQPP must be in the possession of the on-site construction manager and available for review by Ecology staff whenever construction work is under way.

4. The Licensee must, at Ecology's discretion, either apply for an National Pollutant Discharge Elimination System (NPDES) permit and comply with the terms and conditions of the permit or apply for and comply with the terms of an individual NPDES permit when:

    - A construction project meets the coverage requirements of a NPDES permit; and/or

    - A State Waste Discharge General Permit for Stormwater Discharges associated with construction activity.

B. Best Management Practices (BMPs)

1. Work in or near the lake, water within the intake structure, Lake Creek, the powerhouse, the tailrace, or any wetlands must include all reasonable measures to minimize the impacts of construction activity on waters of the state. Water quality constituents of particular concern are turbidity, suspended sediment, settleable solids, oil and grease, and pH. These measures include use of BMPs to control erosion and sedimentation, proper use of chemicals, oil and chemical spill prevention and control, and clean up of surplus construction supplies and other solid wastes.

2. During construction, all necessary measures must be taken to minimize the disturbance of existing riparian, wetland, or upland vegetation.

3. All construction debris must be properly disposed of on land so that the debris cannot enter a waterway or cause water quality degradation to state waters. Retention areas or swales must be used to prevent discharging of water from construction placement areas.

4. The Licensee must ensure that any fill materials that are placed for the proposed habitat improvements in any waters of the state do not contain toxic materials in toxic amounts.

C. Maintaining Turbidity Standards

1. Certification of this Project does not authorize the Licensee to exceed the turbidity standard beyond the mixing zone described in subsections (b) and (c) below. Turbidity in core summer salmonid waters in Packwood Lake, Lake Creek and the Cowlitz River must not exceed five NTU over background turbidity when the turbidity is 50 NTU or less, or have more than a ten percent increase in turbidity when the background turbidity is more than 50 NTU as applied at the edge of a mixing zone.

2. A mixing zone may be established for the turbidity resulting from construction activity. This activity must be consistent with WAC 173-201A-200(1)(e) and WAC 173-201A-400 within the mixing zone and certain conditions the turbidity standard is waived. Waiving the standard will occur only after the implementation of proper best management practices. The mixing zone is established to allow only temporary exceedances of the turbidity criteria during and immediately after in-water work. The temporary turbidity mixing zone restrictions are as follows:

   a. For waters up to 10 cfs flow at the time of construction, the point of compliance must be limited to 100 feet downstream from the activity causing the turbidity exceedance.

   b. For waters above 10 cfs to 100 cfs flow at the time of construction, the point of compliance must be limited to 200 feet downstream from the activity causing the turbidity exceedance.

c. For waters above 100 cfs flow at the time of construction, the point of compliance must be limited to 300 feet downstream from the activity causing the turbidity exceedance.

d. For projects in and around Packwood Lake and associated wetlands, the point of compliance must be limited to a radius of one hundred fifty feet from the activity causing the turbidity exceedance.

5.5 Spills

Protecting aquatic uses through water quality numeric criteria remains the primary purpose of the following conditions. The Project must comply with the standards found in WAC 173-201A, as further described in this Certification. Upon completion of the compliance period, the Licensee must operate the project in full compliance with the state water quality standards.

A. General Oil Spill Prevention & Control Conditions

1. The Licensee must not discharge oil, fuel or chemicals into waters of the state, or onto land with a potential for entry into waters of the state as prohibited by Chapter 90.56 RCW and Chapter 90.48 RCW.

2. For proper disposal, the Licensee must contain wash water with oils, grease or other hazardous materials resulting from wash down of equipment or working areas, and must not discharge these contaminated waters into state waters.

3. Any visible floating oils released from project operation, maintenance activities or construction must be contained and removed from the water.

a. The Licensee must immediately begin and complete containment and clean-up efforts in the event of a discharge of oil, fuel or chemicals in state waters, or onto land with a potential for entry into state waters. This work must take precedence over normal work. Cleanup must include proper disposal of any spilled material and used clean-up materials.

b. Spills into state waters and spills onto land with a potential for entry into state waters, or other significant water quality impacts, must be reported immediately (within one hour) to the Department of Ecology, Southwest Regional Office at 360-407-6300 (24-hour phone number).

c. The Licensee must participate in the Incident Command System (ICS) whenever a Unified Command is established in response to a spill incident that involves or potentially impacts one or more Projects.

d. Do not use emulsifiers or dispersants in state waters including water contained in sumps or other areas that discharge to sumps, the intake structure, Lake Creek or the tail waters.

e. Project Operators must be familiar with and trained on use of oil spill cleanup materials. In the event of a spill, properly dispose of used/contaminated materials and oil, and as soon as possible restock new supplies. Include records of proper disposal in the oil consumption records and keep copies of disposal records of contaminated cleanup supplies on-site and available for inspection by Ecology.

f. Install, or have on-site to deploy, staircases, ladders, harnesses, etc., which will allow oil spill response personnel to safely reach areas that could, in the event of an oil spill, need to be accessed to deploy sorbent pads, boom material or other cleanup equipment.

g. Following all spills into state waters, or onto land with a potential for discharge to state waters, the Licensee must provide a written follow-up report to Ecology's Southwest Regional Office within 15 days of the incident. The report must include a copy of the Licensee's Spill Report Form, a description of the incident, response actions taken and any spill prevention measures taken or recommended to prevent similar spills.

4. Identify and map floor drains in the Project. Post these maps at the Project in a conspicuous location for use by Operators and other personnel in the event of a spill. Floor drains that are no longer needed must be blocked or sealed.

