Merwin Hydroelectric Project
FERC Project No. 935

FINAL LICENSE APPLICATION

Exhibit H – Applicant's Qualifications to Operate the Project

PacifiCorp
Portland, Oregon

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H.1.0 INTRODUCTION

In compliance with the Code of Federal Regulations (18 CFR, Parts 4 and 16), PacifiCorp is applying to the Federal Energy Regulatory Commission (FERC) to relicense the Merwin Hydroelectric Project (FERC Project No. 935) on the North Fork Lewis River, in the State of Washington. The current license for the Merwin Project, which PacifiCorp currently owns and operates, was issued on October 6, 1983 and expires on May 1, 2006.

PacifiCorp is applying for a new license to continue operation of the project. This Exhibit H presents the response to information required by the FERC as described in 18 Code of Federal Regulations (CFR) Section 16.10(a) and (b).

Following this introduction, Section 2.0 describes the Applicant's ability to operate the project. Section 3.0 discusses the need for project power, and Section 4.0 provides data describing alternative power sources. Section 5.0 describes PacifiCorp's electricity consumption efficiency improvement program. Section 6.0 lists Indian tribes potentially affected by the project. Finally, Section 7.0 provides information on project operations.

H.2.0 APPLICANT'S QUALIFICATION TO OPERATE THE PROJECT

H.2.1 COMPANY

PacifiCorp owns and operates 51 hydroelectric plants and serves as operator for 2 additional projects. These facilities are located throughout several states including Oregon, Washington, California, Idaho, Utah, and Montana. The projects contain a total of 91 turbine generator units, representing an installed capacity of approximately 1,100 megawatts (MW), or about 12.8 percent of PacifiCorp's current total generating capacity.

Approximately 190 full-time employees are required to operate, maintain, and provide support for these hydroelectric generation facilities. This group, which is called the Hydro Resources Department, includes 105 operations and maintenance personnel located at various project sites, as well as 54 management, engineering and administrative support staff located in Portland, Oregon, Salt Lake City, Utah and various field locations.

All Hydro Resources Department personnel attend periodic safety and training programs. Staff located in the Portland office attend monthly safety meetings. In addition, staff refresh their skills by attending additional training courses provided by the Company. Staff located at the Lewis River projects attend monthly safety and training meetings.

H.2.2 PROJECT OVERVIEW

The Merwin Hydroelectric Project is one of 3 PacifiCorp hydroelectric projects located on the North Fork of the Lewis River, approximately 10 miles east of Woodland, Washington and 35 miles northeast of Portland, Oregon. The site is about 20 miles upstream of the confluence of the North Fork Lewis River with the Columbia River.

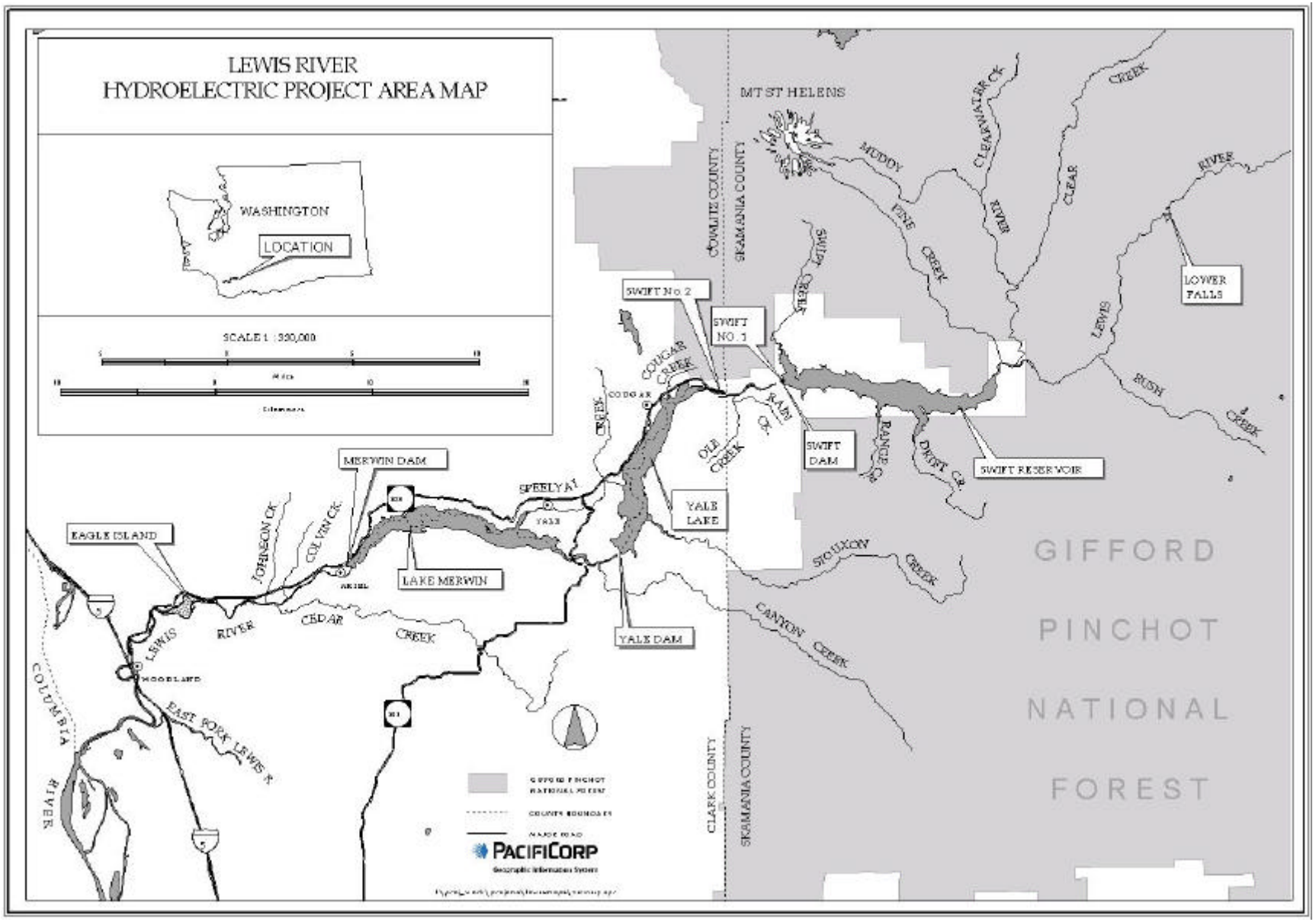

Figure H.2.2-1. Lewis River Hydroelectric Projects Area Map

Located at RM 19.5, the Merwin Project is the first in a string of 4 hydroelectric facilities on the Lewis River. The other three projects are Yale (FERC Project No. 2071), Swift No. 1 (FERC Project No. 2111), and Swift No. 2 (FERC Project No. 2213), all upstream of Merwin. The Yale Hydroelectric Project is located at RM 34 whereas Swift Hydroelectric Projects No. 1 and No. 2 are located upstream at RM 47 and RM 44, respectively. Merwin, Yale and Swift No. 1 are owned and operated by PacifiCorp. Swift No. 2 is owned by the Cowlitz County Public Utility District No. 1 (Cowlitz PUD) and maintained and operated by PacifiCorp under contract. The Merwin Project location within the North Fork Lewis River drainage basin is shown on Figure H.2.2-1.

PacifiCorp is the major private landowner with about 5600 acres in the Merwin Project vicinity. Other adjacent lands in public ownership are managed by the Bureau of Land Management (BLM) and the State of Washington. PacifiCorp pays approximately $7,000 annually in land use fees for the Merwin Project to the FERC.

Merwin operates as a re-regulating facility to meet minimum streamflow and ramping requirements downstream of the project. The Merwin powerhouse discharges directly into the Lewis River. Article 49 of the Merwin license stipulates powerhouse discharge requirements. For a more in-depth description of Merwin operations, see Section 6 of this exhibit H.

PacifiCorp is continually examining ways to improve plant operations and increase generation at its power plants. In 1996, a Generation Capability Assessment study was commissioned to assess the current condition and investigate the potential for upgrades to the Merwin, Yale and Swift No.1 generation facilities (Appendix F). The focus of this study was to identify areas with the greatest potential for improvements to efficiently use the available water resource and improve the project's capability. The study evaluated the current operational regime, water delivery system, hydraulic turbines, generators, generator buses, and transformers. Results of the study identified various upgrades to civil, mechanical, and electrical systems that have the potential to improve the project's operation.

