City of Tacoma,
Department of Public Utilities, Light Division
(Dba Tacoma Power)
Cowlitz Hydroelectric Project
FERC No. 2016

Settlement Agreement License Article 1

Downstream Fish Passage: Riffe Lake and Cowlitz Falls Collection and Passage

Study Plan

1. INTRODUCTION

This plan is prepared as a response to the March 13, 2002, Federal Energy Regulatory Commission (the Commission) Order Approving Settlement and Issuing New License, and the July 18, 2003, Commission Order Denying Rehearing and Lifting Stay for FERC Project No. 2016, Settlement Agreement License Article 1. The license article requires the City of Tacoma, Department of Public Utilities, Light Division (Tacoma Power) to develop and file a plan for downstream fish passage and collection at Riffe Lake and/or Cowlitz Falls within six (6) months of license issuance. At Tacoma Power's request, FERC issued an order on January 23, 2004 extending the submittal date of this Study Plan by 90 days, or to April 19, 2004.

1.1. PROJECT DESCRIPTION

The Cowlitz Project (FERC No. 2016) is Tacoma Power's largest electricity generating facility and is located on the Cowlitz River, Lewis County, Washington. The Project consists of two dams, the Mayfield Dam at river mile (RM) 52 and Mossyrock Dam, upstream at RM 65. In addition to the project generating electricity and providing flood control, Tacoma operates 3 major parks, manages approximately 14,000 acres of wildlife lands, and owns and funds operation of the Cowlitz Salmon Hatchery (RM 50) and the Cowlitz Trout Hatchery (RM 42). The Barrier Dam, associated with the Cowlitz Salmon Hatchery is located at RM 49.5. The original 50-year license for the Cowlitz Project was issued on December 28, 1951. A new thirty-five year license was issued and became effective on July 18, 2003.

The Mayfield development completed in 1963 includes a 250-foot-high, 850-foot-long, concrete arch and gravity dam that impounds Mayfield Lake, which has a maximum surface area of 2, 250 acres. In addition to the Cowlitz River, inflows from the Tilton River also contribute to Mayfield Lake, which supports public and private recreational facilities. An 854-foot-long power tunnel passes through the right abutment of the dam and terminates at a concrete forebay structure. Four penstocks continue from the forebay structure to the four generating units, which have an installed capacity of 162-megawatts (MW).

The Mossyrock development completed in 1968 includes a 606-foot-high double curvature concrete arch dam that creates Riffe Lake, a 23-mile long, 11,830-acre reservoir with 52 miles of shoreline. Riffe Lake supports several parks and other recreational facilities. Three penstocks, varying in length from 248 to 285 feet, extend down to the powerhouse, which is adjacent to the base of the dam. The powerhouse contains two generating units with room for

a third, and has a total installed capacity of 300 MW. Transmission lines link the Mossyrock and Mayfield developments.

FERC License:

APPENDIX A

SETTLEMENT AGREEMENT LICENSE ARTICLES

Article 1. *Downstream Fish Passage: Riffe Lake and Cowlitz Falls Collection and Passage.*

a) Within six (6) months of license issuance, Licensee shall develop and submit a plan for downstream fish passage and collection at Riffe Lake and Cowlitz Falls. The Licensee shall prepare the plan in collaboration with, and subject to approval by, the National Marine Fisheries Service and the U.S. Fish and Wildlife Service. The plan shall include: 1) a report on the results of negotiations among the Licensee, Lewis County Public Utility District (licensee for the Cowlitz Falls Project, FERC No. 2833) and the Bonneville Power Administration regarding shared funding of cooperative efforts to improve downstream passage and collection effectiveness at or near Cowlitz Falls; 2) proposed facilities and measures most likely to achieve the goal of 95% Fish Passage Survival ("FPS"), as defined in the August 2000 Settlement Agreement, to be funded by the Licensee to contribute to effective downstream passage and collection at or near Cowlitz Falls and/or to be constructed by the Licensee downstream of Cowlitz Falls Dam at Riffe Lake; 3) plans to support the on-going operation and maintenance of facilities and measures for downstream passage and collection at or near Cowlitz Falls and/or at Riffe Lake each year for the term of the license; 4) plans for monitoring and evaluation of effectiveness, including determination of the combined FPS of the existing, proposed new and/or improved facilities at or near Cowlitz Falls and/or Riffe Lake; and 5) a construction and implementation timeline not to exceed 12 months from plan approval by the Commission, unless the Licensee can establish good cause for additional time. The draft plan shall be provided for 30-day review and comment to the Fisheries Technical Committee provided for in the August 2000 Settlement Agreement, or if the Settlement Agreement has become void, to the U.S. Fish and Wildlife Service, National Marine Fisheries Service, Washington Department of Fish and Wildlife and Washington Department of Ecology (referred to as "the FTC or agencies"). The Licensee shall include with the plan documentation of consultation and copies of comments and recommendations on the plan, and specific descriptions of how the FTC's or agencies' comments are accommodated by the plan. The Licensee shall submit the final plan to the National Marine Fisheries Service and U.S. Fish and Wildlife Service for approval prior to filing with the Commission. Upon approval by NMFS and USFWS and filing with the Commission, the Licensee shall implement the plan either on its own or pursuant to an agreement reached among the Licensee, Bonneville Power Administration and Lewis County Public Utility District to fund cooperative efforts for passage improvements at or near Cowlitz Falls.

2. OBJECTIVES

1. Provide a plan for fish passage and downstream migrant collection.
2. Provide a record of negotiations with Lewis County Public Utility District (LCPUD) and Bonneville Power Administration (BPA).
3. Include plans to support on-going operations and maintenance of the downstream migrant program.
4. Include a record of consultation with the Fisheries Technical Committee (FTC) for improving downstream juvenile fish passage at or near Cowlitz Falls Dam (CFD) and/or in Riffe Lake.

3. PLAN

3.1. *"A report on the results of negotiations among the Licensee, Lewis County Public Utility District (licensee for the Cowlitz Falls Project, FERC No. 2833) and the Bonneville Power Administration regarding shared funding of cooperative efforts to improve downstream passage and collection effectiveness at or near Cowlitz Falls;"*

Settlement Agreement (SA) Article 1a required Tacoma Power to report monthly on the status of the negotiations with Lewis County PUD (LCPUD) and the Bonneville Power Administration (BPA) to mutually improve downstream fish passage and collection efficiency at or near Cowlitz Falls Dam. LCPUD operates CFD and has a contract with BPA to take the entire generation output of the project. In addition, BPA funds seasonal operation of the fish collection facility at the Cowlitz Falls Fish Collection Facility (CFFCF) located at CFD. The on-going monthly reports began in December 2000, and are sent to the National Marine Fisheries Service (NOAA Fisheries) and the U.S. Fish and Wildlife Service (USFWS). All monthly reports filed to date are included in Appendix 4.

Negotiations with LCPUD and BPA began in 1999 and culminated with the signing of an access agreement on March 17, 2003 to allow research and development activities at CFD. A copy of this agreement is included in Appendix 2. The main issues that arose during negotiations were the access to the dam facility for testing, how testing actions might disrupt operations of CFD, and how the tests would be funded. Another issue discussed was the agreement between BPA and Friends of the Cowlitz (FOC) signed in September 1991.

A preliminary agreement was reached with LCPUD for fish collection efficiency tests planned for 2004; however Tacoma withdrew most of its proposals for 2004 in light of comments to its plan. NOAA Fisheries, LCPUD, BPA and Tacoma met on March 19, 2004 to discuss interim measures that could be implemented immediately while planning the more permanent measures. Agreement was reached on a number of feasible items that are now included in this plan. Tacoma, LCPUD and BPA also reviewed a draft proposal from Tacoma concerning capital construction and long-term maintenance costs at the CFFCF. Those negotiations are private and Tacoma can only express that it is our hope that a long-term partnership will soon be established. Tacoma is not letting negotiations stand in the way of developing plans and the design team is proceeding with planned work.

3.2. *"Proposed facilities and measures most likely to achieve the goal of 95% Fish Passage Survival ("FPS"), as defined in the August 2000 Settlement Agreement,*

to be funded by the Licensee to contribute to effective downstream passage and collection at or near Cowlitz Falls and/or to be constructed by the Licensee downstream of Cowlitz Falls Dam at Riffe Lake"

It was concluded in the Commission's Final Environmental Impact Statement (FEIS) that improving downstream survival of juvenile salmonids is the likely key to recovery in the Cowlitz River basin, and that the most logical place for such improvement to occur is at the Cowlitz Falls Project (See Cowlitz River Project FERC/FEIS, November 2001, pg. 4-34 & 4-35). The Cowlitz Falls Hydroelectric Project began operation in the spring of 1994 and was modeled after the Wells Hydroelectric Project on the Columbia River, Washington. The CFFCF was completed in 1996 and included attraction, collection, dewatering, bypass, and handling/transport facilities.

FERC points out in their FEIS that "...compared with the mature technology of upstream fish passage, downstream passage technology remains experimental. Except for spill, the variety of physical and behavioral approaches to downstream passage has met with about the same degree of success. That is, the level of effectiveness exceeding 50% passage are difficult to achieve, or if achieved, are difficult to sustain." (FERC 2003).

Beginning in 2001Tacoma Power engineers were interested in studies that suggested a high percentage of fish came within several feet of the flume entrances only to ultimately reject them. LCPUD/BPA was looking for a low cost solution. Tacoma built a flared entrance that year to smooth the entrance turbulence only to find that it had little impact on FGE. In 2003 Tacoma tried a submerged high velocity flared entrance based on the observation that fish sometimes escaped the entrance because flows were not at a capture velocity. This also seemed to fail in any dramatic improvement. Tacoma also tried strobe lights in 2003 to push fish into the flume. Strobe lights were found to have a dramatic startle response, which may be useful, but it appears difficult to direct fish other than away from the illuminated areas.

3.2.1 Proposed Process to Achieve the 95% FPS standard

Tacoma Power believes, at this time, that the measures most likely to achieve success at Cowlitz Falls Dam would involve a combination of surface bypass collector(s) and operational changes. Our plan is to make our best effort on each of these fronts while implementing several interim measures. We will be concentrating first on designing a surface bypass collector, investigating removal or modification of the debris deflector and investigating ways to facilitate baffle panel removal which will in turn enhance extended operation of the fish collection facility. Longer-term investigations include limiting reservoir draw downs, which shut down the fish collection facility, and may include pulsing turbines, limiting turbine operation and/or splitting flows between turbine and sluiceways. How fast Tacoma can proceed with these objectives hinges somewhat on LCPUD/BPA cooperation.