5. Oil, fuel and chemical storage containers, containment areas, conveyance systems and oil-filled operating equipment.

a. Within 180 days, the Licensee must provide Ecology with oil inventory lists and diagrams noting location of containers and oil-filled operating equipment holding more than 55-gallons of oil. The Project-specific oil inventories must include location, type of container, number of containers, volume per container, total shell volume, spill potential, type of oil, PCB content and direction of flow in the event of a spill. Project-specific diagrams should note the location of these containers and oil-filled equipment and general oil spill flow direction;

b. The Licensee must keep records of the amounts of oil used on-site for all project equipment containing or using oil. These records must be kept on-site and available for inspection by Ecology;

c. Provide proper containment around each storage container (including transformers) or around a combination of storage containers as appropriate. Proper containment equals the volume of the largest container plus 10 percent;

d. Provide appropriate level markings for all oil gauges (including sight-glass gauges) to ensure Project Operators and maintenance personnel can easily identify an unusual condition;

e. Checks must be conducted during daily rounds of all fuel and lubrication hoses, oil drums, oil or fuel transfer valves and fittings, etc., for drips and leaks. Maintain and properly store them to prevent spills into state waters;

f. Inspect daily equipment containing oil and view oil-level gauges;

g. Provide full oil spill containment capacity plus 10 percent when working on oil containing equipment that might spill or drip oil.

6. Sumps

a. Visually inspect sumps weekly or immediately if an oil leak is suspected, such as in the event of an oil sump high level alarm or other visual indications that oil could reach the sump. Oil detected in the sumps may require cleanup. Reference item d) below.

b. Immediately repair oil leaks that are of sufficient volume to reach the sump and that cannot be contained by placing a container underneath the leak.

c. Provide water-proof lighting in the sump or spotlights adequate to observe oil sheens on the surface of the water in the sumps.

d. The Licensee will initiate cleaning of the sump to remove all oil and oil residue from walls, piping and other structures in contact with sump water as necessary based on the results of weekly inspections and the volume of effluent in the sump. Oil cleanup and removal of effluent will follow the procedure defined in the site SPCC.

7. Transformers

a. Within three years of the issuance of this Certification-Order, verify that transformer containment areas are impervious and fill cracks, caulk pipe penetrations or otherwise ensure that containment areas will contain spills.

b. Transformer containment areas must be inspected during routine plant rounds and immediately following large rain events.

c. Obtain prior approval from Ecology before breaching containment areas for reasons other than containment area maintenance.

d. Conform to industry standards, use Best Management Practices or utilize other control measures for protecting water quality and preventing and containing oil spills when conducting in-place maintenance work on transformers, transporting transformers and transferring transformer oil.

8. Stormwater Pollution Prevention and Containment Area Management

a. The Licensee must use Best Management Practices or other control measures to prevent any oil-contaminated stormwater on the Project site from entering state waters.

b. Stormwater in transformer and oil-filled operating equipment containment areas must be monitored for the presence of oil. If oil is present, the oil must be removed and properly disposed of prior to draining the containment area.

c. Discharge of non-contaminated stormwater from containment areas must be recorded. Records of all stormwater removed or discharged from containment areas must be kept on-site and available for inspection by Ecology.

d. Snowy or icy conditions require close and, at minimum, daily inspection of containment areas and containment drains. Remove any observed stormwater pooling in containment areas as per condition 8 (b)/(c).

9. Other

a. Maintain site security at the Projects to reduce chance of oil spills.

b. The Licensee must coordinate spill response planning and response efforts with other oil-handling facilities and spill response agencies on the Cowlitz River.

c. Compliance with these conditions does not relieve the Licensee from responsibility to maintain continuous compliance with terms and conditions of this Certification or resulting liability from further failure to comply.

6.0 ORDER

Any person who fails to comply with any provision of this Certification-Order No. 6499 shall be liable under the Clean Water Act for a penalty of up to $20,000 per day and under the state Water

Control Act, for a penalty of up to $10,000 per day per violation or such other amount as may be authorized under state law as exists now or may be amended during the term of the license.

You have a right to appeal this Order. To appeal this you must:

- File your appeal with the Pollution Control Hearings Board within thirty (30) days of the "date of receipt" of this document. Filing means actual receipt by the Board during regular office hours.

- Serve your appeal on Ecology within thirty (30) days of the "date of receipt" of this document. Service may be accomplished by any of the procedures identified in WAC 371-08-305(10). "Date of receipt" is defined at RCW 43.21B.001(2).

Be sure to do the following:

- Include a copy of this document that you are appealing with your Notice of Appeal.

- Serve and file your appeal in paper form; electronic copies are not accepted.

1. To file your appeal with the Pollution Control Hearings Board

Mail appeal to:		Deliver your appeal in person to:
The Pollution Control Hearings Board P.O. Box 40903 Olympia, Washington 98504-0903	**OR**	The Pollution Control Hearings Board 4224 – 6th Avenue Southeast Rowe Six, Bldg 2 Lacey, Washington 98503

2. To serve your appeal on the Department of Ecology

Mail appeal to:		Deliver your appeal in person to:
The Department of Ecology Appeals & Application for Relief Coordinator P.O. Box 47608 Olympia, Washington 98504-7608	**OR**	The Department of Ecology Appeals & Application for Relief Coordinator 300 Desmond Drive Southeast Lacey, Washington 98503

3. And send a copy of your appeal to:

Eric Schlorff
Southwest Regional Office
Water Quality Program
P.O. Box 47775
Olympia, Washington 98504-7775

For additional information visit the Environmental Hearings Office Website:
http://www.eho.wa.gov

To find laws and agency rules visit the Washington State Legislature Website:
http://www.leg.wa.gov/CodeReviser

Your appeal alone will not stay the effectiveness of this Order. Stay requests must be submitted in accordance with RCW 43.21B.320. These procedures are consistent with Chapter 43.21B RCW.