The results of the study have been evaluated by PacifiCorp and are being used as a basis for the development of conceptual plans involving upgrades to the existing turbine generator units and associated equipment. These plans are focused to better meet the Company's future needs for energy, and to respond to changes in a variety of operational factors that include environmental, recreation and safety aspects in a cost-effective, balanced manner. Consequently, the Company is considering several plans for upgrades to the Lewis River Projects. Potential Merwin improvements involve the installation of more modern hydraulic turbine runners in the existing Merwin turbine generators to increase unit efficiency while better enabling the Merwin project to respond to operational constraints associated with minimum flow releases to the Lewis River below the project. It is possible that some of these improvements could happen within the first 5 years of new license issuance and involve a non-capacity license amendment.

PacifiCorp will continue to evaluate the opportunity for further project upgrades and/or modifications as future market and operational conditions/requirements change, with the

purpose of ensuring the most cost-effective, efficient and environmentally balanced use of the water resources available.

Continued operation of the Merwin Project, as proposed in this License Application, is the best plan for developing the waterway as stated in Section 10(a)(1) of the Federal Power Act. The application represents a cost-effective, efficient, and environmentally balanced use of the water resources of the Lewis River

H.2.3 FINANCIAL RESOURCES

PacifiCorp is a utility with broad experience in the construction, operation, and maintenance of hydroelectric projects. It's sources of financing and annual revenues are adequate to meet the continuing operation and maintenance needs of the project. The consolidated balance sheet from PacifiCorp's 2002 Annual Report is available in FERC Form No. 1: Annual Report of Major Electric Utilities, Licensees and Others, filed with the Federal Energy Regulatory Commission on April 30, 2003.

H.3.0 NEED FOR PROJECT ELECTRIC GENERATION

H.3.1 PACIFICORP'S INTEGRATED RESOURCE PLANNING PROCESS

On a periodic basis, PacifiCorp completes a comprehensive analysis of future load growth, the ability of existing resources to meet customers' electric energy service needs, and the need for new resources, including customer energy efficiency programs. This process, referred to as the Integrated Resource Plan (IRP), provides a framework for prudent future actions required to ensure that PacifiCorp can continue to provide reliable and least-cost electric service to its customers. Recently, more than 30 IRP stakeholders, representing regulatory commissions, environmental agencies, consumer interests, and others, contributed significant and valuable input to a plan that analyzed load growth, potential resource options, and costs and risks associated with meeting future resource needs. The 2003 IRP was submitted to state regulatory agencies in January 2003, requesting that they acknowledge and support its conclusions, including the proposed action plan. The states with regulatory requirement to file an IRP (Oregon, Washington, Idaho, and Utah) acknowledged the plan in 2003.

Through its short-term and long-term time planning, PacifiCorp strives to:

- Deliver the most economic solution in meeting its load service obligations;
- Reduce commodity risk;
- Serve load with a diverse portfolio that includes both owned assets and purchases; and
- Reduce cost and risk with hedges and load management programs.

As such, the IRP serves as an integral component of the ongoing business and strategic planning of PacifiCorp.

Changes in the structure and regulation of the electricity industry require changes in the approach PacifiCorp takes to integrated resource planning. Given the potential for commodity markets (natural gas and electricity) to exhibit rapid price swings (volatility), alternative resource plans must be evaluated in terms of their exposure to price volatility, in addition to their long-run impact to overall net power cost. Furthermore, unpredictability in the future costs of new supply alternatives arising from gas price and emissions, must be recognized. Finally, the rapidly evolving structure of markets and their attendant risks demand a more timely and responsive process for keeping resource plans current.

The 2003 IRP plan represents PacifiCorp's efforts to adapt its resource planning to these new requirements. The IRP found that a significant amount of additional resources will be needed to meet the expected future needs of customers in PacifiCorp's six-state service area. A projected load growth rate of 2.2 percent per year on the company's East system (Utah, Wyoming, and Idaho) and 2 percent per year on its West system (Oregon, Washington, and California) indicates a need for about 4,000 additional MW of capacity between 2004 and 2014. This growth includes additional needs of current customers, requirements for new customers, and potential increased requirements for supply reserves. The total needs would increase the company's resource portfolio by about 40 percent of current levels, including long-term purchases, by 2014. In addition, the IRP considers expected lost capacity resulting from aging plants, reduced output, and expiring supply contracts. PacifiCorp's resource needs are focused on meeting its obligation to meet the growing requirements of its retail customers.

PacifiCorp's integrated resource-planning methodology uses a robust analytical framework to simulate the integration of new resource alternatives with PacifiCorp's existing resource and transmission rights. This methodology provides an examination of both the expected future costs and the risks of future outcomes. It also allows an examination of the risks inherent in resource planning choices and allowed the choice of the least cost portfolio. This is in contrast to PacifiCorp's previous IRPs, in which a point-estimate optimization method was used to develop plans tuned to a few specific, future cases. The IRP also emphasizes portfolios of resources, since a diverse portfolio is a well-known means of managing risks. The starting point for the analysis is the determination of the gap between growing loads and existing resources, as discussed above. From this starting point, the analysis involves a number of distinct steps:

1. **Portfolio Development**: The first step is the formulation of resource portfolios. Formulating the portfolios requires specifying the types and timing of resource additions such that anticipated loads are reliably served. Portfolios were chosen to span a complete range of likely resource strategies.

2. **Operational Simulation**: Next, the operation of each portfolio is simulated. The simulation develops a base or reference view of the future. In so doing, this step requires calculating the operating costs of the integrated system (both the portfolio additions and the existing resource system) and other performance characteristics under a representative set of assumptions about the future.

3. **Cost Analysis**: Each portfolio's system operating costs are combined with the corresponding capital costs, yielding the Present Value of the Revenue Requirement (PVRR), the main cost metric.

4. **Screening**: Performance measures (PVRR and others) are used to screen the portfolios. Focusing only on portfolios that survive this winnowing allows risk analysis to be performed on the most promising portfolios.

5. **Risk Analysis & Stress Testing**: The risk analysis simulates the performance of a portfolio under a large number of possible futures. The risk analysis also allows conclusions to be drawn regarding each portfolio's sensitivities to assumptions about the future and assessments to be made regarding the variability in a portfolio's cost.

6. **Portfolio Refinement**: Based on these results, iterative improvements to the best performing portfolios are made, defining hybrid portfolios that are tested against each other to identify the least cost, risk-adjusted portfolio.

Modeling was performed on a system basis. Although the transfers between the East and West systems were measured and reported, state-specific impacts were not assessed because PacifiCorp operates its system on an integrated basis.

The IRP includes an action plan that focuses on the next 10 years. Components of the action plan are as follows:

- Detailed plan, including specific findings of need and implementation actions;
- Decision processes for implementing the action plan;
- Procurement Program for implementing the action plan;
- Update on PacifiCorp's current procurement and hedging strategy;
- Description of how PacifiCorp resource planning and business planning are aligned; and
- Discussion on the action plan's consistency with Oregon's restructuring legislation (SB-1149).

This Action Plan is further summarized below.

H.3.1.1 Action Plan

The action plan aims to ensure that PacifiCorp will continue meeting its obligation to serve customers at a low cost with manageable and reasonable risk. At the same time, the Plan remains adaptable to changing course, as uncertainties evolve or are resolved, or if a paradigm shift occurs. An element of the action plan is to preserve PacifiCorp's optionality and flexibility in the future.

The action plan is based on the best information available at the time the IRP is filed. It will be implemented as described, but is subject to change as new information becomes available or as circumstances change. It is PacifiCorp's intention to revisit and refresh the action plan no less frequently than annually. Any refreshed action plan will be

submitted to the State Commissions for their information. The action plan will also be revised as a consequence of subsequent IRPs.

PacifiCorp's action plan applies a diversified resource approach addressing both demand-side and supply-side (new resources) management. The Resources in the Diversified Portfolio I include:

- Up to 450 average MW of demand-side management (DSM) programs;
- 1,400 MW of renewable resources;
- 2,100 MW of resources that may operate continuously
- 1,200 MW of flexible resources that can be available to help achieve load/resource balance during periods of high demand;
- 700 MW of shaped resources – contracts or resources that fill specific needs

PacifiCorp's DSM programs are described in Section 5.0 below. The remaining parts of the Diversified Portfolio I are described in Sections H3.1.2 through H3.1.5.