3.2.1.1 Interim Measures

1. **Operate only one Cowlitz Falls Dam fish collection flume per spillgate and target a flume flow of 40 - 50 cfs each.** As higher flume flows have improved fish collection compared to the 20 cfs treatments, Tacoma Power proposes that one flume per spillgate be operated at 40 - 50 cfs throughout the migration season for a total maximum flow of 100 cfs to the Cowlitz Falls fish collection facility (CFFCF). This measure is supported by past research that demonstrates increased flume flow assists collection. This can be done by leaving the two flume gates at 100% open. Incidental spillage

occurring due to wave action in the flumes will be contained by the PVC pipe that is currently installed and will contain the migrating fish.

Tacoma views this as an excellent opportunity to establish a solid base case condition to compare to the operation of a prototype Surface Bypass Collector (SBC) in 2005. For these reasons, Tacoma proposes that Flume 1 and Flume 3 be operated at 40 - 50 cfs each in 2004. If LCPUD/BPA desires to test flume entrance modifications, Tacoma would support the same modification used on each entrance. If an additional entrance modification is necessary, Tacoma will provide and install.

2. **Lake Scanewa Merwin trap operation.** To improve the collection and determine the timing of age 0+ spring Chinook smolts emigrating from the upper Cowlitz River basin the use of two Lake Merwin traps in Lake Scanewa is proposed. Tasks include; deploy nets and begin trapping on or about July 5, 2004. The traps would be operated from until October 15, or until water flow become too high to effectively operate. All fish collected will be enumerated by species and marked, unless numbers are too great to handle safely. Sample schedule would be three days/week when numbers collected are less than 500 Chinook per day, increase sampling to 5-7 days per week when collection is over 500 Chinook per day. Sub-sample smolts for length and condition.

   All Chinook and other smolts collected in the Merwin traps would be transported to the stress relief ponds at the Cowlitz Salmon Hatchery. A final report on numbers captured and transported and trap efficiency will be included in the Cowlitz Falls Annual Report. Releases of marked fish captured from the trap will be done to calculate fish collection efficiency (FCE) at Cowlitz Falls Dam.

3. **Extended operation of Cowlitz Falls Fish Collection Facility – Fall & Winter.** Currently collection efforts at CFFCF terminate in late August. This proposal would be to extend the operation period into the fall and early winter months, periods that juvenile salmonids historically outmigrated from the upper Cowlitz River basins. This proposal would require leaving the baffle panels in place past October. Tacoma would develop and implement an operational/emergency procedure for the baffle panel removal in spillgates 2 & 3 in the event of a high flow/storm forecast and need for removal. Tacoma offers the support of personnel and equipment to conduct this endeavor.

   Personnel needs for operation and maintenance would be similar to the summer operational periods, with the exception of increased cleaning frequencies due to heavy debris loads. Releases of marked fish captured from CFFCF will be continued to calculate FCE at Cowlitz Falls Dam. Coordination of transportation of smolts to the stress relief ponds by Tacoma Power fish transport trucks.

4. **Debris Barrier.** Tacoma will work with LCPUD & FERC to modify the existing debris barrier to make it more fish friendly and/or design, construct and install a new, fish friendly debris barrier at the dam which may include removing, moving or relocating the existing debris barrier. Tacoma would also design, procure and install a new debris boom and provide labor and equipment to periodically remove woody debris from Lake Scanewa.

3.2.1.2 Surface Bypass Collector(s)

The development of a surface bypass collector (SBC) must address two important but opposing factors: urgency to provide effective protection to migrating salmon stocks, and the need for a thoroughly researched plan due to the high cost of designing, constructing, and evaluating effective systems.

No fish passage mitigation should be implemented without extensive consideration of the need for studies to assess the effectiveness of that mitigation (FERC 2003). To achieve success, Tacoma Power is proposing the following 4-step design process:

1) Gather background biological information

Improve knowledge of the species' response to flow volume, velocity, and acceleration gradients to define the volume of water required to attract fish into the bypass system. Proposed for 2004 will be a review of all past studies and knowledge of horizontal and vertical distributions of downstream migrating juveniles, forebay approach routes and holding patterns, and diel and seasonal behavioral patterns. Some of these characteristics were studied by the U.S. Geological Survey, Columbia River Research Lab (USGS) at CFD.

The majority of research at CFFCF has been focused on improving fish collection at the flumes on spillgate # 2 and #3. If Tacoma Power considers any major modification of fish collection flumes and/or other structures to achieve required FPS, additional measures may be proposed in the vicinity of spillgate #1, spillgate # 4, and the debris barrier and/or coffer dam that may require additional biological research prior to implementation. Some of these additional measures were summarized by Harza (1993). Surface bypass collection in the vicinity of spillgate # 1 may be found to have research merit for some operational scenarios (i.e. low turbine output).

2) Coordination of biology and engineering into design alternatives

Biological information must be integrated into the design alternatives. Decisions on whether single or multiple openings are required; entrance depth, width and discharge; and the hydraulic transition from the forebay entrance(s) to the collection flume(s) must be made on anticipated biological effectiveness. Computational Fluid Dynamic (CF) modeling already underway by Tacoma Power will allow the study of the hydraulic environment created by the dam and its operations, which in turn affect juvenile and adult salmonid passage behavior. Such modeling will allow a wide range of concepts and alternatives to be quickly tested.

FERC states that "...achieving levels of effectiveness above 50% is often difficult. High passage efficiency is dependent upon flow conditions, including the volume of flow for spills, power generation, and fish bypass as well as the apportioning of flow among these three uses." (FERC 2003). Models that describe and predict flows in front of, through and out of fish passage structures can provide a better understanding of the hydraulic forces fish confront in attempting to navigate these facilities.

CF mathematical models have recently been used to provide highly detailed and fairly accurate simulations of flow characteristics near hydropower projects to assist in fish passage studies (Meselhe and Odgaard 1998). Like hydraulic physical models, CF simulations enable studies of varying flow conditions using different structural and hydraulic designs. These simulations are typically conducted before constructing costly passage systems that may be very difficult to modify, if modifications are needed.

Superimposing information about individual fish movements on the output from numerical models allows more precise understanding of fish behavior and their reactions to certain hydraulic conditions. CF modeling should lead to a greater understanding of fish behavior at Cowlitz Falls Dam and is expected to provide some of the fish passage design criteria required in order to satisfy the FPS goal.

A CF model will be used to simulate 3-D velocity distributions near Cowlitz Falls Dam powerhouse, turbine intakes, debris barrier, spillway forebays and the sluice gate channel. Tacoma Power proposes that hydraulic information from CF models will be used to assist in the design of a prototype surface bypass collector and to investigate potential linkages between project operations and downstream fish passage. CF modeled velocities and turbulence results, in combination with hydroacoustics and radio telemetry tracking, could promote understanding of how fish respond to the physical environment. CF modeling represents a well-developed technology and an excellent tool to simulate velocity distribution, design fish passage systems and improve understanding of passage system effects on fish. Tacoma Power believes that CF modeling will save a significant amount of research time over physically testing every concept and will help focus efforts where the 95% FPS goal is most likely to be achieved.

3) Prototype design, construction, evaluation and modification

A low-cost prototype surface bypass system will be designed in 2004 and constructed for deployment in 2005 based on the results of fish collection research and CF modeling. The prototype test structure will be evaluated for biological, hydraulic, structural and operational performance. Turbine performance, structural loads, structural reactions to powerhouse load rejections, hydraulic adjustments to gate settings, trash raking, and system operation and maintenance criteria all require attention and definition once constructed. With sufficient data collected in each of these areas, plans for a final bypass design can be developed. Evaluation of the prototype surface bypass system may reveal design or performance flaws that require adjustment.

Tacoma Power's SBC concept that will be constructed for testing in 2005 will endeavor to satisfy the following criteria:

- A single SBC for spillgate #3 terminating at flume #3.
- Prevent dipping velocities at baffle panels and spillgate from impacting the advance of smolts.
- Provide smooth velocity transition from baffle panels to flume entrance (<0.2 fps/ft).
- Simple installation and removal.
- Achieve a 5 - 7 fps capture velocity at flume entrance by increasing flume #3 flow.
- Blocking the second baffle panel slot in front of flume #4 to increase flow velocity in the SBC.
- Approach velocity at dewatering sections that does not exceed 0.8 fps.
- Flexible adjustment of SBC porosity and/or flows possible to adapt to turbine operation and/or local fish ramp conditions.

4) Permanent surface bypass collector

Following the implementation of a successful prototype surface bypass collector, a more permanent design may be completed that will likely consist of two units (one for each turbine) and will utilize materials and methods that provide better durability and operations while retaining the biological criteria and design of the successful prototype.

We consider successful implementation to mean that over 95% of the smolts that enter five feet into the SBC will continue down the flume on that attempt. The first permanent SBC is planned to be in operation in 2006 in the spillgate #2 while the original prototype will continue in operation in spillgate #3. After 2006 an SBC is planned to be in operation for each turbine. Replacement of the prototype unit would depend on the improvements that were designed into the permanent SBC and if they warrant its replacement or should be delayed pending further refinements and study.

3.2.1.3 Operational Changes

A number of operational changes are proposed to begin immediately or to be studied. The interim measure plan calls for extended operation of the CFFCF. Possible further changes include year round operation of the fish collection facility, studying the possibility of limiting reservoir drawdowns, investigating replacement or modification of the trash boom or schemes to allow temporary removal, pulsing turbines, limiting turbine operation and splitting flows between turbine and sluiceways. These proposals are intended to supplement a successful SBC to increase overall fish passage efficiencies to the target levels.

3.3."Plans to support the on-going operation and maintenance of facilities and measures for downstream passage and collection at or near Cowlitz Falls and/or at Riffe Lake each year for the term of the license;"

Tacoma Power has recently proposed to LCPUD and BPA a long term agreement covering capital improvements and operations and maintenance of the CFFCF. Those negotiations are private and the details may not be disclosed until both parties agree. For the present Tacoma is proceeding with funding the increased costs associated with the interim measures included in this plan. Tacoma is also proceeding with all the engineering proposals discussed in this plan. No delays to the design or implementation of proposals listed in this plan will be caused by Tacoma simply because negotiations are not final. The following discussion is therefore somewhat general.

Tacoma Power will contribute to the on-going operation and maintenance of the CFFCF by maintaining a representative on the Cowlitz Falls Fish Facility Technical Committee, by coordinating and cooperating with LCPUD on research projects and tasks, by providing manpower and equipment for fish passage survival improvement tasks at the CFFCF or CFD, by providing funding for research activities and projects at CFD or funding for research activities related to improving the survival of downstream migrant juveniles on the Cowlitz River. and by continuing the operation of the juvenile and adult fish transportation program in the Cowlitz River basin.