DATED this 24th day of July, 2009, at Lacey, Washington.

for

Garin Schrieve, P.E.
Water Quality Manager
Southwest Regional Office

REFERENCES

Lucas, R. and Chilcote, M., 1982. Life History and Possible Genetic Origins of Rainbow Trout from Packwood Lake, Washington. Washington Dept. of Game Pg. 3.

EES Consulting. 2008. Tailrace Temperature Monitoring and Enhancement Plan for Energy Northwest's Packwood Lake Hydroelectric Project (FERC No. 2244). Submitted to Energy Northwest. June, 2008 (See Appendix A)

EES Consulting. 2007/10. Lake Creek Instream Flow Study Report, for Energy Northwest's Packwood Lake Hydroelectric Project (FERC No. 2244). Submitted to Energy Northwest. October, 2007

EES Consulting. 2007/9. Final temperature model, Lake Creek, for Energy Northwest's Packwood Lake Hydroelectric Project (FERC No. 2244). Submitted to Energy Northwest. September, 2007

EES Consulting. 2007. Water Temperature Report, Final Report, for Energy Northwest's Packwood Lake Hydroelectric Project (FERC No. 2244). Submitted to Energy Northwest. September, 2007

APPENDIX A. WATER TEMPERATURE MONITORING AND ENHANCEMENT PLAN

The Appendix A – Water Temperature Monitoring Plan by EES is different in some parts from the language in this 401 Certification. These differences are noted in Section 4.5 of the Certification. Where there are differences between Appendix A and the Certification, the Licensee (EN) must follow the 401 Certification.

The differences include, but may not be limited to:

- The Licensee (EN) must monitor and determine if the water quality criterion is met within three years and achieve compliance within ten years of license issuance.
- The Licensee (EN) must monitor temperature at six water sites and one air site as noted in the Certification above.
- Table 1 in Appendix A is only relevant with these changes as noted in the Certification.

The following plan is attached solely for reference.

Tailrace Water Temperature Monitoring and Enhancement Plan

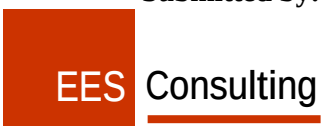
for

Energy Northwest's
Packwood Lake Hydroelectric Project
FERC No. 2244
Lewis County, Washington

Submitted to:

P.O. Box 968
Richland, Washington 99352-0968

Submitted by:



1155 North State Street, Suite 700
Bellingham, Washington 98225
360.734.5915 phone, 360.734.5918 fax

June 2008

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TAILRACE WATER TEMPERATURE MONITORING AND ENHANCEMENT PLAN

1.0 INTRODUCTION

Energy Northwest, Licensee of the Packwood Lake Hydroelectric Project, filed its Final Application for New License (FLA) with the Federal Energy Regulatory Commission (FERC) on February 24, 2008. FERC issued an Additional Information Request (AIR) on April 8, 2008. FERC requested that Energy Northwest provide clarification of Protection Mitigation and Enhancement (PM&E) measures and to submit several fully developed resource management plans, including a Tailrace Water Temperature Monitoring and Enhancement Plan. As stated in the AIR:

In Section E.5.2.3 of your FLA, as one of your proposed environmental measures for water resources, you propose to develop a monitoring plan to evaluate the effectiveness of project operations under the new license in meeting the applicable temperature standard at the confluence of the tailrace with the Cowlitz River side channel. You also indicate the possible need for additional measures other than the timing of the project outage, such as the establishment of a mixing zone in the Cowlitz River below the tailrace. While we understand the overall goal of this monitoring plan, the lack of descriptions of the possible additional measures, and while we support adaptive management, the lack of a clearly defined strategy in your FLA, makes it difficult for us to complete our environmental analysis of this proposal.

So that we may more accurately analyze the effects of your proposed measure on water temperature, please develop and file with the Commission a detailed tailrace water temperature monitoring and enhancement plan. The plan should include (1) a thorough description of the monitoring that you propose to implement to monitor your compliance with applicable state temperature standards; and (2) a listing of any environmental measures that you may be implementing in the tailrace area over the term of a new license including and an approximate cost estimate for each of the proposed or possible measures. If applicable, the plan also should include a description of the steps that would be taken if performance goals are not achieved.

This Tailrace Water Temperature Monitoring and Enhancement Plan is being submitted in response to the AIR.

1.1 Goals and Objectives

The purpose of the Tailrace Water Temperature Monitoring and Enhancement Plan is to monitor water temperatures in the Project's lined tailrace, at the Packwood Lake outlet and the mouth of Lake Creek, to determine the effects of the tailrace water on Cowlitz River water temperature. The monitoring to be implemented under this plan is intended to document the Project's compliance with water quality standards promulgated by the Washington Department of Ecology (Ecology). This monitoring, together with the proposed change in timing of the Project's annual maintenance outage, will be the main actions that Energy Northwest will take toward achieving and demonstrating compliance with current water quality standards.

1.2 Water Quality Standards

Ecology will issue a water quality certification, pursuant to Section 401 of the Clean Water Act (CWA), for the operation of the Project under a new FERC license. The certification will require compliance with the water quality standards set forth by Ecology under the CWA. This Tailrace Water Temperature Monitoring and Enhancement Plan describes the methods Energy Northwest will employ to comply with the state standards and its Project-specific water quality certification.