H.3.1.2 Renewable Resources

The beginning portfolios that were developed in the IRP contained wind resource additions in line with the proposed Federal Renewable Portfolio Standard (RPS). These additions were modeled as electricity purchase flat contracts for 1,146 MW of wind generation planned from 2003 through 2013 and charged at $50/MWh. In the final portfolios, the $50/MWh flat contract was replaced with profiled wind, which is wind whose profile follows an anticipated, more realistic production shape. Under profiled wind, energy deliveries are anticipated to differ in each hour of the day. This profiled wind has been included based on its economic merits. Solar and geothermal opportunities will also be examined on a case-by-case basis for economic merit and inclusion in PacifiCorp's overall resource portfolio.

H.3.1.3 Flexible Resources

Diversified Portfolio I anticipated a requirement for up to 1,200 MW of flexible resources to be added over the plan period 2006 to 2013. However, the IRP recognizes that the equipment market and economics at the time decisions are made will dictate the actual technology used. Flexible resources are a necessary component of every portfolio and serve two purposes. One purpose is to meet the load shape requirements for both the east and west sides of PacifiCorp's system. The second, as anticipated by the IRP, is to meet the capacity requirements of a 15 percent planning margin.

Uncertainty remains regarding the planning margin requirements outlined in FERC's proposed Standard Market Design (SMD). PacifiCorp has designed the action plan based on a 15 percent planning margin. Further study of an appropriate planning margin for PacifiCorp will continue, and is an element of the action plan. These resources may consist of power purchase agreements, facility leases, self-build alternatives, or a combination thereof.

H.3.1.4 Additional Long-Term Resources

In line with the load growth, plant retirement and contract expiration, an estimated 2,100 MW of additional long-term resources are expected to be required. Three new resources are expected for the East and one for the West.

These resources may consist of power purchase agreements, facility leases, self-build alternatives, or a combination thereof.

H.3.1.5 Shaped Products and Power Purchase Agreements

Diversified Portfolio I also anticipates the requirement of approximately 700 MW of customized power purchase agreements throughout the plan period 2004 to 2013. These contracts were anticipated by the IRP to fill an immediate short term need in the system.

H.3.2 DEMAND-SIDE MANAGEMENT

PacifiCorp has long been an innovator in energy efficiency programs. In the late 1970s, the company's zero interest weatherization program helped residential customers overcome the financing hurdle for efficiency improvements. The Hood River Conservation Project, in which PacifiCorp and other suppliers weatherized homes in an entire community, provided a national model for what concerted utility efforts can achieve. The company-sponsored Energy Edge to demonstrate the energy savings possible for new commercial buildings. Similarly, the Super Good Cents program promotes energy-efficient residential construction and the development of new building codes for efficiency. The Energy FinAnswer program offers financing and other incentives to commercial and industrial customers for load reduction projects.

PacifiCorp views economic DSM programs as an effective means helping to meet its load service obligations. PacifiCorp's DSM programs will continue to be an integral component of the IRP planning process. New and existing programs will be modeled along with supply-side options to determine the optimal resource portfolio. PacifiCorp's existing programs for 2003 are listed in Table H3.2-1.

Table H.3.2-1. DSM Programs Operating During 2003.

DSM Program Name	Description	Availability
Energy FinAnswer (Schedule 125, enhanced with incentives)	Engineering & incentive package for improved energy efficiency in new construction and retrofit projects. Commercial, industrial, and irrigation.	OR, WA, UT
Lighting Retrofit Incentive (Schedule 116)	Incentives for energy-efficient lighting retrofit projects in commercial and industrial facilities greater than 20,000 sq. ft.	OR, WA, UT
Small Retrofit Incentive (Schedule 115)	Incentives for energy-efficient retrofit projects in commercial and industrial facilities less than 20,000 sq. ft.	OR, WA, UT
Energy FinAnswer (schedules vary by state)	Engineering & financing package for improved energy efficiency in new construction and retrofit projects. Commercial, industrial and irrigation.	WY, ID, CA
Appliance Recycling Program	An incentive program designed to remove inefficient refrigerators from the market.	ID*, UT*, WA*

DSM Program Name	Description	Availability
Compact Fluorescent Light Bulb Program	Two free CFLs are offered to residential customers through direct mail offer. Provides immediate savings benefits and encourages CFL use.	ID*, WY*
Enhanced Audit and Weatherization Program	Residential in-home audit with customer choice of low interest loan or 25% rebate to assist in funding cost effective recommended measures. Instant savings measures were added to legislatively mandated audit in mid-2000 in order to "enhance" the offer.	OR
Utah Residential and Small Commercial A/C Load Control Program	Turn-key load control network financed, built, operated and owned by a third party vendor through a pay-for-performance contract.	UT*
Low-Income Weatherization Program	The Company partners with community action agencies to provide no cost residential weatherization services to income-qualifying households.	CA, ID, WA
Do-It-Yourself Home Audit	A residential fuel-blind do-it-yourself home energy audit. Customers fill out the form and send it in, company generates a report of cost-effective recommendations and mails to customer.	CA, ID, OR, UT, WA, WY
Do-It-Yourself Web based audit	Residential and small commercial web-based energy audit. Fill in the audit information and program provides an energy analysis of your home or business. Fuel-blind audit.	Pilot in WA and possibly UT.
BPA Conservation and Renewable Discount Program	Credits received against PacifiCorp's BPA electricity purchases for incremental energy efficiency and renewable investments. Strategy will be created on how best to leverage these dollars to benefit the company and the communities served.	OR*, WA*, ID*
Energy Efficiency Education – Bright Ideas Booklet	Published booklet featuring residential energy use and efficiency information that is mailed to customers upon request. Available in English and Spanish.	CA, ID, OR, UT, WA, WY
Low Income Energy Education Services	Provides qualifying customers energy education and do-it-yourself instruction on how to reduce energy costs. Minimal direct installation assistance to qualifying senior citizens.	OR – Portland Area only
Efficient Air Conditioning Program	Provides customer incentives for improving the efficiency of air conditioning equipment and/or maintaining or converting air conditioning equipment to evaporative cooling technologies.	UT*, WA*
Energy Education to Schools	Provides classroom instruction to grade school and intermediate students on energy education.	WA (Lower Yakima Valley schools)
Low Income Conservation	Energy education and conservation measure installation services to a minimum of 550 households annually over a 3-year period (beginning FY 2001). Estimated savings per home 1,636 KwH.	UT
Northwest Energy Efficiency Alliance (NEEA)	A series of conservation programs sponsored by utilities in the region designed to support market transformation of energy efficient products and services in OR, WA, ID. Programs include manufacturer rebates on compact fluorescent bulbs to building operator training courses.	OR, WA, ID

DSM Program Name	Description	Availability
Commercial Retro Commissioning	Pilot program designed to work with customers to re-commission the operation of their commercial buildings consistent with the building was designed to operate.	UT
* Programs under evaluation.		

The Company intends to continue to use DSM as a valuable and cost-effective load management tool.

H.3.3 ENERGY AND COST IMPLICATIONS OF LICENSE DENIAL

PacifiCorp's current plan for meeting control are reliability requirements and retail customer demand includes the generation associated with the future FERC license of the Merwin Hydroelectric Project. Should this flexible resource be unavailable, its replacement would be required for both reliability and load service obligation purposes. The replacement cost of power lost from the project can be represented generally using PacifiCorp's current 34-year power cost projections. The annual levelized value of power over the next 34 years under current license operation, using a discount rate of 7.5 percent, is estimated to be between $44 and $66.

Given the numerous influential variables, it is challenging to quantitatively evaluate the consequences of license denial. Two broad consequences are discussed below: the impact of license denial on PacifiCorp customers, and the impact of license denial on the local environment of the Merwin Hydroelectric Project site.

Power generated on the Lewis River is part of PacifiCorp's overall portfolio. Without the local generation, PacifiCorp would be required to acquire replacement power and integrate the new resource into PacifiCorp's system. Integration costs for a new resource would depend upon its location and connection to the electric grid. It would be highly unlikely that a new resource could be integrated without incurring transmission wheeling costs, which could be significant if interconnection is across congested paths. Other benefits that would be lost are those resulting from the flexible nature of the resource.