Tacoma Power representation on the Cowlitz Falls Fish Collection Facility Technical Committee

- Attendance at two or more annual meetings
- Attendance at on-site inspections, tours and coordination meetings
- Coordination of research and operational activities including:
    - Juvenile collection improvement activities and research at CFFCF
    - Downstream juvenile migrant transportation
    - Upstream adult transportation from the Cowlitz Salmon Hatchery separator
    - Upstream adult hauling from CFFCF (adult fallbacks)

Utilization of Tacoma Power manpower and equipment for tasks at CFFCF or CFD

- Mobile crane support including operations personnel
- Boats and personnel for reservoir activities
- Road maintenance where impacted by fish transportation trucks

Funding for research activities and projects at CFD or at CFFCF

- Annual contribution of $40,000 or greater for juvenile fish tagging studies
- Funding and/or cooperation for 2004 and future actions at CFFCF specifically designed to improve the entrance of the fish bypass system and the *opportunity for discovery* of juveniles in the vicinity of the fish bypass entrance
- Prototype collectors and guidance equipment will be fabricated, installed, tested and evaluated at CFD
- Cooperation with the USGS Biological Resources Section, Columbia River Research Laboratory, and outside vendors for further testing of concepts for juvenile fish attraction. Associated research activities may utilize Tacoma Power facilities, equipment and personnel

Operation of the upper Cowlitz River basin fish transportation system

- Managing fisheries on the Cowlitz River requires transporting natural and hatchery salmon and steelhead past the Cowlitz River dams and reservoirs utilizing trap-and-haul.
- Adult fish are collected, enumerated, checked for marks and hauled upstream from the separator at the Cowlitz Salmon Hatchery. Hatchery-origin adults are kept at the hatchery for brood stock, recycled back to the lower river or hauled upstream. Naturally produced adult salmonids are transported by truck to one of four sites on the Tilton, Cowlitz and Cispus rivers where they continue their journey to spawn.
- Downstream migrating juvenile fish from the Cispus and upper Cowlitz rivers are collected, enumerated, checked for marks and hauled downstream from the CFFCF. The transported juvenile fish are released into "stress-relief ponds" at the Cowlitz Salmon Hatchery to improve their survival when they continue their journey downstream.
- Tacoma Power will continue to conduct the on-going juvenile transportation program downstream from CFD to the stress relief ponds at the Cowlitz Salmon Hatchery. Tacoma Power has conducted this hauling program annually since 1995 under a contract with BPA. Funding for the operation of the program is shared with BPA: however, funding for maintenance, repairs, depreciation, replacement cost or modifications is borne entirely by Tacoma Power.
- The successful operation of the collection facility at CFD since 1996 has resulted in annually increasing numbers of juveniles transported from the upper Cowlitz River basin (Table 1). In addition, truck-scheduling challenges associated with increasing run sizes of adult salmonids in the Cowlitz River destined for the upper basin has required an additional fish hauling truck in the Cowlitz River basin.
- Tacoma Power will continue to provide assistance and advice on repairs or modifications to juvenile and adult fish transfer mechanical systems at CFFCF.

Table 1. Number of upstream and downstream hauling trips for juvenile and adult salmonids in the Cowlitz River basin:

YEAR	TRIPS ABOVE COWLITZ FALLS
1995	17
1996	21
1997	82
1998	168
1999	312
2000	361
2001	467
2002	646
2003	528

3.4 "Plans for monitoring and evaluation of effectiveness, including determination of the combined FPS of the existing, proposed new and/or improved facilities at or near Cowlitz Falls and/or Riffe Lake;"

Definition: *"Fish Passage Survival" ("FPS") as used in proposed license article 1 and applied to Cowlitz Falls Dam, Riffe Lake, and Mossyrock Dam, means the percentage of smolts entering the upstream end of Scanewa reservoir, and adjusted for natural mortality, that are collected at Cowlitz Falls Dam and Riffe Lake and Mossyrock Dam, that are transported downstream to the stress relief ponds, and subsequently leave the stress relief ponds at Barrier Dam as healthy migrants.*

The effectiveness of FPS at CFD can be calculated using an experimental approach of determining the annual fish guidance efficiency values and the annual yield of naturally produced smolts from the upper river basin. Tacoma Power proposes the following model be used for calculating smolt survival from the upper Cowlitz River basin to below Barrier Dam

The individual steps necessary to calculate FPS on an annual basis for naturally produced spring Chinook, coho and steelhead juveniles (NORs) from the upper Cowlitz River basin are as follows:

1. Work cooperatively with the operators of the CFFCF to conduct the fish guidance efficiency estimates (FGE) at CFD. This involves releasing marked juvenile fish above the CFD and collecting or detecting them at the dam or the CFFCF.
2. Calculate the total number of juveniles collected at CFD and calculate the total number of juveniles transported downstream and ultimately released from the stress relief ponds at the Cowlitz Salmon Hatchery.
3. The total number of juveniles collected at CFFCF (adjusted for FGE fish) divided by the calculated FGE results in the total yield of juveniles from the upper Cowlitz River basin.
4. Use the Ecosystem Diagnosis and Treatment (EDT) values calculated by Mobrand Biometrics, Inc. for the historical natural survival of downstream migrants.
5. Apply the values to the following model on a species basis:

MODEL:

$$FPS = [[N/CF_{yield}]/ P] \times 100$$

Where:

N = Number released alive downstream of Barrier Dam

= Cowlitz Falls $Dam_{transported\ number}$ - $Transported_{mortalities}$ - Stress Relief $pond_{mortalities}$

CF_{yield} = Total yield of juveniles from above Cowlitz Falls Dam

= Number captured at CFD / CFD_{FCE} on a species basis

Where:

CFD_{FCE} = mean of weekly fish collection efficiency values calculated by mark/recapture studies at CFD

And:

P = Historical natural survival of migrant smolts from the head of Lake Scanewa to the Stress Relief Ponds

= Reach benchmark productivity survival value from Cowlitz EDT model

= .99 for steelhead

= .97 for spring Chinook

= .96 for coho

Reference: Lars Mobrand, Mobrand Biometrics, Inc. May 6, 2002

3.5. "A construction and implementation timeline not to exceed 12 months from plan approval by the Commission, unless the Licensee can establish good cause for additional time."

Tacoma Power, the agencies and FERC staffs have all concluded that the most likely method to achieve satisfactory downstream fish passage survival is through improvements to Cowlitz Falls Dam. If all the answers to what measures would achieve that success were known, a complete construction and implementation timeline would be easy to propose.

In section 3.2 Tacoma Power outlined the fish collection work planned for 2004. We propose and have begun work on building a CF model to aid in understanding flow patterns and to aid in design of of the SBC. The work that LCPUD, BPA and USGS have done in testing baffle panel configurations has been invaluable and we believe this work has made fish passage success, as we have defined it, to be an achievable goal. We believe that a SBC with properly adjusted

flows, coupled with other measures will succeed. To that end we believe that the following general schedule is feasible:

- CFD modeling of Cowlitz Falls began in 2003
- Implementation of interim measures in 2004
- Implementation of engineering studies in 2004 concerning; debris barrier, reservoir drawdown, baffle panels, SBC design
- Installation of a prototype SBC in 2005
- Installation of a permanent SBC in 2006
- Construction of a second permanent SBC in 2007 (unless delay is warranted)

Tacoma Power is committed to meeting the terms of the Settlement Agreement and the Commission's License Order by working collaboratively with LCPUD and BPA to improve fish passage survival in the upper Cowlitz River basin. Within 18 months of completion of construction, in accordance with subparagraph (b) of this license article, Tacoma will report on the effectiveness of the facilities and/or measures to meet the FPS target and/or file a plan for further improvements. Since two SBC's will be operating in the spring of 2006 Tacoma proposes the report on effectiveness be submitted to the FERC following the 2007 outmigration with the due date being set as December 31, 2007.

References:

Bates, K. K. 2003. Cowlitz Falls Juvenile Fish Facilities Recommendations for Biological Testing. August 1, 2003. Report prepared for Lewis County PUD and Bonneville Power Administration.

ENSR Consulting and Engineering. 1994. Cowlitz Falls Gate Slot Velocity Measurements.

Federal Energy Regulatory Commission. 2003. Evaluation of Mitigation Effectiveness at Hydroelectric Projects: Fish Passage. DRAFT.

Harza Northwest, Inc. and ENSR Consulting and Engineering. 1993. Final Report (Appendices G to I) BPA and PUD No. 1 of Lewis County Cowlitz Falls Project – Hydraulic Model Studies for Fish Collection Facilities, Document No. 3373-001-330.

Johnson, G.E. and D.D. Dauble. 1995. Synthesis of existing physical and biological information relative to development of a prototype surface flow bypass system at Lower Granite Dam. Final Report to U.S. Army Corps of Engineers, Walla Walla, WA.

Meselhe E.A., and Odgaard A.J. 1998. "Three-Dimensional Numerical Flow Model for Fish Diversion Studies at Wanapum Dam." *Journal of Hydraulic Engineering*, ASCE, vol. 124 (12).

Schille, Pat. 1999. Washington Department of Fish and Wildlife – Washington State Fish Screening Unit Costs ($/cfs).

Appendices

1. Cowlitz Falls Juvenile Fish Facilities, Recommendations for Biological Testing, Ken K. Bates, August 1, 2003.

2. Access Agreement; Among Tacoma Power, Public Utility District No. 1 of Lewis County and the Bonneville Power Administration, Contract No. 03GS-75129. March 19, 2003.

3. Access, Construction and Operations and Maintenance Agreement at the Cowlitz Salmon Hatchery in support of the Cowlitz Falls Dam Management Plan executed by the United States Department of Energy acting by and through the Bonneville Power Administration and the City of Tacoma, Contract No. DE-MS79-96BP94847. November 21, 1995.

4. Monthly Reports to the National Marine Fisheries Service and the U.S. Fish and Wildlife Service on the status of negotiations among Tacoma Power, Lewis County Public Utility District No. 1 and the Bonneville Power Administration. (December 7, 2000 to present)

5. Scope of Work for Cowlitz Falls CFD model

6. Drawings

9/18/03
hand out

Cowlitz Falls Juvenile Fish Facilities

Recommendations for Biological Testing

Ken Kozmo Bates
Submitted to Mike Kohn, LCPUD
August 1, 2003

The purpose of this report is to recommend biological variables to be tested for collection of fish at Cowlitz Dam and specifically in the zone near the fish flume entrances. It is not intended to cover studies of attraction and guidance though those elements will affect collection and are therefore discussed briefly.