Compliance with the state water quality standards requires, in part, knowing the natural water quality condition for a water body. When the 7-day average of the maximum daily temperatures (7-DAD Max)[1] exceeds the water quality temperature criteria (16°C for Lake Creek), and that condition is due to natural conditions, then human actions, considered cumulatively, may not cause the 7-DADMax temperature to increase more than 0.3°C (WAC 173-201A-200(1)(c)(i)).

"AKART" is an acronym for "all known, available, and reasonable methods of prevention, control, and treatment." AKART shall represent the most current methodology that can be reasonably required for preventing, controlling, or abating the pollutants associated with a discharge. The concept of AKART applies to both point and nonpoint sources of pollution. The term "best management practices," typically applied to nonpoint source pollution controls is considered a subset of the AKART requirement. (WAC 173-201A).

Energy Northwest will use AKART in its efforts to achieve compliance with the water quality standards.

1.3 Background

Water from Packwood Lake enters the Cowlitz River by one of two routes: one is the natural route via Lake Creek, and the other is via the Packwood Lake Hydroelectric Project. Naturally warmed surface water is withdrawn from Packwood Lake at the Project intake and diverted through a water conveyance to the Packwood powerhouse, a portion of which is buried. There it passes over the turbine runner, enters a stilling basin, and is routed back to a side channel of the Cowlitz River, via a lined tailrace canal (Figures 1 and 2, below).

[1] **"7-DADMax"** or **"7-day average of the daily maximum temperatures"** is the arithmetic average of seven consecutive measures of daily maximum temperatures. The 7-DADMax for any individual day is calculated by averaging that day's daily maximum temperature with the daily maximum temperatures of the three days prior and the three days after that date. WAC 173-201A-020.

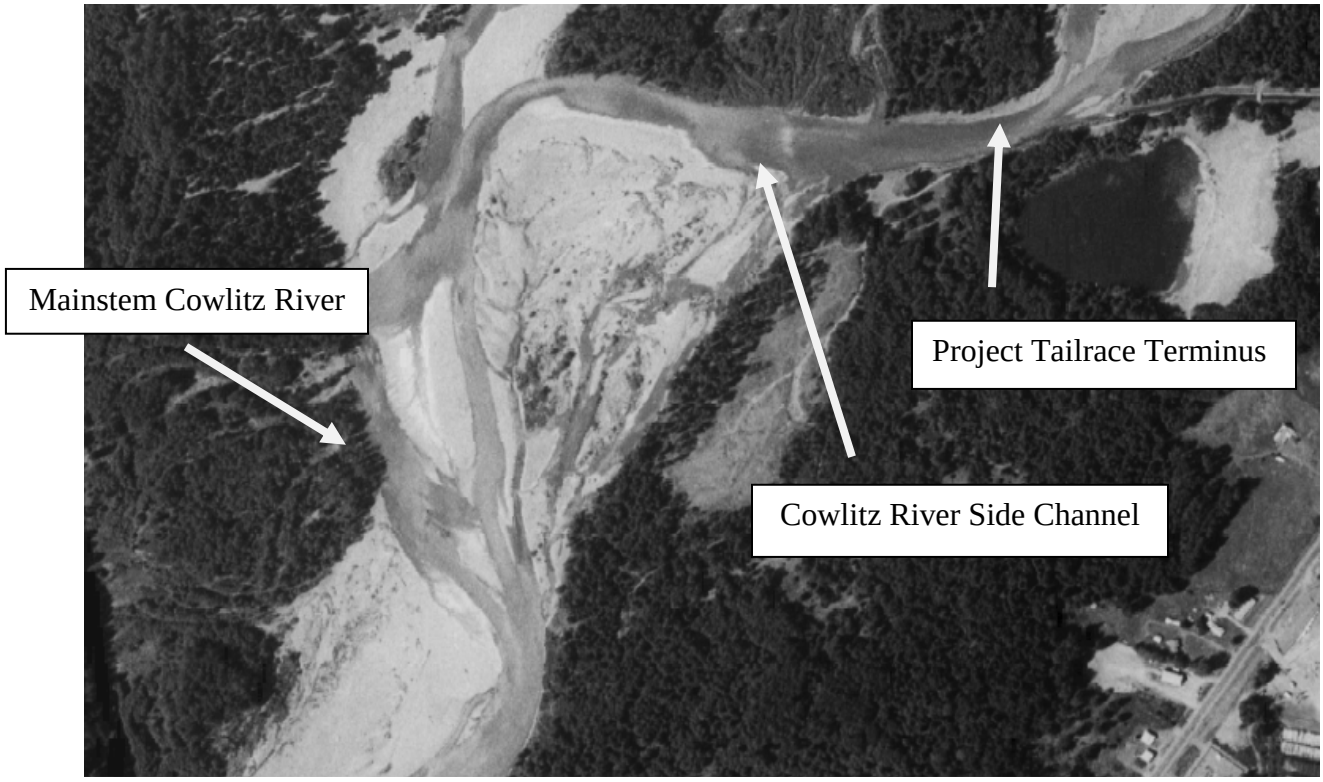

Figure 1. Aerial Photo of Tailrace Terminus and Cowlitz River

The Department of Ecology has established that waters in the tailrace are waters of the state and therefore must comply with the state water quality standards. Prior to construction and operation of the Packwood Lake Hydroelectric Project, the water that now enters the Cowlitz River through the Project tailrace entered the Cowlitz River via Lake Creek. (Figure 1-2).