More so than any other production facility in its portfolio, PacifiCorp, as the Lewis River operator, relies heavily on utilizing the project's generation flexibility in meeting its reliability obligations as the operator of two electrical control areas. The flexibility afforded by the projects on the Lewis River, when operated in a coordinated, safe, and environmentally prudent fashion, help enable PacifiCorp to: 1) meet moment-to-moment changes in load demand within two control areas of the North American Electric Reliability Council (NERC); 2) provide operating reserve capacity to maintain electric grid voltage and frequency in the event of the loss of generation or critical transmission elsewhere on the grid; 3) managing inadvertent interchange with other electrical control areas; 4) minimizing the exposure of its ratepayers to financial impacts of power price volatility; 5) maximizing its ability to dispatch fossil fuel plant units at maximum economy to its ratepayers and to minimize fossil fuel consumption by running thermal units at maximum efficiency unit loadings; and 6) firming up and making useful the generation from intermittent resources such as wind turbines.

Additionally, in the event of license denial, PacifiCorp would be required to undertake transmission and distribution system reinforcement projects in the local area to compensate for the lost power supply and voltage control provided by the project. Figures 3.3-1 and 3.3-2 shows the transmission system serving the area supported by the project.

Public use of project lands has resulted in potential resource conflicts and impacts on cultural, biological and other resources. PacifiCorp's license application will include a number of proposals to improve current conditions and provide a balanced use of resources in the project area. If PacifiCorp's license application is denied, or if operations are continued under current conditions (annual) license, none of these measures will be implemented, resulting in potential resource degradation.

License denial could also result in competition for the license. Competition would delay licensing, thereby forestalling the proposed project improvements and enhancement measures. Finally, denial of the license application could lead to decommissioning of the project. While this scenario is unlikely, such an action would have significant cost implications to PacifiCorp customers and investors.

Figure H.3.3-1. Transmission Network Diagram Sheet 1

Figure H.3.3-2. Transmission Network Diagram Sheet 2

The Federal Energy Regulatory Commission Order No. 630, issued on February 21, 2003, provides guidelines on material that can be classified as Critical Energy Infrastructure Information (CEII) and should be filed with the Commission as confidential information pursuant to 18 CFR 388.112. Due to their potentially sensitive nature, transmission network diagrams (Figure H3.2-1 and H3.2-2) are not provided in this copy of the License Application.

H.4.0 ALTERNATIVE POWER SOURCES

H.4.1 CAPACITY AND ENERGY REQUIREMENTS

PacifiCorp currently provides electricity and related energy services to 1.5 million customers in 6 western states: California, Idaho, Oregon, Utah, Washington, and Wyoming. About 4 percent of PacifiCorp's retail sales are to industrial customers, about 11 percent are to commercial customers and about 85 percent are to residential.

In calendar year 2002, PacifiCorp's retail system energy requirements were 5,867 average megawatts (MWa). The winter and summer peak loads were 7,585 MW and 8,511 MW, respectively. PacifiCorp has more than 8,300 MW of generation capacity. About 68 percent of PacifiCorp's capacity comes from company-owned thermal and hydroelectric plants, and 32 percent from power purchases. PacifiCorp generally uses its hydroelectric resources to respond to hourly, daily, weekly, and seasonal load fluctuations.

PacifiCorp's annual calendar energy requirements in the year 2011 are forecast to range between 7,081 MWa and 12,148 MWa (Table H.4.1-1). The winter and summer coincidental peak load forecast for year 2011 range from 9,071 and 9,177 MW, respectively, in the low case to 11,170 and 11,308 MW in the high case. The average annual growth rate percent was determined by the formula (Last year/First Year)^(1/number of years between the first and last year).

Table H.4.1-1. Total forecasted energy and peak load requirements for the PacifiCorp system.

	Energy		**Winter Peaks**		**Summer Peaks**	
	Avg. Annual Growth Rate %	**Total MWa at 2011**	**Avg. Annual Growth Rate %**	**Total MW at 2011**	**Avg. Annual Growth Rate %**	**Total MW at 2011**
Low	0.7	7,081	0.1	9,071	0.5	9,177
Medium	2.1	7,594	0.8	9,727	1.3	9,875
High	3.3	12,148	2.2	11,170	2.7	11,308

Operation reserve requirements use the Western Electricity Coordinating Council Coordinating Council (WECC) and the Minimum Operating Reliability Criteria (MORC) guidelines. Operating reserves ensure day-to-day reliability. The guidelines identify spinning and non-spinning reserves. The WECC requires its members to maintain the following operating reserve: sufficient spinning reserve to provide regulating margin, plus an additional amount of operating reserve equal to the sum of 5 percent of committed hydroelectric generation and 7 percent of committed thermal generation (at least half of which must be spinning reserve).

H.4.2 COST OF ALTERNATIVE SOURCES OF POWER

As a part of the IRP analysis, a variety of alternative supply-side and demand-efficiency resource acquisitions were evaluated. For comparative purposes, capital costs of alternate supply-side resources are presented in Table H4.2-1. The replacement costs are specific to the Project and based on a future Project total generating capacity of 136 MW. The annual cost is based on an average annual Project generation of 511,534 MWh. This value is the total Project long-term (30-year) average generation, not including generation from Swift No. 2. Costs are developed annually by the PacifiCorp Hydro Resources Department.

Table H.4.2-1. Capital Cost of Alternate Supply-Side Resources

Source	$/kW	Project Replacement Cost$ ($ Millions)[1]	Estimated Annual O&M Cost for Replaced Project Power ($ Million)[2]
Natural Gas	697	95	20
Cogeneration	917	125	23
Wind	1,067	141	20
Coal	1,754	238	16
[1] Cost estimates derived from January 2003 IRP Appendix C Table c.18.			
2 Cost estimate includes the Project replacement costs			

H.4.2.1 Natural Gas-fired Resources

The most efficient available technology for utilizing natural gas is a combined-cycle combustion turbine (CCCT). CCCT technology is mature and commercially available. Construction lead times are about 2 years with another 1 year needed for the necessary permits. Environmental impact is low, with the greatest problem being nitrogen oxide (NOx) emissions, but control technologies are available.

The advantages of a CCCT is the relatively low capital cost. When comparing to a non-natural gas fueled resource, such as a coal plant, the disadvantage of a CCCT is its higher fuel cost (the cost of fuel required for a CCCT to produce a kilowatt-hour (kWh) of electricity is greater than that of a coal plant). While natural gas-based resources, depending on their location, can have uncertainty over the future cost and supply of natural gas, other resources are more sensitive to uncertainty around other costs (emissions and system integration). The estimated capital cost for a CCCT unit in Oregon is $697/kW. To meet the Project production using natural gas-fired resources would cost an estimated $95 million in capital to build a plant. Annual operations, including the cost of capital, would be an estimated $20 million per year.

H.4.2.2 Cogeneration

Cogeneration facilities require extraction steam from a factory or industrial plant. The technology is mature and commercially available. Siting a cogeneration plant should be relatively straightforward. The difficulty with this technology is partnering with the

industrial user. The estimated capital cost for siting a cogeneration facility in Oregon, Washington or California is $917/kW. To meet the Project production using cogeneration facilities would cost $125 million in capital to build a plant. Annual operations, including the cost of capital, would be an estimated $23 million per year.

H.4.2.3 Wind

Wind turbine technology has changed significantly over the past decade and is now entering a third generation of development and testing. Units in the 50 to 500 kW range are a proven technology. Advantages of wind-based resources include project scalability, often a minimum environmental impact, no fuel cost, and a comparatively short lead-time for construction.

Disadvantages of wind power include a low capacity factor, intermittent energy source (i.e., energy gets produced only when the wind is blowing).

Wind can also be a difficult resource to schedule than hydroelectric plants in that it requires the accurate prediction of where and when the wind will blow. Thus, resources can be an important component to a diversified portfolio but should not be viewed as a viable replacement alternative for a flexible resource such as those located along the Lewis River. Indeed, PacifiCorp's IRP anticipates the significant addition of renewable resources such as wind over the planning horizon. However, this IRP conclusion was reached based on an underlying assumption that PacifiCorp would have continued access to flexible hydro resources in order to assist in the reliable integration of intermittent renewable resources such as wind.