Generally I think current study efforts are on the right track. I suggest a more deliberate approach in some cases focusing on stimulus and response mechanisms rather than expecting to jump to a final fix. I suggest limiting effort on fish collection until attraction and guidance have been optimized. These and specific study suggestions are described below.

Part of the intention of this review These recommendations are based on my general knowledge of Cowlitz Falls and similar projects, fish passage studies at the project, and a recent brief review of some of the draft 2002 ADCP, ADV data and DIDSON video images of fish behavior.

The nomenclature I use here is consistent and expanded from what is generally used at the project. Attraction means movement of fish in forebay to the vicinity of the baffle slots. Guidance means passage through the baffle slots into the spill bay. Collection means passage of fish from the spill bay into the juvenile collection flume and juvenile transport system.

These recommendations were presented informally to staff involved in fish collection at Cowlitz Falls. The graphics of that presentation with sketches and a summary of observations are available.

Observations

Hydraulics and Fish Accumulation

The ADV and ADCP data offer valuable insights into fish behavior relative to collection especially when correlated to DIDSON camera images. They are somewhat limited in they do not correlate to each other well because of different locations, velocity cell dimensions, and turbine flows.

The most obvious fish behavior is the accumulation of fish near the centerline of the spillway slot several meters upstream of the collection flume entrance. Correlating that information with the ADV and ADCP velocity data concludes that fish cannot enter the collection flume without energetically swimming to it. They cannot drift into the flume passively. They have to swim at speeds close to their sustained swimming ability in order to enter it.

In the area between where fish accumulate and the flume entrance, the flow dips down. It circulates in a very clear counterclockwise circulation pattern (looking north into a vertical plane) down the face of the radial gate and towards the induction slot. This is not unexpected since most of the flow enters at the top of the baffle plate and exits through the induction slot. It is not clear what the vertical velocities are. The ADV data were taken at a flow of about 4,300 cfs. The ADCP data, which clearly shows the circulation pattern and downward velocities, were taken when the flow was 1,720 cfs. At that flow, downward velocities at the face of the radial gate were up to 10 cm/s. A correlation by Russell Perry of fish density and vertical velocities throughout the spill bay shows no fish holding where the flow dips at 10 cm/s or more. A graphic of that correlation is included in the appendix figures. Hydraulic modeling by Harza in 1994 showed the induction slot flows varied from 80 to 380 cfs per unit at turbine flows of 1,500 to 4,500 cfs. Using a direct correlation of measured downward velocities in that vicinity to induction flow the dipping velocity fish experience just upstream of the collection flume entrance at turbine flows of 4,500 cfs is about 28 cm/s. That borders on the upper range of sustained swimming speed for 120mm coho, as reported by Bell and others, of 24 to 36 cm/s.

There is a streamwise velocity that ranges from 6 to 30 cm/s with turbine flows of 1,720 to 4,300 cfs based on both the ADV and ADCP data in the vicinity of where fish accumulate. This is substantiated by an unpublished analysis by Russell Perry of fish abundance relative to velocity.

Throughout the spill bay, there is a very distinct break-off of fish density at a mean velocity at 36 cm/s.

To get to where the fish accumulate within the spill bay they pass through a streamwise deceleration of 0.08 cm/s/cm and congregate in an area of about 0.18 cm/s/cm. The 6/26-27/02 ADV data at 4,300 cfs per unit was used to scale velocities. To enter the flume, fish must pass through an accelerating zone of 0.35 cm/s/cm.

It's commonly observed at other projects that fish do not readily pass through hydraulic conditions of decelerating or rapidly accelerating flow over distance (strain). A common acceleration criteria used to optimize passage is 0.10 cm/s/cm. There is no known scientific validation that that criterion is a critical limit but it has been used successfully in many situations. It was the basis for the geometry of the initial wedge screen at Cowlitz Falls.

All of this together means the fish are holding in the most comfortable area near the surface within the spill bay and in order to get to the flume entrance, the have to pass through a zone with velocities near or greater than their sustained swimming speed. They have to energetically and intentionally swim to the flume entrance. This is totally contrary to modern screen design of providing passive guidance to a fish bypass.

Other Collection Conditions

Non-hydraulic characteristics of the flume entrance that might affect collection success are the dimensions of the flume opening, depth, light, and color. Lighting conditions include daylight, night darkness, artificial light at night, and shadows. Artificial light includes intentional light for passage and ambient light that might affect passage.

Cover should also be considered. Cover is overhead or in-water structure to make fish feel more comfortable holding or moving through an area. Cover might be hydraulic, overhead cover, or a combination of the two. Be aware that some predators may be more structure oriented than salmon and thereby take advantage of the cover better than salmon.

Recommendations

My recommendations are based on a brief review of recent studies, data scaled from graphics, and rough calculations; feasibility of the recommendations should be verified with a more thorough review, calculations and data.

Base measurements

Baseline data are needed to document hydraulic conditions in and upstream of the baffle slots and in the spill bay. ADCP velocities should be recorded at about four flows from the minimum to maximum turbine flows. Sample cells and coverage should resemble the 2002 ADCP data. Accurate velocity measurements should be taken within the slots so we know slot and total flow entering the spill bay. Correlate this to the Harza induction slot data.

Consider building a computational fluid dynamic (CFD) model of the spill bay. It would allow the study of hydraulic treatments with a cost savings of velocity measurements in the long term. Changes such as baffle and induction slot openings and locations at various turbine flows could be derived. This would reduce the need for baseline ADCP data. The DIDSON camera information is useful. It should be collected for all species in a range of flows.

The correlation of fish density to hydraulic parameters of velocity, strain and turbulence are very useful. I've suggested to Russell Perry that these relationships be normalized to reflect the preference of hydraulic conditions by fish. Sum the abundance of fish in bins of hydraulic parameters. For example, it appears that for one test about 25% of the fish were within a velocity bin of 20 to 21 cm/s. Divide each fish density data by the percentage of the total volume for which that condition is present. For example, if the numbers of fish in two different hydraulic conditions are the same but those conditions each represent 10 and 90% of the sampled volume, one is actually nine times more selected than the other.

Accumulation of fish is likely due to a combination of turbulence, strain, velocity, and depth plus non-hydraulic parameters. With enough information, multivariate analysis of the relationship of fish accumulation to those hydraulic parameters would be interesting and could provide a basic stimulus-response parameter as described above.

Spill Bay Circulation

Three options are considered for dealing with the accelerating and dipping flow upstream of which fish accumulate.

Flume Entrance Extension

One option is to extend the flume entrance to where the fish accumulate. Extend the flume with a geometry designed to control velocity, downward flow, and acceleration so it is hydraulically "invisible". The flume would be extended to several meters upstream. The velocity there varies from 6 to 30 cm/sec. If a flume entrance were five feet wide by four feet deep, the 30 cm/sec would be exactly achieved with a flume flow of 20 cfs a unit flow of 4,500 cfs, and at a reservoir elevation of 861.0.

This would only test whether fish accept the velocity and acceleration conditions. By varying the flume flow from 10 to 30 cfs, accelerations from 0.07 to 0.22 cm/s/cm and entrance velocities from 15.0 to 45 cm/sec could be tested. To achieve similar hydraulic conditions at other turbine flows the entrance may have to be extended further.

With a forebay range of several feet a final flume extension following this idea would have to have a tilting floor to modify flume dimensions based on turbine flow. The articulating floor would be hinged at the downstream end so the upstream end of the floor could be moved vertically to change the depth and open area of the entrance.

The flume extension would eliminate the acceleration and downward flow that might be blocking fish between where they accumulate and the flume entrance. Additional detail calculations and verification of geometry are needed to fully understand the feasibility of this option and of using the section of wedge screen. Baseline velocity data as described above are also needed at several flows to verify circulation pattern and velocities.

Project personnel have noted a higher FCE (fish collected / fish passing the dam) when the flow is less than 6,000 cfs. That may be due to lower initial attraction of fish to the turbine or to increased acceptance of the flume entrances due to flow patterns in the spill bay. It is expected that at least several operational settings will be necessary to optimize entrance conditions at various river flows.

The recommended extension is different than the modified flume entrances tested in 2001 and 2003 and other suggestions for flume attachments. The 2001 flume entrance extended four feet with an opening of about three feet wide by five feet deep. The 2003 flume entrance extends six feet with an opening of about eight feet wide by three feet. The exact depths are not known because the reservoir elevation during the test is not known. These devices don't simultaneously create hydraulics identical to the background hydraulics, eliminate downward flow at the entrance, control acceleration within the device, and reach upstream to where the majority of fish accumulated.

A third suggestion, the FBFC, has been to create an overflow spillway with a dewatering device. The idea has merit in that it can use more flow than can be conveyed by the flume system. That additional flow might eventually be necessary anyway to either create additional attraction, affect the flow patterns within the spill bay, and/or simultaneously allow a high entrance velocity and open area optimized for fish collection. Regardless though, the effects of collection velocity, acceleration, downward velocities, and open dimensions should be understood first. A similar device has been used successfully at the Lake Washington Ship Canal. It could be installed on the flume entrance; a flume flow of about 30 cfs would allow a ten-foot wide crest and a critical depth of one foot. Additional hydraulic analysis should be conducted to verify it would function through the range of expected forebay elevations.

Radial Gates Screen

The second option is to break the circulation pattern within the bay, which could be done by removing water at the face of the radial gate so it will not fall. This option is not recommended at this time without hydraulic modeling and confidence that it would be effective and operable.

It includes a screen chamber on the face of the gate that would collect flow and a conduit to carry the flow to the induction slot. The flow that dips at the face of the radial gate is about 128 cfs at 1,400 cfs and 447 cfs at 4,500 cfs. This is calculated by scaling vectors off the ADCP plots and extrapolating to the high flow with the Harza induction flow curves. The flow is greater than the flow that would come through the top baffle slot assuming the distribution of flow is equal to the distribution of slot area (top slot A=240 sq ft; C-slot A=80 sq ft) because of the recirculation in the spill bay. Only about 260 cfs enters through the A slots at a turbine flow of 4,500 cfs. The vertical circulation pattern would be eliminated If that 260 cfs were removed through screens at

the face of the radial gate. A screen covering about the top half (14 feet) of the face of the radial gate would be necessary. The conduit needed to carry to the flow to the induction slot would cause substantial head loss and redistribution of flow to the C-slot. A more feasible screen could be used if it is agreed that 0-age fry need not be protected.

Baffle Slots

The third option to affect the spill bay circulation is to modify the baffle slots. A number of baffle configurations might improve flow characteristics in the spill bay. Baffle configurations will also certainly affect attraction and guidance.