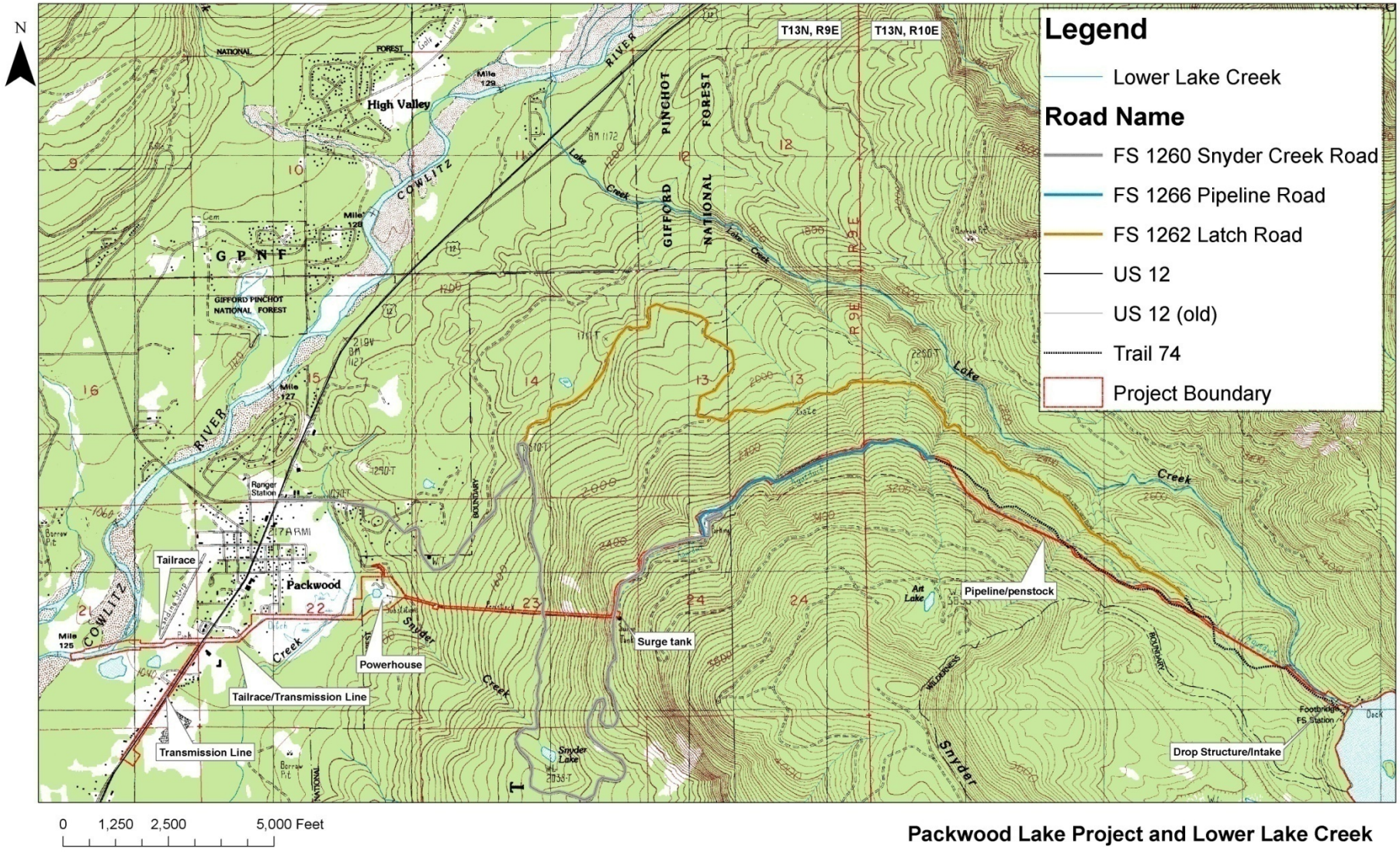

Figure 2. Packwood Lake Project and Lower Lake Creek

Energy Northwest modeled pre-Project water temperature conditions in Lake Creek and used the findings as the basis for establishing the temperature criteria to be applied to the tailrace discharge into the Cowlitz River.

Energy Northwest utilized the QUAL2Kw model to assess pre-Project water temperatures in Lake Creek. QUAL2Kw is a river and stream water quality model that represents a modernized version of the QUAL2E model (Brown and Barnwell 1987). QUAL2Kw is similar to QUAL2E in the following respects:

- One dimensional. The channel is well mixed vertically and laterally.
- Steady state hydraulics. Non-uniform, steady flow is simulated.
- Diel heat budget. The heat budget and temperature are simulated as a function of meteorology of a diel time scale.
- Diel water-quality kinetics. All water quality variables are simulated on a diel time scale.
- Heat and mass inputs. Point and non-point loads and abstractions are simulated.

Analysis using the QUAL2Kw model determined the pre-Project 7-DADMax water temperature in Lake Creek to be 19.09°C (EES Consulting, 2007). Given this modeled, "natural" temperature, and applying the criteria for temperature in the Washington water quality standards, the maximum allowable temperature for water delivered by the Project to the Cowlitz River via the tailrace is 19.39^{o}C. (WAC 173-201A)

Two years of water temperature monitoring and analysis were conducted in the Project tailrace (2004 and 2005). The highest seven-day period of water temperatures in the tailrace during both years of the monitoring occurred between August 15 and August 21, 2004. (EES Consulting, 2007). High temperatures ranged from .21.25°C (2004) and .20.83°C (2005). Using a 7-DADMax of 21.25°C, the maximum allowable temperature would be exceeded by 1.86°C.

Because the tailrace water is likely to exceed the temperature standard in August, Energy Northwest has agreed to undertake a schedule of compliance, to implement best management practices (non-construction facility operation changes), and to complete the necessary water quality studies (temperature monitoring) to verify the effectiveness of proposed changes in achieving compliance with the state water quality standards (Ten Year attainment plan, allowed under WAC 173-201A-510(5); see Appendix A).