Capital cost for wind resource development is estimated at $1,067/kW for the Oregon, Washington, and California region. To meet the Project production using wind facilities would cost an estimated $141 million in capital to build a plant. Annual operations including the cost of capital would be an estimated $20 million per year.

H.4.2.4 Coal

There are large coal reserves in western North America. While coal-fired generation has higher capital cost and longer lead time for construction, coal fuel operating costs can be much lower than the operating cost of a natural gas generator. This is especially true if the coal plant can be built near the coal reserve, thus avoiding the need to transport the coal great distances. Further, coal costs are historically less volatile than natural gas costs. Because coal reserves are not located close to large metropolitan areas (i.e., where the large blocks of retail load are located), it becomes necessary to carefully assess the capability of the transmission grid to move the electricity from a new coal-fired generating plant to the load it will be serving.

Integrated Gasification Combined Cycle (IGCC) is a coal technology that uses a coal gasification process to produce gas that can then be used to fuel a combined-cycle gas turbine. This technology can achieve slightly lower pollutant emission levels and higher efficiencies than a conventional coal-fired plant. However, IGCC is only now beginning to reach full commercialization. There are a half a dozen or so commercial plants in the

world to date, and most of these are fueled by petroleum residuals. Work is being done to improve their operation on both coal and petroleum residuals, and progress in this area is expected. Capital and operating costs are now higher than those of traditional coal-fired plants, but these could decline as larger economies of scale are reached.

Because PacifiCorp needs future resources to meet forecasted customer demands, the company is currently reviewing Project economics of three possible coal projects in the Utah or Wyoming area. The capital cost of the projects range from $1,582/kW to $2,056/kW. The average of the three estimated capital costs for coal options is $1,754/kW (this number was used to estimate replacement costs and annual operations). To replace the Project production using coal resources would cost an estimated $238 million in capital. Annual operations, including the cost of capital, would be an estimated $16 million per year. However, the physical ability to directly transmit power from these studied projects to PacifiCorp's western control area does not currently exist and would likely result in additional material expense.

H.4.3 PURCHASING MARKET POWER

If PacifiCorp did not receive a new Project license, the company, at least in the short-term, would need to obtain replacement power purchased on the open market. The market value of energy is based on incremental power cost estimates as provided by internal price projections that use a combination of market clearing price models and market data. These represent the marginal opportunity cost (or market value) of power, using an average of California-Oregon-Border (COB) and Mid-Columbia values. The market value of energy is calculated using the on-peak and off-peak prices multiplied by the long-term (30-year) average on-peak and off-peak megawatt hours (MWh) that may be generated by the proposed Project under normal conditions.

The annual average value of power for the 30-year license period (starting in 2006) is estimated to be $70/MWh. The range around this estimate is from a low of $56/MWh to a high of $83/MWh. Elements that influence the estimate include actual river flows through the Project and the value of power at any given time.

The Project operates during peak and off-peak demand periods. The average value of on-peak generation, assuming a 30-year average value of COB and Mid-Columbia values ($74 per MWh) and a future on-peak generation of 291,647 MWh (proposed Project), is $32.9 million per year. The average value of off-peak generation, assuming a 30-year average value of COB and Mid-Columbia values ($62 per MWh) and a future off-peak generation of 219,888 MW hours (proposed Project), is $15.6 million per year.

Market purchases, of course, would not replace the capabilities of the project with respect to helping PacifiCorp maintain the reliability and electrical integrity of the PacifiCorp control areas.

H.4.4 PLANS TO MODIFY PROJECT FACILITIES AND OPERATION

As part of this license application, PacifiCorp is not proposing any major modifications or upgrades. However, the Company will continue to evaluate the potential for project

upgrades and modifications as future market and other conditions change, to ensure the most cost-effective, efficient and environmentally balanced use of the water resources available

H.5.0 INDIAN TRIBES POTENTIALLY AFFECTED BY THE PROJECT

The Merwin Project does not occupy any established Indian tribal reservation; however, two Pacific Northwest Indian Tribes have treaty-protected rights which may be affected by the Merwin Project. To keep the tribes informed on how the project may affect those protected rights, PacifiCorp consulted with the following Indian tribes or organizations:

Yakama Nation
PO Box 151
Toppenish, WA 98948

Cowlitz Indian Tribe
PO Box 2547
Longview, WA 98632

Consultation with the 2 tribes is described in Section 3.7 of the Preliminary Draft Environmental Assessment in volume 2 of this application.

H.6.0 HISTORICAL AND DAILY PROJECT OPERATION

H.6.1 PROJECT OPERATION

Merwin is one of the 4 Lewis River Hydroelectric Projects that are operated as integral components. Scheduling of power resources is coordinated daily based on factors such as reservoir storage, fishery requirements, recreation requirements, flood control requirements, snow pack conditions, current and forecasted inflow conditions, system load requirements, availability of other resources, and in-stream flow requirements. Real-time adjustments to this schedule can and do occur as load and resource conditions dictate. Water releases for generation are based on the need for the dispatch of a flexible resource, real-time load demands, river and reservoir objectives.

The Merwin powerhouse is operated and monitored from the Hydro Control Center (HCC) located nearby the Merwin headquarters building. The plant is visited several times daily as 3 operators are on duty for the Lewis River Projects during normal work hours. At all other times, 2 operators are on duty. Operators live in housing near the Merwin powerhouse and are available on short notice for local control. The Merwin units can be manually or automatically operated from the powerhouse or the HCC.

HCC is staffed 24 hours a day with at least one operator per shift. Preschedules for anticipated hourly generation are centrally communicated from Portland for each plant. The prescheduled generation is dispatched in real-time through coordination between

HCC and the C&T Real Time Generation Control Desk located in Portland. Merwin units are then operated from HCC in one of 3 control modes, as follows:

Local Manual Operation: To start a unit on local manual, the operator verifies that the lube oil pump for the turbine guide bearing is operating and the bearing oil level is normal. The operator can then push the start button, and the unit will roll and come up to speed. Once up to speed, the operator turns on the synchroscope and manually synchronizes the unit to the line, and closes the breaker to connect the unit to the system. The output and voltage can then be adjusted manually as required by the operator.

Local Auto Operation: To start a unit on local auto, the operator verifies that the lube oil pump for the turbine guide bearing is operating and the bearing oil level is normal. The operator can then push the start button, and the unit will roll, come up to speed, synchronize, and close the breaker automatically. The output and voltage can then be adjusted by the operator.

Remote Auto Operation: To start in remote auto, the selector switch located at the plant must be in the "remote auto" position, and the unit auxiliaries must be functioning normally. The Merwin operator can then send a start signal via the SCADA system, and the unit will roll, come up to speed, synchronize, and close the breaker automatically. The Merwin operator can then adjust the load as required or put the unit on load control. Unlike the Yale and Swift Projects, Merwin can not be operated from C&T the Real Time Generation Control Desk Portland and unit loading must be controlled from HCC.

Lake Merwin is normally operated between elevations 233.5 feet and 239.6 feet (full pool). There is no prescribed normal winter elevation. The lake is typically operated in the top 5 feet for recreational purposes during the summer. It may be drawn down as low as 165 feet msl during non-recreational periods for special operations.

Daily inflows to the Lewis River system are used by the Swift, Yale and Merwin Hydroelectric Projects to meet generation system requirements while maintaining minimum flows, reservoir levels, and storage requirements. Article 49 of the Merwin license defines minimum flows, ramping rates, and other operational constraints for Merwin.

When natural inflows to Lake Merwin are in excess of power production capacity and reservoir storage space nears the prescribed minimum, spilling is initiated. During high run-off conditions, the projects operate under special guidelines established to manage peak storm runoff in accordance with the respective FERC licenses. When conditions require releases from Merwin Dam (the farthest downstream project) to be significantly greater than Merwin's turbine capacity, appropriate notifications are made to respective county emergency management services, National Weather Service, and U.S. Army Corps of Engineers at predetermined discharge levels.

H.6.2 PROJECT OPERATION DURING FLOOD CONDITIONS

The current flood control operating procedures for the Lewis River Hydroelectric Projects are fully documented in PacifiCorp's Standard Operating Procedures for High

Runoff (1994). The Merwin powerhouse is monitored 24 hours per day by an operator with constant displays of reservoir and tailwater elevations for the 4 Lewis River Projects. In addition to the Company's monitoring equipment, the National Weather Service operates a network of automated precipitation gages and river gages that telemeter hydro-meteorological events on the Lewis River. The event data are received at the Cowlitz County Emergency Services office and simultaneously at the National Weather Service offices in Portland and Seattle. PacifiCorp also has real time access to this automated data.