Two options that might increase collection are 1) decrease the area of the top slot and increase the C-slot to decrease dipping flow; and 2) close the C-slot partially and close the induction slot to eliminate the dipping flow. These options are not stated as recommendations; they are stated to merely show the range of options that might be tested since the two actions are so disparate but may achieve the same objective.

Modification of baffle and induction slots is especially interesting because these are changes that could be made seasonally depending on species and turbine flow. Settings could be optimized separately for steelhead/cutthroat/coho at several flows and for fall Chinook at a normal flow and changed during the season. A few modified configurations are suggested here only as a beginning to a thorough list and analysis of options. First considerations of baffle slot options should be driven by attraction and guidance efficiencies, not collection efficiency. See the discussion below on attraction and guidance.

Cover

Cover might also be tested. Cover might be hydraulic, overhead cover, or a combination of the two. Hydraulic cover could be a group of vertical beams hanging in the water just upstream of a flume entrance. A pattern something like four-inch pieces on 15-inch centers in a band four feet wide by 12 feet upstream might be reasonable. Overhead cover could be a shade panel of about the same overall area suspended just over the water surface or floating on the surface. Cover would be tested with side-by-side paired treatments at two flume entrances. If the flume extension is tested, a test parameter should include partial shading over the extension as well as part of the flume.

Fish Behavior Tests

Some tests have previously been conducted in holding ponds at the Cowlitz Falls juvenile collection facility. Additional tests might be conducted there as well as at the fish collection flume entrances to better understand fish behavior.

The holding ponds offer an opportunity to test fish behavior relative to flume entrance conditions without the cost and complications of modifications to the flumes and/or spill bays. Simple tests could optimize the following hydraulic and non-hydraulic parameters associated with the flume entrance. Research is needed to relate fish passage to the parameters in the following table. This information is needed for a number of fish collection efforts in the Northwest. Studies should be coordinated with other projects to maximize their benefit.

Non-hydraulic	Light (daylight, night darkness, ambient light, shadows)
	Color
	Cover (Hydraulic, overhead)
	Entrance dimensions
	Entrance depth
Hydraulic	Acceleration
	Velocity (at abrupt acceleration, vertical component)

The dimensions of the flume entrance and flume depth cannot be tested in the ponds because of scale ratios. These will be modified if the extended flume entrance is tested. Vertical velocity may be the most important hydraulic parameter but it cannot be tested in the confined flume.

None of the behavioral tests are primary passage tests or modifications. They are intended to optimize conditions for whatever overall plan or device proves successful.

Focus on Stimulus-Response

In fish passage work there is always a tendency to focus studies on specific solutions. Specific "fixes" are studied with the hopes of securing an early success rather than taking time to study the behavior of fish in more of a basic research mode. There's nothing wrong with that approach if there are few variables or if we understand relationships among variables such as how extending a screen affects flow and pressure distributions, which then affect fish behavior.

I suggest that study objectives and results be described by parameters that directly relate to stimulus-response mechanisms; parameters that are sensed by fish. For example, study objectives could be to learn the response of coho to acceleration. A range of accelerations would have to be tested at several velocities to satisfy the objective. Try to vary one parameter at a time and describe results in terms of that parameter. Also test hydraulic parameters concurrently to build multivariate relationships of fish preference to velocity, vertical velocity, and acceleration.

Start with a list of stimulus-response mechanisms and ask how each one is affected through the operating range of the facility for each "fix" that is attempted. Summarize each test with stimulus-response lessons learned.

Attraction and Guidance

Optimize attraction and guidance before investing a lot of effort goes into perfecting collection. Optimize attraction and guidance based on flow and fish and expect to make seasonal changes to baffle, induction slot, and collection flume configurations. Ideally we would develop the best attraction and guidance for spring species at several flows and summer species at a typical flow. I understand there is discussion of seasonal removal of debris deflector also; this would fit into the summer optimization for summer species. For testing, the baffle panels should be configured to be easily modified from one configuration to another so several configurations could be tested without major modifications. This might be done by making some of the solid panels within the baffle structures slide in guides.

In the meantime, we must obviously collect fish. There's nothing wrong with improving collection seasonally and annually; just don't focus all the work there.

Lewis County
PUBLIC UTILITY DISTRICT
321 N.W. PACIFIC AVENUE • CHEHALIS, WASHINGTON
Mailing Address: P.O. Box 330, Chehalis, WA 98532-0330
1-800-562-5612 • (360) 748-9261 • FAX (360) 740-2455

March 19, 2003

Ms. Debbie Carlson
Bonneville Power Administration
M/D 1399
P.O. Box 968
Richland, WA 99352-0968

Mr. Pat McCarty
Tacoma Power
3628 South 35th
Tacoma, WA 98409

Dear Debbie and Pat:

Enclosed for your respective files is one fully-executed copy of the Access Agreement.

Sincerely,

Dave Muller
Manager

DJM/cb
Enclosure

~~ROUTE TO~~ COPIES TO	FOR INFO	FOR ACTION
Max Emrick		
Rick Herrmann		
Kristin Jensen		
Kim Moore	✓	
Debbie Young	✓	
Brad Ingle		
Dennis Koehn		
Dean McLeod	✓	
Mark Larkin	✓	
Due By:		

Lewis PUD PUBLIC UTILITY DISTRICT County

Contract No. 03GS-75129

ACCESS AGREEMENT

Among Tacoma Power, Public Utility District No. 1 of Lewis County and the Bonneville Power Administration

This Access Agreement, executed on the 19TH day MARCH, 2003, by City of Tacoma Light Division doing business as Tacoma Power ("Tacoma" hereinafter), and Public Utility District No. 1 of Lewis County, Washington (Lewis), municipal corporations of the State of Washington, and the United States of America, Department of Energy acting by and through the Bonneville Power Administration (Bonneville), sometimes referred to collectively as "Parties" or individually as a "Party",

WITNESSETH:

Whereas, Lewis holds a license from the Federal Energy Regulatory Commission (FERC - license No. 2833) to construct and operate a hydroelectric generating facility in Lewis County, Washington, known as the Cowlitz Falls Project, and

Whereas, Lewis is participating with FERC and the National Marine Fisheries Service (NMFS) in consultations under section 7 of the Endangered Species Act (ESA) concerning potential impacts of the Cowlitz Falls Project on listed anadromous fishes, and

Whereas, Tacoma holds a FERC license (No. 2016) for the Cowlitz River Project (Cowlitz Project), under which it operates two hydroelectric generating facilities, which are located downstream from the Cowlitz Falls Project, and

Whereas, the relicensing of Tacoma's Cowlitz Project is an "agency action" which is subject to section 7 of the ESA, and Tacoma is engaged in formal section 7 consultation with FERC and NMFS, and

Whereas, in connection with the relicensing of its Cowlitz Project, Tacoma has agreed to certain anadromous fish mitigation provisions through a comprehensive settlement agreement with federal and state agencies and non-governmental organizations, which agreement has been substantially approved by FERC; and

Whereas, the Bonneville Power Administration (Bonneville) has constructed and operates a juvenile Fish Collection Facility at the Cowlitz Falls Project, and

Whereas, Tacoma has requested access to the Cowlitz Falls Project and Bonneville's Fish Collection Facility to investigate and study measures for improving juvenile fish collection, and

Whereas, Bonneville and Lewis have agreed to cooperate with Tacoma in its efforts to improve juvenile fish collection at Cowlitz Falls.

Now, therefore, the Parties agree as follows:

1. Term

This Agreement shall become effective as of the date of execution of this Agreement by the Parties. This Agreement shall continue from year to year unless terminated by any of the Parties. Any Party may terminate this Agreement immediately for cause or without cause upon thirty (30) days written notice. The intent of this Agreement is to coordinate communication and access for fisheries experiments and testing at Cowlitz Falls Project. This Agreement will be terminated and a new agreement will be negotiated if long-term, mutually agreeable solutions are developed.

2. Right of Entry to the Cowlitz Falls Project.

Pursuant to the terms of this Agreement, Lewis grants to Tacoma, the nonexclusive right to enter onto that portion of the Cowlitz Falls Project set forth in Exhibit A for the limited purpose of providing assistance to Lewis and Bonneville in locating, designing, constructing, operating, maintaining, repairing, rebuilding, upgrading, and removing fish collection facilities as defined more specifically by Cowlitz Falls Fish Facility Fisheries Research Plans, Exhibit C, and subsequent research plans as defined and agreed to by the Parties and attached as amended Exhibit C.

3. Right of Access to the Cowlitz Falls Reservoir

Pursuant to the terms of this Agreement, Lewis grants to Tacoma, the nonexclusive right to access to that portion of the Cowlitz Falls Project parks, roads, boat ramps, and reservoir for the purpose of releasing adult anadromous fish in the Cowlitz Falls Reservoir. The Fish Release Site Agreement executed by Tacoma and Lewis dated December 7, 1994, is terminated and superseded with the execution of this Agreement.

4. Right of Entry to the Bonneville Fish Collection Facilities

Pursuant to the terms of this Agreement, Bonneville grants to Tacoma, the nonexclusive right to enter on that portion of the Fish Collection Facilities set forth in Exhibit B for the limited purpose of providing assistance to Lewis and Bonneville in locating, designing, constructing, operating, maintaining, repairing, rebuilding, upgrading, and removing fish collection facilities as defined more specifically by Cowlitz Falls Fish Facility Fisheries Research Plans, Exhibit C, and subsequent research plans as defined and agreed to by the Parties and attached as amended Exhibit C.

5. Right of Entry Notice / Procedures / Responsibility

a. Entry by Tacoma shall include reasonable prior notice by Tacoma of its intention to enter the Cowlitz Falls Project, the Cowlitz Falls reservoir, or the Fish Collection Facility. Tacoma shall provide annual schedules of expected anadromous fish releases in the upper Cowlitz and Cowlitz Falls reservoir. Tacoma shall provide actual monthly upper Cowlitz and Cowlitz Falls reservoir release numbers by species.

b. Notice shall be provided by Tacoma to Cowlitz Falls Project Superintendent (Jim Byrd) at 360-497-5351 or by email, Jim.Byrd@lewiscounty.com. The names of Tacoma employees, contractors, agents, and representatives shall be included in the notice.

c. Normal access to the Cowlitz Falls Project is limited to the daytime hours (7:30 a.m. to 4:00 p.m.) Monday through Friday. Access outside normal daytime hours shall require written approval by Lewis and/or Bonneville and any additional expense shall be reimbursed by Tacoma.

d. Tacoma employees (other than for fish hauling) shall be accompanied by Lewis personnel while on the Cowlitz Falls Project site unless prior authorization is given by Lewis. Lewis may require prior written authorization.

e. Tacoma employees (other than for fish hauling), contractors, agents, and representatives shall be accompanied by Bonneville, Lewis, and/or Washington State Department of Fish and Wildlife (WDFW) personnel while on the Fish Collection Facility site, unless prior authorization is given by Lewis and/or Bonneville. Bonneville may require prior written authorization.

f. Tacoma employees, contractors, agents, and representatives may use Cowlitz Falls Project and Fish Collection Facility equipment provided prior written approval and training is obtained from Lewis and/or Bonneville.

g. Tacoma employees, contractors, agents, and representatives shall be responsible for proper and safe operation of Cowlitz Falls Project and Fish Collection Facility equipment and shall abide by Lewis' Accident Prevention Program (copy of which is attached hereto as Exhibit D).

h. Tacoma shall comply with all applicable codes, regulations, and laws in the implementation of the provisions of this Agreement.

i. Tacoma shall be responsible for and reimburse Lewis and Bonneville for any damages, wear and tear, and repairs to equipment and facilities resulting from access and use provided under this Agreement.