2.0 ENVIRONMENTAL MEASURES

As part of a coordinated set of PM&E measures in the Final License Application for the Project, Energy Northwest plans to address Project effects on several environmental resources by implementing the following measures proposed in the final license application in the tailrace vicinity. (Energy Northwest, 2008):

- Modifying the timing of the annual Project maintenance outage for the new license term
- Eliminating the current lake drawdown that occurs prior to the annual outage.
- Conducting a fish rescue effort in the tailrace slough below the tailrace if the project flows are the primary source of water for the tailrace slough. (See Final License Application, Exhibit E, Section E.5.3.1.3.7).

Currently, Energy Northwest shuts down the Project for annual maintenance on October 1, and the Project is off line during most or all of the month. Under the new license, Energy Northwest

is proposing to shut down between August 15 and September 15. The new outage timing will coincide with the period when water temperatures are warmest at Packwood Lake. Because no water would be discharged to the Cowlitz River from the Project tailrace during the outage, there would be no elevation of temperature, or exceedence of temperature criteria caused by the Project during that time.

Changing the outage timing to this period, and eliminating the current pre-outage lake drawdown are expected not only to reduce the temperature impacts of the Project during the warmest time of the year, but also to provide benefits to any ESA-listed fish in the tailrace slough. Chinook spawning begins on about August 15 in the vicinity of the Project. By starting the outage on August 15th rather than the current October outage timing, the Project will avoid providing attraction water that would draw adult Chinook salmon into the tailrace slough to spawn. Because the lake will not be drawn down prior to the outage, there will be sufficient water stored for continuous flows when the Project comes back on line, thereby reducing the risk of dewatering any Chinook salmon eggs that may be present in the tailrace side channel.

It is important to note the Washington Department of Fish and Wildlife and the U.S. Fish and Wildlife Service have indicated that the outage timing will also be constrained by the spawn timing and out-migration of adfluvial rainbow trout in Packwood Lake, as well as the need to provide increased bypass flows to support spawning and rearing in the anadromous reach of lower Lake Creek.

As an additional measure, Energy Northwest will conduct a fish rescue effort in the tailrace slough from the terminus of the tailrace down to the confluence with the mainstem Cowlitz River when conditions warrant. The tailrace slough side channel of the Cowlitz River can experience frequent and dramatic changes. During some years, large volumes of river water flow through the tailrace slough and in other years the river provides very little flow. During low river flows the project tailrace provides the majority of water through the slough. Under these conditions the water flowing from the Project tailrace does not meet the river for several hundred feet or more downstream of the tailrace terminus.

This situation presents a challenge for monitoring temperature impacts to the mainstem of Cowlitz River. Energy Northwest will conduct monitoring and continue consultation with Ecology to determine how to best obtain data and document conditions and achieve compliance.

3.0 Tailrace Water Temperature Monitoring

It is anticipated that moving the outage will have a beneficial effect on water temperature in the Cowlitz River at the confluence with the Project tailrace, since no water at all will be released through the powerhouse during most of the hottest period of the year. Energy Northwest is proposing to monitor water temperature, as described below, after beginning the new outage schedule to determine if moving the outage brings the Project into compliance with the temperature standard.

To confirm the expected beneficial effect on water temperatures of the proposed change in the annual Project outage schedule, Energy Northwest will monitor water temperatures at seven sites in four areas: 1) in the tailrace, 2) Lake Creek, 3) Packwood Lake, and 4) the Cowlitz River. Monitoring will take place on an annual basis between June 25th and October 5th for the first ten years of the new license (or until modified by the Department of Ecology).

Data will be collected in 30-minute intervals using Onset tidbit$_{tm}$ thermisters. Data will be organized on a monthly basis and a comparative analysis will be conducted. An annual report will be submitted to Ecology for a 60-day comment period, and Ecology's comments will be addressed, prior to the report being filed with FERC. The annual report will document water temperatures in the tailrace, as well as differences in the mainstem Cowlitz River upstream and downstream of the tailrace contribution. The proposed placement of thermisters at the Cowlitz River sites is preliminary until landowner permission and permits have been received for access and placement of the probes.

The temperature loggers will be downloaded monthly. The seven sites will be established as follows:

1. POWT1 – Located near where the stilling basin empties into the tailrace.
2. POWT2 – Located in the immediate vicinity of the fish barrier near the terminus of the tailrace. This site will be established in an area that ensures that no mixing with Cowlitz River water is taking place.
3. CRUTR1 – A secure location upstream of the tailrace in the mainstem of the Cowlitz River. This site will monitor water temperatures in the Cowlitz River above the point where temperature can be affected by the tailrace.
4. CRUTR2 – Located upstream of the tailrace in the side channel of the Cowlitz River.
5. LCMH – Located in Lake Creek near the mouth.
6. PLO – Located in Packwood Lake near the outlet canal leading to the intake.
7. PAT – Located along the tailrace or side channel collecting ambient air temperature.