During flood events when conditions require releases from Merwin Dam to be significantly greater than its turbine capacity, considerable coordination takes place between PacifiCorp, the National Weather Service, Clark County and Cowlitz County emergency services agencies, the City of Woodland, and, in very severe events, the U.S. Army Corps of Engineers. In general terms, PacifiCorp notifies the National Weather Service and county and local government of actual or expected large releases from Merwin Dam. The National Weather Service and the relevant county and local government agencies issue notifications and warnings to the public and, if the situation warrants, may initiate evacuations.

In addition to the above notifications, information on the total release from Merwin Dam is publicly available on the Merwin flow information recording. This phone system was installed by PacifiCorp in 2000 and is available to the public by dial-in to Merwin Headquarters. The recording is updated every 24 hours when flows are above 15,000-cfs and are reported in 5,000-cfs increments.

H.6.3 PROJECT SAFETY

In accordance with FERC guidelines issued February 22, 1988, PacifiCorp has prepared and maintains an Emergency Action Plan (EAP) for the Lewis River Hydroelectric Projects. The EAP details the procedures that PacifiCorp will take in the unlikely event of a dam failure (PacifiCorp 1999). The EAP is updated annually and new issues are filed with FERC every 5 years. The primary purpose of the EAP is to provide maximum early warning to people who may be affected by the sudden release of water caused by natural disaster, accident, or failure of any component of the Lewis River Hydroelectric Projects. Copies of the current EAP are kept at all times at the project and at appropriate company dispatch offices. Copies are also provided to county agencies that deal with emergency services in the project vicinity. The EAP clearly identifies whom PacifiCorp personnel must contact in the event of an emergency. The EAP describes the actions taken to provide public notification. PacifiCorp annually tests the EAP using a simulated emergency and provides training to responsible personnel.

In accordance with state law, PacifiCorp maintains personnel safety records. A review of records from the most recent 5-year period (1998 through 2002) indicates there was one lost time accident at the Lewis River Hydro Control Center in 2001 when an employee strained his knee.

PacifiCorp also maintains records of accidental injuries or deaths to members of the public associated with its hydro projects. A review of these records for the most recent 5-

year period (1998 through 2002) indicates there have been no such reports. The current public safety plan was submitted to the FERC Portland Regional office on September 30, 1992. The plan was subsequently accepted on October 20, 1992.

Fencing restricts public access to hazardous areas near Merwin dam and powerhouse. Appropriate warning signs are placed at recreation areas throughout the project. Log booms are in place in front of the spillway section and powerhouse intake.

To maintain a safe environment, project facilities are inspected on a regular basis. The powerhouse and dam are inspected daily. The spillway gates and motors are tested each year to pass high flows. The project is inspected by the FERC staff from the Portland Regional Office every 3 years. The most recent FERC Environmental and Public Use Inspection (EPUI) was conducted on April 1, 2002.

H.6.4 RECORD OF PROJECT HISTORY

The initial license for the Merwin Hydroelectric Project was issued to Inland Power & Light Company (a predecessor of Pacific Power & Light) on December 12, 1929 for a 50-year period. The license expired in 1979. An application for a new license was filed with the FERC in 1977 and a competing license application was filed by a joint venture composed of the Clark County's and Cowlitz County's public utility districts. A new license was issued to PacifiCorp effective October 6, 1983 until December 11, 2009. In January 1999, PacifiCorp and Cowlitz PUD filed a request with FERC for approval of the use of FERC's Alternative Licensing Process (ALP) and for the simultaneous and coordinated processing of the applications for all 4 Lewis River Projects. Included with this request was an application to accelerate the Merwin license expiration date from 2009 to 2006 to coincide with the expiration dates of the Swift No. 1 and Swift No. 2 licenses. On April 1, FERC approved PacifiCorp and Cowlitz PUD's request to use the ALP; on April 8, 1999, FERC issued its Order Accelerating License Expiration Date.

The Merwin Project was constructed from 1929 to 1932. Commercial operation began in September 1931 with a single generating unit. Since original construction, significant improvements have been made to project facilities:

- Between 1934 and 1937, 5-foot high flashboards were added to the top of the spillway gates, raising the maximum operating pool level from 235 feet to 239.6 feet;
- In 1948, a new bridge of longer span and improved alignment was constructed below Merwin Dam;
- In 1948-1949, the height of the parapet and cutoff walls was increased to elevation 242 feet on the gravity section of the dam adjacent to the spillway;
- In 1949, the second generating unit was installed;
- In 1958, the third generating unit was installed;
- In 1989-1990, the spillway gates were repainted and fitted and tested with new seals and lifting chains with individual link grease fittings;
- In 1989-1990, both the dam and headgate crane and the powerhouse gantry crane were repainted;

- In 1990, the thrust block and nonoverflow section were anchored to the foundation rock by post-tensioned anchors in order to provide sufficient stability to meet the cracked base uplift requirements in the FERC guidelines;
- In 1996, automated and supervisory controls for more automated and remote controlling of the powerhouse and spillway and the overall Lewis River hydro system were installed; and
- In 1999, the gate struts were replaced with heavier members, and the cracks downstream and above the trunnions were epoxy grouted.

A more comprehensive list and description of project construction, upgrades and improvements is included in Exhibit C of this application.

H.6.5 PROJECT OUTAGES

PacifiCorp procedures for reporting forced outages at the Lewis River Projects were updated in 2001. All outages are currently reported digitally and provide the date, time, and duration of the outage, amount of lost generation, and the reason for the outage, including the action taken to correct the cause (Table H.6.5-1).

Prior to 2001, outage reporting was recorded in hand-written power logbooks, with different reporting procedures than are currently followed. Outages for this period are grouped by powerhouse unit, outage time, and total potential lost generation for the year (Table H.6.5-2). Actual outage occurrences are expected to have been fewer than shown due to unrecorded maintenance events and load shifting to accommodate for water availability. All calculations for lost generation are based on turbine nameplate rating (maximum unit MW) and not on actual generation being produced at the time of the outage. Use of the nameplate rating likely overestimates the lost generation.

Table H.6.5-1. Merwin Project Outages (January 1, 2001 through May 21, 2003)

Outage Start (Date/Time)	Outage End (Date/Time)	Duration (Hours)	Unit	Total Unit Capacity (MW)	Cause	Potential Lost Generation (MWHrs)
Planned Outages 1/1/2001 through 5/21/2003						
01/30/2001 6:45:00 AM	01/30/2001 2:15:00 PM	7.50	Merwin 3	45	Maintenance Outage	337.50
06/13/2001 9:30:00 AM	07/06/2001 4:10:00 PM	558.67	Merwin 3	45	Annual Outage	25,140.00
09/21/2001 5:31:40 PM	10/24/2001 7:14:00 PM	793.70	Merwin 3	45	Overhaul/Upgrade Outage	35,716.50
05/04/2002 10:50:00 AM	05/17/2002 2:10:00 PM	315.33	Merwin 1	45	Annual Outage	14,190.00
06/24/2002 1:16:00 PM	07/02/2002 2:50:00 PM	193.57	Merwin 2	45	Annual Outage	8,710.50
07/08/2002 1:15:00 PM	07/16/2002 9:37:00 AM	188.37	Merwin 3	45	Annual Outage	8,476.50
08/05/2002 9:47:00 AM	08/07/2002 11:30:00 AM	49.72	Merwin 2	45	Maintenance Outage	2,237.30
08/07/2002 4:15:00 PM	08/08/2002 4:10:00 PM	23.92	Merwin 1	45	Maintenance Outage	1,076.30
01/23/2003 8:15:00 AM	01/23/2003 1:55:00 PM	5.67	Merwin 1	45	Maintenance Outage	255.00
02/27/2003 10:57:00 AM	02/27/2003 3:38:00 PM	4.68	Merwin 1	45	Non-Generation Issue	210.80
04/27/2003 10:00:00 AM		n/a	Merwin 3	45	Annual Outage	n/a
Unplanned Outages 1/1/2001 through 5/21/2003						
01/28/2001 12:38:00 PM	01/29/2001 2:35:00 PM	25.95	Merwin House	1	Electrical Systems	26.00
03/06/2001 9:15:00 AM	03/06/2001 10:05:00 AM	0.83	Merwin House	1	Generator/Exciter	0.80
05/31/2001 4:20:00 PM	05/31/2001 5:45:00 PM	1.42	Merwin 3	45	Personnel Error	63.80
11/06/2002 3:56:00 PM	11/06/2002 5:46:00 PM	1.83	Merwin 3	45	Controls/ Communication	82.50
12/16/2002 8:10:00 AM	12/16/2002 10:08:00 AM	1.97	Merwin 1	45	Controls/ Communication	88.50
01/21/2003 8:22:00 AM	01/21/2003 8:40:00 AM	0.30	Merwin 2	45	Generator/Exciter	13.50
02/21/2003 7:07:00 AM	02/21/2003 3:10:00 PM	8.05	Merwin 1	45	Electrical Systems	362.30
02/24/2003 9:58:57 AM	02/25/2003 11:40:00 AM	25.68	Merwin 1	45	Electrical Systems	1,155.80
03/12/2003 12:45:38 PM	03/12/2003 4:15:00 PM	3.48	Merwin House	1	Electrical Systems	3.50