6. Planning and Coordination Procedures

a. Lewis and Bonneville will coordinate with Tacoma to provide such information as may be reasonably necessary to assist Tacoma in meeting its Cowlitz River fisheries obligations.

b. The Parties shall exchange information as necessary to assist Tacoma in meeting its Cowlitz River fisheries obligations and for coordination and development of fisheries research plans at the Cowlitz Falls Project, the Fish Collection Facility, and the Cowlitz Projects.

c. The Parties shall discuss and coordinate all planning, design, fabrication, construction, maintenance, operation and monitoring activities among the Parties to this Agreement. All studies, research plans, designs and fish collection activities at the Cowlitz Falls Project, reservoir or Fish Collection Facility shall address plant operation and maintenance affects and costs. Lewis and Bonneville shall approve all studies, research plans, designs and fish collection activities at the Cowlitz Falls Project and the Fish Collection Facility, and within the Cowlitz Falls Reservoir. Such approval shall be obtained prior to discussion, communications, and dissemination of studies, plans, designs, and fishery research activities to third parties.

d. Each phase of study, research or development shall include cost estimates (no less than annually) for construction, implementation, operation and maintenance, and removal. The Parties shall agree to reimbursement, cost

sharing, and/or payment provisions prior to implementation at each phase of study, development and implementation.

7. Ownership of Facilities

a. Bonneville owns and shall continue to own the Fish Collection Facilities.

b. Lewis owns and shall continue to own the Cowlitz Falls Project and associated appurtenances.

c. Unless otherwise agreed in advance, modifications, additions, and betterments shall be the property of the owner of the property to which such modifications, additions, and betterments are made.

d. Lewis and Bonneville may request that Tacoma remove any such modifications, additions, or betterments and restore the Cowlitz Falls Project and the Fish Collection Facilities, or, if after 60 days of written notice, Tacoma fails to make significant progress on the requested removal and restoration, Lewis and/or Bonneville may remove such modifications, additions, or betterments and Tacoma shall reimburse Lewis and Bonneville the removal expense.

8. Regulatory Approval

a. The Parties agree that all required regulatory approvals will be obtained prior to implementation of any provision under this Agreement. Lewis, as the Cowlitz Falls Project owner and licensee, shall take the lead in obtaining any regulatory approval or revisions related to the Cowlitz Falls Project. Bonneville, as the Bonneville Fish Collection Facility owner, shall take the lead in any regulatory approvals or revisions related to such facility. Tacoma shall take the lead in any regulatory approvals or revisions related to the Cowlitz Project. Copies of regulatory approvals shall be provided to each Party.

b. In undertaking the planning, financing, construction, acquisition, operation maintenance and implementation of the provisions of this Agreement, the Parties must comply with the requirements of all licenses, permits, and regulatory approvals necessary for such planning, financing, construction, acquisition, operation and maintenance. It is also agreed that this Agreement is made subject to the provisions of all such licenses, permits, and regulatory approvals.

c. Should the relicensing of the Cowlitz Project by FERC result in changes to Tacoma's fisheries obligations, including any changes that may result from the ESA section 7 consultations related to that Project, Lewis and Bonneville agree to make a good faith effort to work with Tacoma to meet such obligations to the extent that the Cowlitz Falls Project and/or the Fish Collection Facility may be involved. Except as otherwise agreed in writing, the Party whose obligations are being met shall be responsible for the cost of any measures undertaken by itself or by the other Parties to meet such obligations.

9. Assignment

Each Party agrees that it shall not assign or transfer its interests, rights, or obligations under this Agreement without the written consent of the other Parties unless the Party's ownership interest in property is also transferred. This Agreement shall inure to the benefit of and shall be binding upon the respective successors and assigns of the Parties.

10. Dispute Resolution

Every attempt shall be made by all Parties to resolve disputes arising from the implementation of this Agreement at a technical level. In the event a dispute cannot be resolved at a technical level, the dispute shall be elevated through the appropriate levels of authority, up to and including the Lewis PUD Manager, Bonneville's Manager of Contract Generating Resources, and the Generation Manager of Tacoma for resolution. In the event that the matter is still unresolved, either Party may obtain the services of a professional mediator. The mediator shall be chosen by agreement of both Parties, but the Party requesting the services shall cover the costs, unless the Parties agree otherwise.

If dispute resolution is not successful, any Party may seek administrative or judicial relief to enforce this contract or resolve the dispute.

11. Uncontrollable Force

Any obligation of a Party to perform under this Agreement shall be excused when failure to perform such obligations is due to an Uncontrollable Force. In the event that any Party is unable to perform due to an Uncontrollable Force, such Party shall exercise due diligence to remove such inability with reasonable dispatch. Nothing in this section shall be construed to require any Party to settle any strike or labor dispute in which it may be involved. Any Party shall notify the other(s) as soon as practicable of any Uncontrollable Force, which may impair performance under this Agreement. Failure to give

such notice within a reasonable period shall be deemed a waiver of such Uncontrollable Force.

Uncontrollable Force is an act or event beyond the reasonable control of a Party, and which by exercise of due diligence and foresight such Party could not reasonably have been expected to avoid or remove, which impairs the ability of the Party to perform and, includes, but is not limited to, failure of or threat of failure of facilities, flood, earthquake, storm, accident, fire, lightning, and other natural catastrophes; epidemic, war, labor, or material shortage, strike or labor dispute, or sabotage; and also includes restraint by an order of a court of competent jurisdiction or by regulatory authorities against any action taken or not taken by a Party, after a good faith effort by the appropriate Party to obtain: 1) relief from such order, or 2) any necessary authorizations or approvals from any governmental agency or regulatory authority.

12. Hold Harmless

Each Party to this Agreement agrees to save, defend, indemnify and hold the other Parties to this Agreement harmless from claims of personal injury, death and/or property damage or loss, except to the extent such claims arise from the negligent or intentional acts of the indemnified Party, its agents or employees. To the extent necessary to implement this hold harmless agreement with the exception of claims which are barred by the statute of limitations, each of the Parties waives all code or statutory defenses or immunities it may otherwise have, including, but not limited to, immunities afforded by Title 51 RCW. The Parties have mutually negotiated the terms of this hold harmless Agreement, including, but not limited to, the waiver of immunity under industrial insurance law.

13. Notices

Any notice, demand, approval, proposal, protest, consent, direction, or request provided for this Agreement shall be effective from the date mailed or transmitted by facsimile or similar means, and shall be directed as follows:

If to Lewis;

Public Utility District No. 1 of Lewis County
Manager
P.O. Box 330
Chehalis, WA 98532
Manager, davem@lcpud.org
Project Superintendent, jim.byrd@lewiscounty.com
Project Biologist, mike@lcpud.org

If to Bonneville; Bonneville Power Administration
Manager, Contract Generating Resources
M/D 1399
P.O. Box 968
Richland, WA 99352-0968
Project Manager: Debbie Carlson, dcarlson@bpa.gov

If to Tacoma; Tacoma Power
Generation Manager
3628 South 35th
Tacoma, WA 98409

The Parties may change their recipient(s) of notice at any time by designating a new recipient(s) in a letter delivered to the other Party(s).

14. Severability

The obligations and liabilities of the Parties under this Agreement are several, and are not joint. Neither Party(s) shall be obligated or liable for any obligation or liability of the other Party(s). Neither Party(s) shall have, by virtue of this Agreement any right, power or authority to incur any obligation or liability of, to act as the agent or representative of, or to otherwise bind the other Party(s).

15. Governing Law

This Agreement shall be interpreted, governed by, and construed under the laws of the State of Washington.

16. Waivers

Except as agreed by the Parties, no provision of this Agreement may be waived except as confirmed in writing. Any waiver at any time by a Party of its right with respect to a default under this Agreement or with any other matter arising in connection herewith, shall not be deemed a waiver with respect to any subsequent default or matter.

17. Invalid Provision

If any provision(s) of this Agreement is held to be invalid or unenforceable, the validity and enforceability of the remaining provisions shall not be affected thereby.

18. Exhibits

Exhibits to this Agreement are hereby incorporated into the Agreement. In the event of conflict between the terms of an exhibit and the body of the Agreement, the terms of the exhibit shall control.

Exhibit A	Cowlitz Falls Project Map
Exhibit B	Fish Collection Facilities Map
Exhibit C	Cowlitz Falls Fish Facility – Fisheries Research Plans
Exhibit D	Lewis County PUD Accident Prevention Program

19. Third-Party Beneficiaries

There are no third party beneficiaries of this Agreement. Nothing contained in this Agreement is intended to confer any right or interest on anyone other than the Parties, their respective successors, assigns and legal representatives.

20. Amendment

No change, amendment, or modification of any provision of this Agreement shall be valid unless set forth in a written amendment to this Agreement signed by all Parties.

21. Headings Not Binding

The headings and captions in this Agreement are for convenience only and in no way define, limit, or describe the scope or intent of any provision or sections of this Agreement.

22. Agreement of the Parties

This Agreement represents the entirety of the Agreement between the Parties, and this Agreement supercedes any prior written or oral agreements between the Parties regarding the subject matter of this Agreement.

23. Construction

Should any provision of this Agreement require judicial interpretation, the Parties hereto agree that the court interpreting or construing the same shall not apply a presumption that the terms hereof shall be more strictly construed against a Party by reason of the Rule of Construction that a document is to be more strictly construed against the party who itself or through its agents

prepared the same, it being the Agreement of the Parties that all have participated in the drafting of this Agreement.

In Witness Whereof, the Parties hereto have executed this Agreement.