The five monitoring sites in the vicinity of the Project tailrace are shown in Figure 3 below

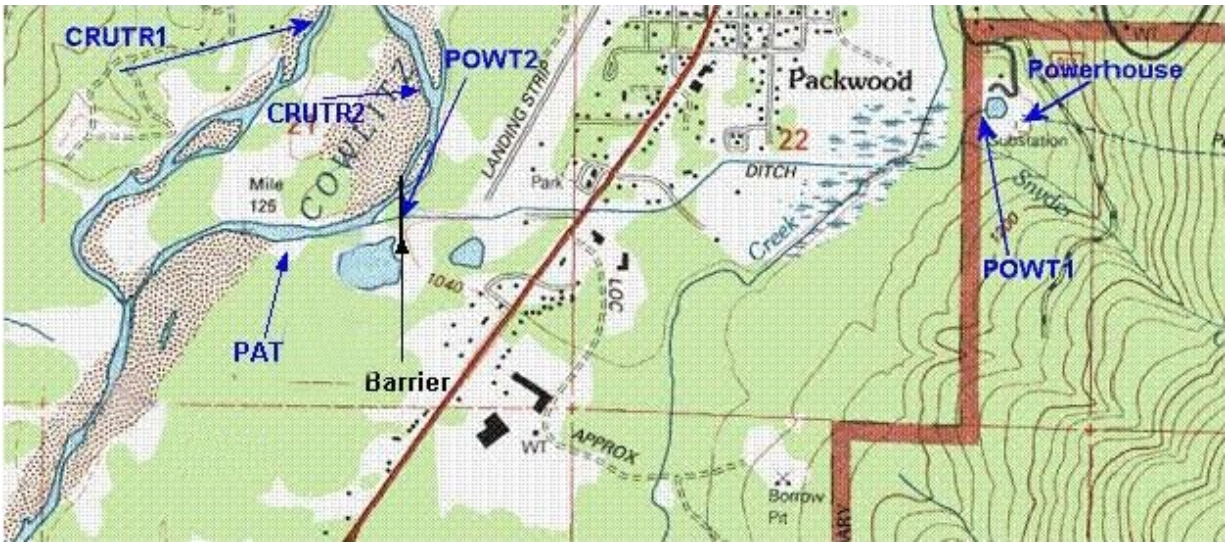

Figure 3. Thermister Locations for Monitoring Packwood Tailrace Water Temperatures

Energy Northwest must send Ecology a temperature monitoring Quality Assurance Project Plan (QAPP) for approval 60 days prior to the start of temperature monitoring.

Energy Northwest will use best management practices in conducting temperature monitoring. If monitoring shows that shifting the annual outage to August, as proposed, does not bring the Project fully into compliance with the temperature criteria, Energy Northwest will consult with

Ecology to determine whether alternative reasonable and feasible techniques exist that may be effective in achieving full compliance.

If Ecology determines that Energy Northwest has employed AKART and the temperature criteria still has not been met at the end of ten years of monitoring, Energy Northwest will consult with Ecology to determine the next appropriate steps to be taken, These may include the designating a mixing zone, determining whether the continued Project temperature excursions are economically and socially acceptable, doing temperature mitigation (such as shade tree plantings) upstream on the Cowlitz River, or ramping power usage, if all other reasonable, feasible measures have been tried or investigated.

4.0 Schedule and Deliverables

Both the modification to the outage timing and water temperature monitoring will begin with Energy Northwest's receipt of the new license from FERC. The outage timing modification will be permanent and continue for the duration of the new license. Water temperature monitoring will be conducted for the first ten years of the new license, unless the temperature criteria are met for three consecutive years, at which time Energy Northwest will petition DOE to suspend or modify the monitoring activities. As described above, an annual report will be submitted to Ecology and other agencies for a 60-day comment period, at the end of which, Energy Northwest will meet with Ecology to discuss the monitoring data and the need for continued monitoring. Ecology's comments will be incorporated and addressed prior to filing with FERC. Table 1 displays an annual schedule of tasks related to the Packwood Tailrace Water Temperature Monitoring Plan. Each year's data will be discussed with agency representatives at an annual resource coordination meeting intended to review all compliance work being conducted for Energy Northwest's new license. Table 2 summarizes estimated annual costs for the environmental measures described in Section 2.0.

Table 1. Packwood Tailrace Water Temperature Monitoring and Enhancement Plan Schedule

Task	Time Frame	Frequency
Submit to Ecology a temperature monitoring QAPP	60 days prior to the 1st monitoring period	Once, with updates as needed
Temperature Monitoring in the Tailrace	June 25 – October 5	Annually for the first 10 years of new license*
Packwood Project Outage	August 15 – September 15	Annually for the duration of the new license
Draft Tailrace Water Temperature Monitoring Report to Agencies for review	Annually, 60 days prior to the Resource Coordination Meeting	Annually for the first 10 years of new license*
Tailrace Water Temperature Monitoring Report to FERC	After receiving comments from WDOE and other Agencies.	Annually for the first 10 years of new license*
Resource Coordination Meeting	To be determined in consultation with Agencies	Annually for the duration of the new license

*if compliance not achieved for 3 consecutive years

Table 2. Estimated Costs of Proposed PME Measures for the Tailrace Slough

Environmental Measure	Estimated Annual Cost	Comments
Temperature Monitoring	$11,600	
Modifying Outage Timing	$16,268	Based on an increase of 3 hours of labor per week for weekly inspections and 40 hours per year for annual maintenance (196 manhours). (from Table D-2, Energy Northwest 2008)
Eliminating Drawdown Prior to Outage	$5,722	The cost for a shutdown in August is estimated at $5,772. (Based on a minimum shutdown duration of 12 hours X blended costs of $48.1/Megawatt hr X 5 MW/hr X 12 hrs; each occurrence) (from Table D-2, Energy Northwest 2008)
Fish Rescue	$12,980	2 continuous years of seining the stilling basin and tailrace fish rescue. If capture is below threshold set by the BO, seine 2 more times 3 years apart. Each occurrence requires a Fish capture permit and personnel with a fish handling experience Total is: 4 consultants trained in fish handling/snorkeling (80hrsX$95/hr=$7600) + Per Diem for 4 Consultants @$90 per day for two days=$720) + 2 Plant Staff $83/hr X 10hrs =$1660) + $3,000 annual permit costs 3. If the plant must be shut down to perform the stilling basin seining and tailrace fish rescue (from Table D-2, Energy Northwest 2008).