Table H.6.5-2. Merwin Project Outages (January 1, 1998 through December 31, 2000)

Year	Unit	Unit Capacity (MW)	Outage Hours			Potential Lost Generation (MWHrs.)
			Planned	Unplanned/Forced	Total	
1998	Merwin 1	45	3,093.74	929.14	4,022.88	181,029.6
	Merwin 2	45	1,416.22	949.98	2,366.20	106,479
	Merwin 3	45	457.54	216	673.54	30,309.3
1999	Merwin 1	45	1,136.64	907.17	2,043.81	91,971.45
	Merwin 2	45	53.09	698.87	751.96	33,838.2
	Merwin 3	45	162.04	309.75	471.79	21,230.55
2000	Merwin 1	45	*	*	*	*
	Merwin 2	45	*	*	*	*
	Merwin 3	45	*	*	*	*

* data unavailable

H.6.6 STATEMENT OF LICENSE COMPLIANCE

The license for the Merwin Project was issued on October 6, 1983. A list of license articles that pertain to environmental resources is provided below.

Article 12 safeguards the right to use water for purposes of navigation, storage, and plant discharges in a manner that protects life, health, property, power purposes, recreation, and other beneficial public uses.

Article 15 directs the Licensee to construct, maintain, and operate reasonable facilities for the conservation and development of fish and wildlife resources.

Article 17 is similar to Article 15 in that it provides for the construction, operation, and maintenance of reasonable recreational facilities.

Article 19 directs the Licensee to take reasonable measures to prevent soil erosion, stream sedimentation, and any form of water or air pollution during construction, operation, or maintenance of the project.

Article 39 provides a framework for environmental consultation between PacifiCorp and resource agencies, stated as follows: “The Licensee shall consult and cooperate with the U.S. Fish and Wildlife Service, the Washington State Departments of Game, Ecology (WDOE) and Fisheries, the U.S. National Marine Fisheries Service, and the National Park Service of the Department of Interior, and other appropriate agencies for the protection and development of the environmental resources and values of the project area. The Commission reserves the right to require changes in the project works or operations that may be necessary to protect and enhance those resources and values.”

Article 41 directs the Licensee to cooperate with WDOE (in compliance with federal, state, and local regulations) to plan and provide for the collection, storage, and disposal of solid wastes generated on project lands and waters. The plan shall include: (1) the location of solid waste receptacles to be provided at public use areas; (2) schedules for

collection from those receptacles; (3) provisions for including in the plan any additional public use areas as they are developed; and (4) the locations of disposal sites and methods of disposal.

Article 43 relates to minimum reservoir storage requirements as mandated by FERC. Storage requirements are combined to include all 3 reservoirs, rather than at individual projects (Table H.6.6-1). This allows the most efficient distribution of storage space among the 3 reservoirs. Records indicate that PacifiCorp is in compliance with Article 43.

Table H.6.6-1. Minimum combined storage space schedule for Merwin, Yale, and Swift reservoirs.

Date	Minimum Storage Space (acre-ft)
September 20	0
October 10	35,000
November 1 – April 1	70,000
April 15	35,000
April 30	0

Article 44 states that the Lewis River hydroelectric system will operate together to maximize the energy production and capacity while meeting obligations for flood control and other beneficial public uses.

Article 47 states that PacifiCorp shall provide recreational facilities, in accordance with Exhibit R (Recreation Management Plan) of the Application for Relicense, for optimum public utilization of the project recreational resources.

Article 48 states that the Licensee will carry out the Wildlife Habitat Management Plan (PacifiCorp 1990, 1998). The plan may from time to time be amended, modified, or expanded by agreement among the Licensee and resource agencies.

Article 49 The Swift No. 1, Swift No. 2, and Yale licenses contain no provisions dictating ramping rates or minimum flow levels. Lake Merwin has the capability and is used to re-regulate flows released from upstream. A primary function of Merwin Dam is to regulate flows downstream of the project. Because of this, Merwin is not as flexible as other resources on the Lewis River system but does provide a valuable contribution toward PacifiCorp's reliable operation of its two control areas. Article 49 defines minimum flows, ramping rates, and other operational constraints for Merwin (Table H.7.6-2). The purpose of Article 49 is to provide for the public safety, recreation, and enhancement of spawning and rearing habitat for fish, namely fall chinook salmon. Provisions in Article 49 were developed principally by the Washington Department of Fish & Wildlife (WDFW) through negotiated agreements with PacifiCorp. The rationale for determining flow criteria and ramping rates emphasized safety, fish stranding, and operational flexibility. Flows above 3,000 cfs were thought to reduce stranding potential as aerial photographs showed a nearly full channel at flows above this level. The protection of fall chinook juveniles was enhanced by restricted spring flow variations. These restrictions are known as plateau operations, which provide stable flows for emerging and outmigrating fall chinook. The effects of fluctuations on fall chinook

spawning were not considered significant as stranded redds accounted for less than 2 percent of the total redds, and increased minimum flows in October and November spread out spawners as compensation (pers. comm., Ed Weiss, PacifiCorp, retired). PacifiCorp voluntarily follows a 2-inch per hour ramping rate. During high-runoff operation (natural flows at Merwin greater than 15,000 cfs), spilling may cause the river to rise faster than specified in Article 49 to reduce the risk of flooding downstream of Merwin.

Table H.6.6-2. Minimum flow and ramping rate provisions downstream of Merwin powerhouse, as stipulated in Article 49 of the Merwin license.

Time Period	Minimum Flow Requirements	Ramping Rate Requirements
Dec. 8 – Feb. 28	1,500 cfs	Ramp-up limit = 1 ft/hour, based on Ariel gage. Ramp-down limit = 1.5 ft/hour, based on Ariel gage
March 1 – May 31	During March, between 1,000 and 2,000 cfs, depending on runoff volume forecast on March 1.	Daily fluctuation in flows below Merwin powerhouse is restricted by flow plateaus. Flow plateaus will vary in length depending on changes in natural flow and power demand on the Lewis River.
	During April, between 1,300 and 2,700 cfs, depending on runoff volume forecast on April 1.	In up-ramping, between flow plateaus, rates of change cannot exceed 1 ft/hour.
	During May, between 1,650 and 2,700 cfs, depending on runoff volume forecast on May 1.	In down-ramping, rate of change in flow between plateaus depends on starting flow plateau. If starting plateau is greater than 6,000 cfs, down-ramping cannot exceed 750 cfs/hour. If starting plateau is 3,000-6,000 cfs, down-ramping cannot exceed 500 cfs/hour. If starting plateau is less than 3,000 cfs, down-ramping cannot exceed 300 cfs/hour.
June 1 – July 31	During June, 2,700 cfs, as long as natural flow at Merwin is equal to or greater than 2,000 cfs.	Same as March 1 to May 31 period.
	During July 1-15, 2,000 cfs, as long as natural flow at Merwin is equal to or greater than 1,600 cfs.	
	During the period July 15-31, 1,500 cfs, as long as natural flow at Merwin is greater to or equal to 1,200 cfs.	
Aug. 1 – Oct. 15	1,200 cfs	Same as Dec. 8 – Feb. 28 period.