City of Tacoma, Light Division
(dba Tacoma Power)

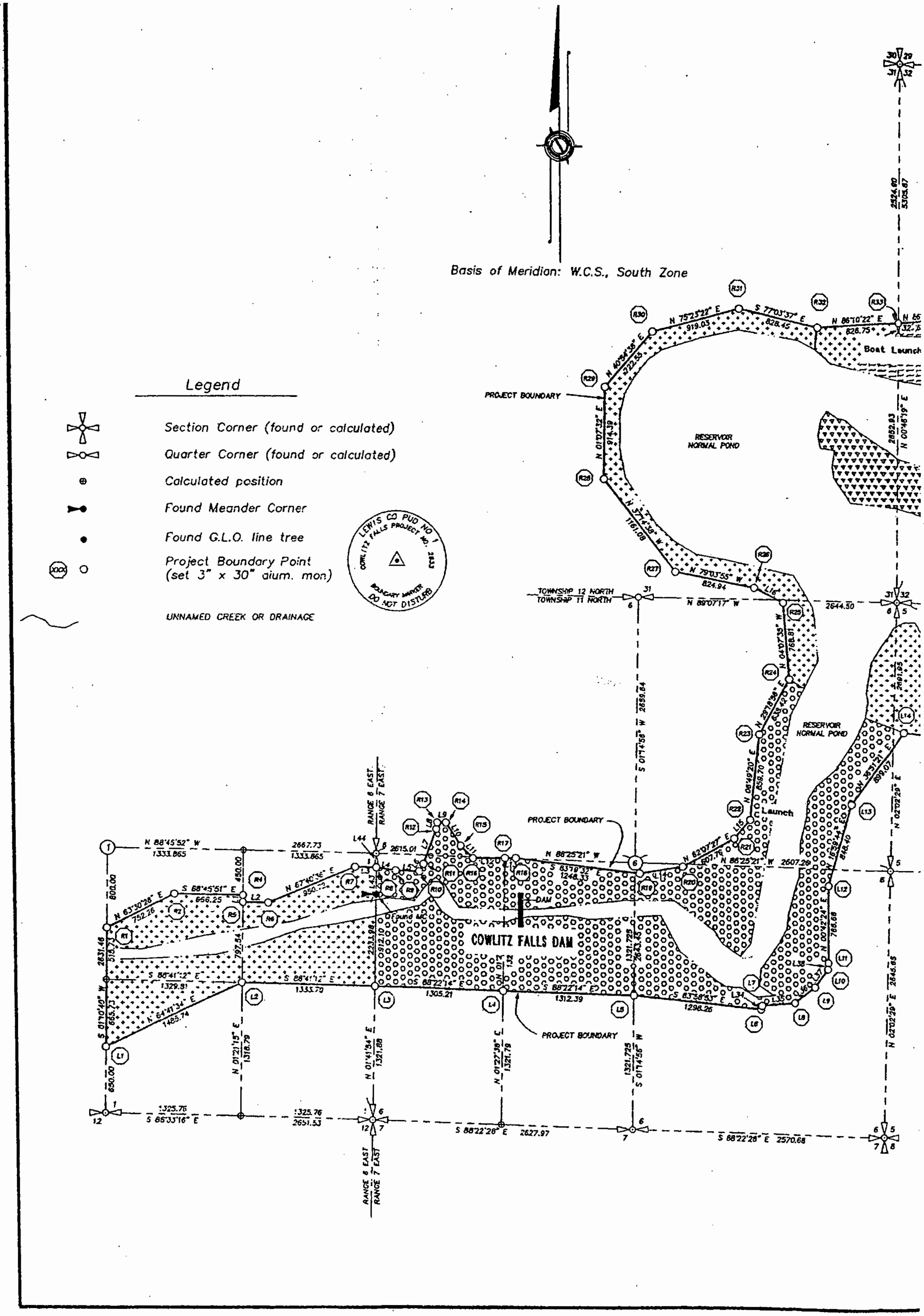
Date 3-17-03

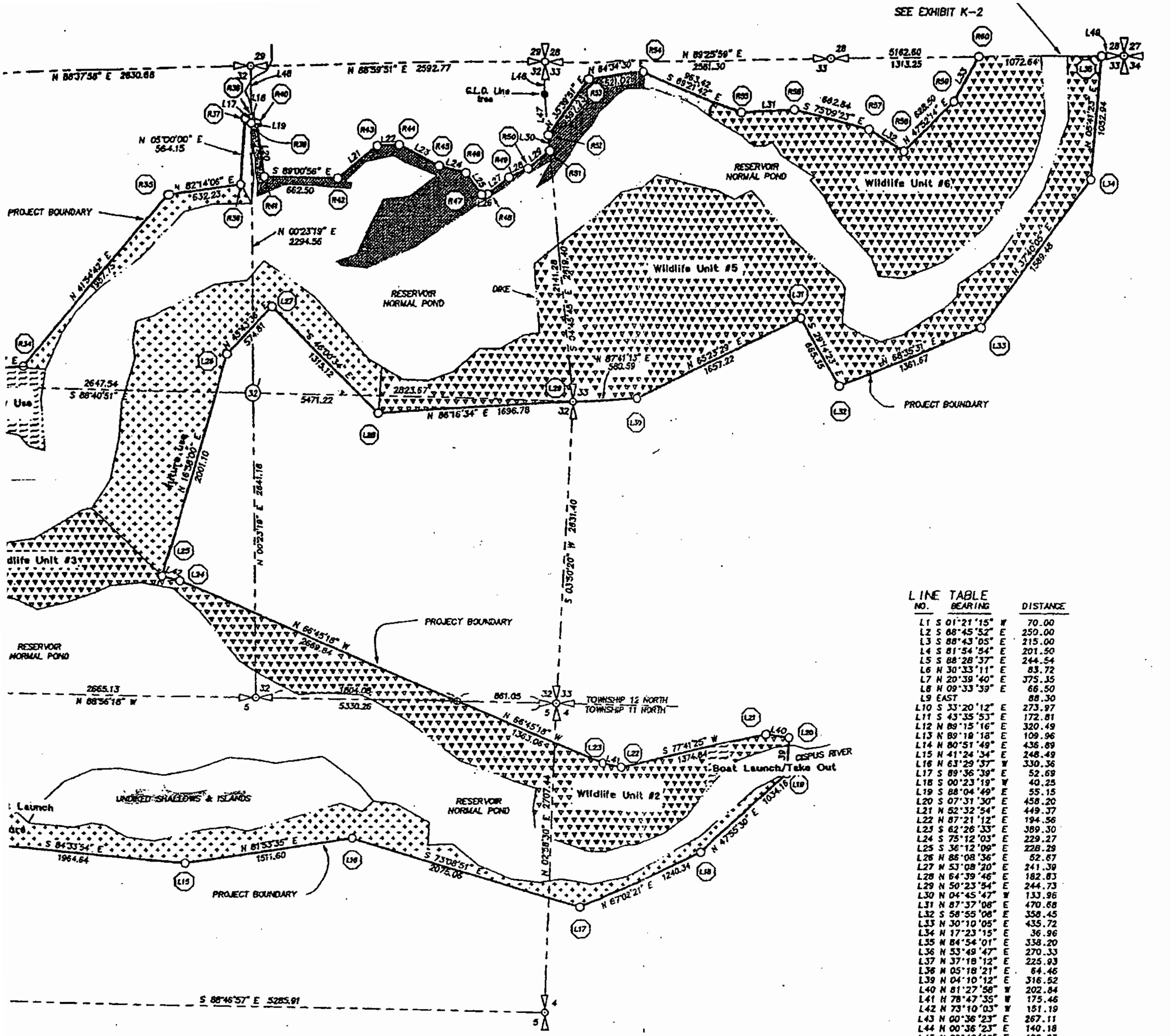
United States of America
Department of Energy
Bonneville Power Administration

Date 3/6/03

Public Utility District No.1 of Lewis County

Date 3/19/03


Basis of Meridian: W.C.S., South Zone
Legend
Section Corner (found or calculated)
Quarter Corner (found or calculated)
Calculated position
Found Meander Corner
Found G.L.O. line tree
Project Boundary Point
(set 3" x 30" alum. mon)
UNNAMED CREEK OR DRAINAGE
LEWIS CO PUD NO 1
COWLITZ FALLS PROJECT NO. 2833
BOUNDARY MARKER
DO NOT DISTURB
PROJECT BOUNDARY
RESERVOIR NORMAL POND
Boat Launch
Launch
TOWNSHIP 12 NORTH
TOWNSHIP 11 NORTH
RANGE 6 EAST
RANGE 7 EAST
COWLITZ FALLS DAM
DAM
Found MC
N 75°23'22" E
919.03
S 77°03'37" E
828.45
N 86°10'22" E
828.75
N 01°07'32" E
914.39
1161.08
N 79°03'55" W
824.94
N 89°07'17" W
2644.50
S 01°14'56" W
2659.64
N 88°45'52" W
1333.865
2667.73
N 63°30'28" E
752.26
S 88°45'51" E
656.25
N 67°40'36" E
N 88°25'21" W
S 63°19'32" E
1248.33
2607.26
S 88°41'12" E
1329.81
1333.70
S 88°22'14" E
1305.21
1312.39
1298.26
N 64°41'34" E
1485.74
S 01°10'40" W
2831.46
N 01°21'15" E
1318.79
N 01°41'34" E
1321.88
N 01°22'38" E
1321.79
S 01°14'56" W
S 88°33'16" E
1325.76
2651.53
S 88°22'28" E
2627.97
2570.68
N 02°02'29" E
2645.85
N 00°46'19" E
2524.60
5305.87
2615.01
450.00
797.54
800.00
650.00
2233.98
0912.10
766.68
848.40
899.07