5.0 References Cited

Brown, L. C. and T. O. Barnwell, Jr., 1987. The enhanced water quality models QUAL2E and QUAL2E-UNCAS documentation and user manual. EPA document # EPA/600/3-87/007, Cooperative Agreement # 811883, Environmental Research Laboratory, U.S. Environmental Protection Agency, Athens, GA.

EES Consulting. 2007. Final temperature model, Lake Creek, for Energy Northwest's Packwood Lake Hydroelectric Project (FERC No. 2244). Submitted to Energy Northwest. September, 2007.

Energy Northwest, 2008. Final Application for New License, Packwood Lake Hydroelectric Project, FERC No. 2244, Energy Northwest, Richland, WA. February, 2008.

Appendix A (of the EN Temperature Monitoring Plan)

Washington Administrative Code Section 173-201A-510, Sections (4) and (5)

WAC 173-201A-510

Means of implementation.

(4) **General allowance for compliance schedules.**

(a) Permits, orders, and directives of the department for existing discharges may include a schedule for achieving compliance with water quality criteria contained in this chapter. Such schedules of compliance shall be developed to ensure final compliance with all water quality-based effluent limits in the shortest practicable time. Decisions regarding whether to issue schedules of compliance will be made on a case-by-case basis by the department. Schedules of compliance may not be issued for new discharges. Schedules of compliance may be issued to allow for: (i) Construction of necessary treatment capability; (ii) implementation of necessary best management practices; (iii) implementation of additional storm water best management practices for discharges determined not to meet water quality criteria following implementation of an initial set of best management practices; (iv) completion of necessary water quality studies; or (v) resolution of a pending water quality standards' issue through rule-making action.

(b) For the period of time during which compliance with water quality criteria is deferred, interim effluent limitations shall be formally established, based on the best professional judgment of the department. Interim effluent limitations may be numeric or nonnumeric (e.g., construction of necessary facilities by a specified date as contained in an ecology order or permit).

(c) Prior to establishing a schedule of compliance, the department shall require the discharger to evaluate the possibility of achieving water quality criteria via nonconstruction changes (e.g., facility operation, pollution prevention). Schedules of compliance may in no case exceed ten years, and shall generally not exceed the term of any permit.

(5) **Compliance schedules for dams:**

(a) All dams in the state of Washington must comply with the provisions of this chapter.

(b) For dams that cause or contribute to a violation of the water quality standards, the dam owner must develop a water quality attainment plan that provides a detailed strategy for achieving compliance. The plan must include:

(i) A compliance schedule that does not exceed ten years;

(ii) Identification of all reasonable and feasible improvements that could be used to meet standards, or if meeting the standards is not attainable, then to achieve the highest attainable level of improvement;

(iii) Any department-approved gas abatement plan as described in WAC 173-201A-200 (1)(f)(ii);

(iv) Analytical methods that will be used to evaluate all reasonable and feasible improvements;

(v) Water quality monitoring, which will be used by the department to track the progress in achieving compliance with the state water quality standards; and

(vi) Benchmarks and reporting sufficient for the department to track the applicant's progress toward implementing the plan within the designated time period.

(c) The plan must ensure compliance with all applicable water quality criteria, as well as any other requirements established by the department (such as through a total maximum daily load, or TMDL, analysis).

(d) If the department is acting on an application for a water quality certification, the approved water quality attainment plan may be used by the department in its determination that there is reasonable assurance that the dam will not cause or contribute to a violation of the water quality standards.

(e) When evaluating compliance with the plan, the department will allow the use of models and engineering estimates to approximate design success in meeting the standards.

(f) If reasonable progress toward implementing the plan is not occurring in accordance with the designated time frame, the department may declare the project in violation of the water quality standards and any associated water quality certification.

(g) If an applicable water quality standard is not met by the end of the time provided in the attainment plan, or after completion of all reasonable and feasible improvements, the owner must take the following steps:

(i) Evaluate any new reasonable and feasible technologies that have been developed (such as new operational or structural modifications) to achieve compliance with the standards, and develop a new compliance schedule to evaluate and incorporate the new technology;

(ii) After this evaluation, if no new reasonable and feasible improvements have been identified, then propose an alternative to achieve compliance with the standards, such as site specific criteria (WAC 173-201A-430), a use attainability analysis (WAC 173-201A-440), or a water quality offset (WAC 173-201A-450).

(h) New dams, and any modifications to existing facilities that do not comply with a gas abatement or other pollution control plan established to meet criteria for the water body, must comply with the water quality standards at the time of project completion.

(i) Structural changes made as a part of a department approved gas abatement plan to aid fish passage, described in WAC 173-201A-200 (1)(f)(ii), may result in system performance limitations in meeting water quality criteria for that parameter at other times of the year.

[Statutory Authority: Chapters 90.48 and 90.54 RCW. 03-14-129 (Order 02-14), amended and recodified as § 173-201A-510, filed 7/1/03, effective 8/1/03. Statutory Authority: Chapter 90.48 RCW and 40 CFR 131. 97-23-064 (Order 94-19), § 173-201A-160, filed 11/18/97, effective 12/19/97. Statutory Authority: Chapter 90.48 RCW. 92-24-037 (Order 92-29), § 173-201A-160, filed 11/25/92, effective 12/26/92.]