Table H.6.6-2. Minimum flow and ramping rate provisions downstream of Merwin powerhouse, as stipulated in Article 49 of the Merwin license (continued).

Time Period	Minimum Flow Requirements	Ramping Rate Requirements
Oct. 16 – Dec. 7	During the period Oct. 16 – 31, minimum flow of 2,700.	Same as Dec. 8 – Feb. 28 period.
	During the period Nov. 1 – 15, minimum flow is lesser of 4,200 cfs or natural flow at Merwin plus 2,000 cfs.	
	During the period Nov. 16 – Dec. 7, minimum flow is the lesser of 5,400 cfs or natural flow at Merwin plus 2,000 cfs.	

Compliance with Article 49 is evaluated from readings at the Ariel gaging station approximately ¼ mile downstream of the project. FERC requires that they and various resource agencies be notified when Article 49 provisions are violated. Table H.6.6-3 describes periods when unscheduled flow deviations have occurred since the new license was issued in October 1983. These unscheduled occurrences were made known to FERC in PacifiCorp's quarterly streamflow reports and were found by FERC to be in compliance with Article 49. WDFW requests for flow reductions related to fall chinook salmon monitoring are not included. These requests include weekly drawdowns to 1,200 cfs from mid-October through December, allowing biologists to count and sample fall chinook returns. This information is used for harvest indexing, estimating escapement, and to make predictions on the following year escapement.

Table H.6.6-3. Summary of Article 49 unscheduled flow deviations occurring downstream of Merwin Dam from 1983-to present (based on Ariel gage).

Date	Description	Cause
June 6, 1999	Flow reduced from ~3,010 to 500 cfs. During this flow deviation, fish mortalities were observed in the Merwin Dam fish trap and downstream of Merwin Dam.	Mechanical failure
April 24, 1999	Flow reduction from 2,690 cfs to 2,120 cfs (570 cfs) within one hour.	Operator error
March 7, 1999	Flows reduced from 10,908 to 8,962 cfs within 1 hour.	Operator error
July 15, 1998	Flows reduced from 2,084 to 1,304 cfs within 1 hour.	Mechanical failure
April 6, 1998	Flow reduction of 1,690 cfs within 2 hours, by accidentally taking one unit off line.	Operator error
June 1 – June 8, 2003	Flows incorrectly released at 2,000 cfs instead of 2,700 cfs.	Operator error

An equipment failure on June 6, 1999 resulted in a series of meetings with WDFW and NMFS. Discussions centered on actions to prevent a reoccurrence. A letter describing the event was sent to the FERC on June 24, 1999 (letter to D. Boergers, FERC, from R.A. Landolt, PacifiCorp). An additional meeting occurred on September 17, 1999, where WDFW and PacifiCorp agreed to mechanical upgrades and a communication protocol to prevent a repeat of this event. In addition, WDFW filed a claim for fish losses with PacifiCorp. Discussions of the claim have resulted in proposals from PacifiCorp to improve habitat in the lower river as compensation for the natural fish lost in June 1999.

These proposals were not accepted and payment of $750,000 was issued to WDFW in October 2002.

Article 50 relates to hatchery production and is stated as follows in the Merwin license: "The Licensee shall make the following provisions for anadromous fish other than fall chinook salmon: Spring Chinook Salmon - The Licensee shall pay all expenses for the annual hatchery production of approximately 250,000 juvenile spring chinook (to produce 12,800 adult fish). This production will take place in existing hatcheries. Coho Salmon - The Licensee shall pay all expenses for the annual hatchery production of approximately 2,100,000 juveniles (to produce 71,000 adult fish). This production will take place in existing hatcheries. Steelhead and Sea-Run Cutthroat Trout - The Licensee shall construct and pay all operating and maintenance expenses of a hatchery to produce annually approximately 250,000 juvenile steelhead (about 41,600 pounds) and approximately 25,000 juvenile sea-run cutthroat trout (up to 6,250 pounds)."

Article 51 has resident fish provisions for all 3 reservoirs, and is stated as follows: "The Licensee shall provide, and shall pay costs of operation and maintenance of, such facilities that must be provided or modified to provide for the following resident fisheries: Merwin: Annual release of 100,000 kokanee at 7-8 fish per pound. Kokanee releases can be supplemented partially or completely with rainbow trout (same poundage) if insufficient numbers of kokanee are available. Yale: Protection of habitat on that portion of Cougar Creek under control of the Licensee which provides spawning for resident sockeye (kokanee) salmon. Swift: Annual release of 800,000 rainbow trout fry at 25-30 fish per pound."

Article 52 states that the Licensee shall, if feasible: (1) provide one additional small boat access below Merwin, (2) take over and maintain 2 existing boat launching facilities below Merwin, and (3) secure 3 additional bank-fishing easements below Merwin. Records indicate the project complies partially with Article 52. The Licensee recently secured the third bank-fishing easement downstream of the Lewis River Hatchery to fully comply with this article.

A review of compliance records indicates the Merwin Project to be in compliance with its license articles.

Merwin Hatchery Agreement The Merwin Hatchery Agreement (MHA) is an agreement signed between PacifiCorp and WDFW to meet the state's fishery management objectives resulting from the construction of Merwin Hatchery. The MHA was signed by all parties on June 30, 1988 and will remain in effect until December 11, 2009, unless otherwise modified. The objectives of the MHA are to provide a rainbow trout, steelhead trout, and sea-run cutthroat trout program in the Lewis River, while at the same time protecting the salmon resources in the river, particularly fall chinook salmon. The MHA calls for several measures to ensure the protection of the salmon in the Lewis River:

1. Closing the Lewis River fishery from Merwin Dam to Colvin Creek during the period of fall chinook salmon spawning (October 1 through December 15) of each year.

2. Establishing select stocking locations for steelhead and cutthroat trout to minimize predation on and competition with fall chinook salmon.

3. Developing a disease control program for the Merwin Hatchery that considers disinfecting source water and implementing an effluent treatment system.

4. Initiating a yearly monitoring program to evaluate the effect of hatchery practices on fall chinook salmon resources, including annual spawning ground surveys, juvenile tagging, annual juvenile population estimates, and a limited predation study to determine the levels of predation on fall chinook salmon by other trout and salmon in the river.

Monitoring described in measure #4 coincides with the Merwin hatchery evaluation.

The MHA also states that the parties will undertake a special evaluation of factors affecting fall chinook salmon population dynamics (e.g., flows, hatchery operations, etc.) if the juvenile population declines below historical levels.

The MHA also provides measures to ensure the successful stocking of steelhead and cutthroat trout in the lower Lewis River. According to the MHA, the selection of stocking locations for these anadromous trout is to be the most downstream areas (below the Lewis River hatchery for steelhead, below County Bridge at Woodland for cutthroat) that ensure broodstock collection and reasonable sport harvest. The MHA also identifies other hatchery management measures such as fish size at release (8 to the pound), a smolt stocking period (March 16 through May 31), and a hatchery design that allows for volitional steelhead smolt release (i.e., a system that allows steelhead smolts to migrate from their rearing ponds to a collection facility on their own volition).

In addition to the salmon monitoring program, the MHA also calls for a steelhead monitoring program to evaluate and modify the steelhead stocking strategies. The steelhead monitoring program involves the release of marked groups of fish at select locations, followed by a creel census program to evaluate the contribution of the hatchery fish to the harvest and aid in a determination of their availability as broodstock at Merwin Dam or at the Lewis River hatchery.

H.7.0 LITERATURE CITED

Pacific Power & Light Company. 1990. Merwin wildlife habitat management plan, standard operating procedures. Pacific Power and Light. Portland, Oregon. July 1998.

Pacific Power & Light Company. 1994. Standard Operating Procedures for High Runoff. Portland, OR.

PacifiCorp, 1996. Generation Capability Assessment. Lewis River Hydroelectric Projects. Portland, OR.

PacifiCorp. 1998. Merwin Wildlife Habitat Management Plan, Standard Operating Procedures. Pacific Power and Light. Portland, Oregon. July 1998.

PacifiCorp. 1999. Emergency Action Plan 1999. Lewis River Hydroelectric Projects. PacifiCorp. Revised 2003.

PacifiCorp. 2003. Integrated Resource Plan. Portland, OR.

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