LINE TABLE

NO.	BEARING	DISTANCE
L1	S 01°21'15" W	70.00
L2	S 68°45'52" E	250.00
L3	S 88°43'05" E	215.00
L4	S 81°54'54" E	201.50
L5	S 88°28'37" E	244.54
L6	N 30°33'11" E	83.72
L7	N 20°39'40" E	375.35
L8	N 09°33'39" E	66.50
L9	EAST	88.30
L10	S 33°20'12" E	273.97
L11	S 43°35'53" E	172.81
L12	N 89°15'16" E	320.49
L13	N 89°19'18" E	109.96
L14	N 80°51'49" E	436.89
L15	N 41°24'34" E	248.49
L16	N 63°29'37" W	330.36
L17	S 89°36'39" E	52.69
L18	S 00°23'19" W	40.25
L19	S 88°04'49" E	55.15
L20	S 07°31'30" E	458.20
L21	N 52°32'54" E	449.37
L22	N 87°21'12" E	194.56
L23	S 62°26'33" E	389.30
L24	S 75°12'03" E	229.27
L25	S 36°12'09" E	228.29
L26	N 86°08'36" E	52.67
L27	N 53°08'20" E	241.39
L28	N 64°39'46" E	182.83
L29	N 50°23'54" E	244.73
L30	N 04°45'47" W	133.96
L31	N 87°37'08" E	470.68
L32	S 58°55'08" E	358.45
L33	N 30°10'05" E	435.72
L34	N 17°23'15" E	36.96
L35	N 84°54'01" E	338.20
L36	N 53°49'47" E	270.33
L37	N 37°18'12" E	225.93
L38	N 05°18'21" E	64.46
L39	N 04°10'12" E	316.52
L40	N 81°27'58" W	202.84
L41	N 78°47'35" W	175.46
L42	N 73°10'03" W	151.19
L43	N 00°36'23" E	267.11
L44	N 00°36'23" E	140.18
L45	N 00°46'19" E	128.03
L46	S 01°11'41" W	276.47
L47	S 04°45'44" E	344.15
L48	N 00°23'19" E	441.67
L49	N 89°26'00" E	195.41

- FOREST/TIMBER LANDS (Present Use)
- OPERATION/MAINTENANCE LANDS (Project Use)
- WILDLIFE MANAGEMENT UNIT (Project Use)
- RECREATION LANDS (Project Use)
- RURAL LANDS (Present Use)

BUFFER ZONE MANAGEMENT PLAN

COWLITZ FALLS PROJECT
FERC PROJECT NO. 2833
PUBLIC UTILITY DISTRICT NO. 1
OF LEWIS COUNTY
REVISED EXHIBIT K-1
1999
PROJECT BOUNDARY MAP

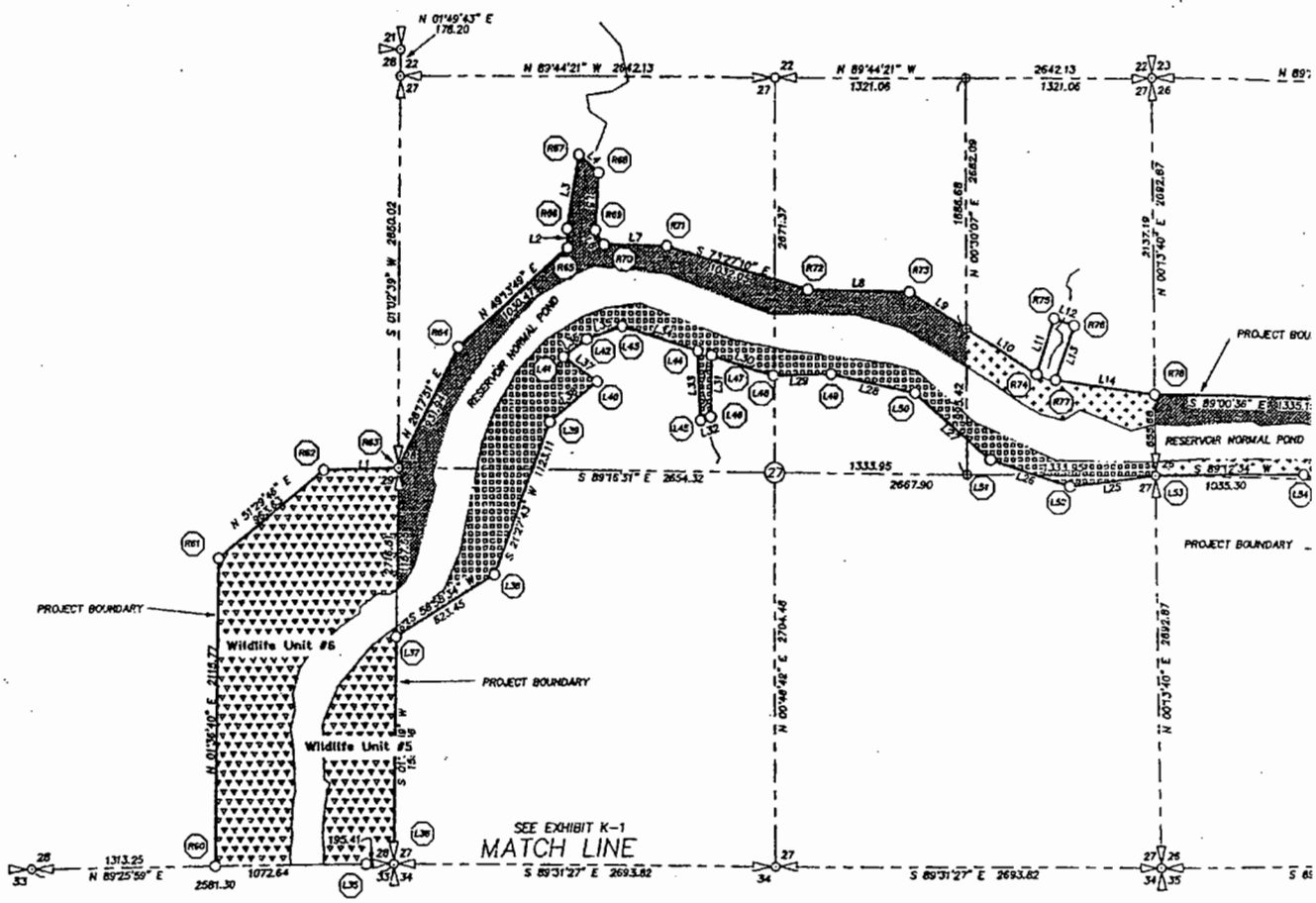
Scale 1"=600' 0 300 600 1200 Feb. 7, 2001

LAND USE DESIGNATIONS

Sheet 1 of 4

Drawing revised for BZMP first update

PUD-SJG, 2/7/01

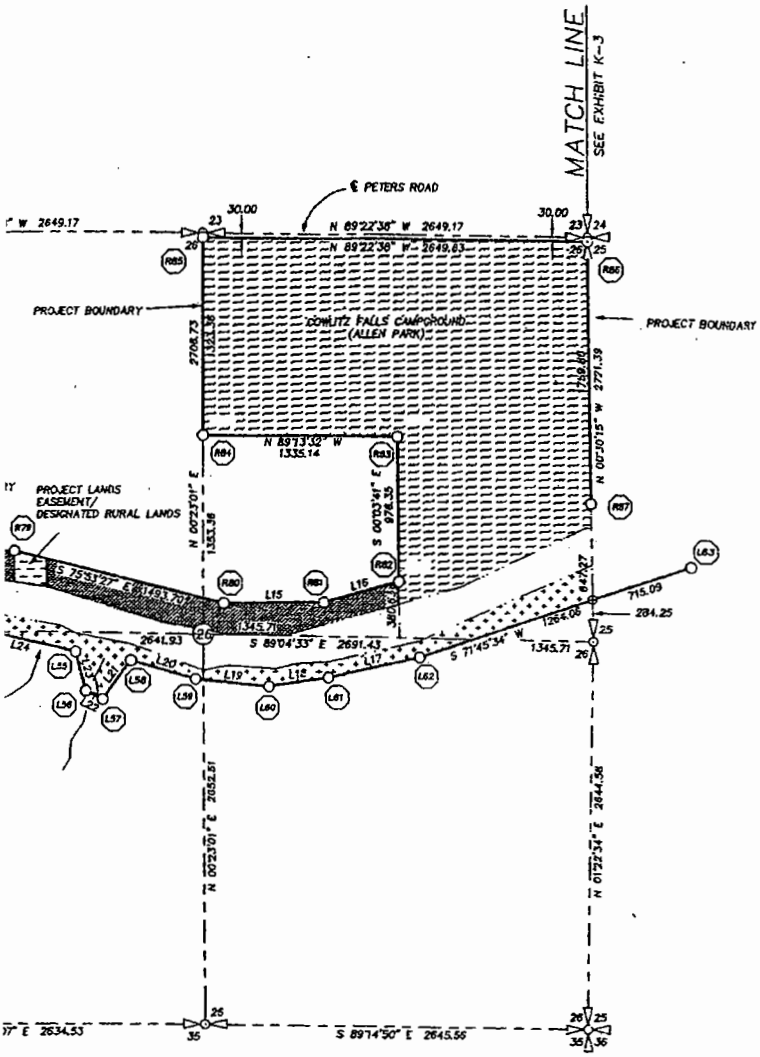


TOWNSHIP 12 NORTH, RANG
WILLAMETTE MERIDIA
LEWIS COUNTY, WASHIN

- FOREST/TIMBER LANDS
- WILDLIFE MANAGEMENT UNIT
- RECREATION LANDS
- AGRICULTURE LANDS
- RURAL LANDS

Legend

- Section Corner (found or
- Quarter Corner (found or
- Calculated position
- Project Boundary Point (set 3" x 30" alum. mon)
- UNNAMED CREEK OR DRAINAGE



Basis of Meridian: W.C.S., South Zone

LINE TABLE

NO.	BEARING	DISTANCE
L1	N 86°35'03" E	530.94
L2	N 00°29'22" W	130.55
L3	N 10°05'26" E	503.61
L4	S 48°07'35" E	162.59
L5	S 04°04'17" W	386.48
L6	S 31°14'36" E	114.25
L7	S 88°45'43" E	437.66
L8	S 88°42'35" E	701.48
L9	S 57°21'40" E	464.79
L10	S 57°21'40" E	577.90
L11	N 18°16'48" E	399.77
L12	S 70°53'21" E	145.26
L13	S 20°07'12" W	393.86
L14	S 81°31'17" E	717.59
L15	N 89°32'47" E	890.05
L16	N 74°25'41" E	530.36
L17	S 77°36'15" W	641.66
L18	S 81°32'15" W	418.56
L19	N 84°16'42" W	507.35
L20	N 74°06'15" W	457.71
L21	S 36°28'18" W	328.49
L22	N 64°51'26" W	132.04
L23	N 14°28'55" W	274.97
L24	N 76°20'36" W	748.17
L25	S 83°34'18" W	620.85
L26	N 71°29'04" W	587.21
L27	N 48°02'02" W	689.17
L28	N 77°24'40" W	590.43
L29	S 88°16'58" W	405.13
L30	N 72°16'03" W	444.99
L31	S 01°27'11" W	417.32
L32	S 71°38'14" W	75.86
L33	N 01°48'51" W	472.52
L34	N 72°30'48" W	557.28
L35	S 71°02'43" W	266.31
L36	S 54°18'56" W	202.54
L37	S 53°49'43" E	287.17
L38	S 50°24'41" W	430.67

6 EAST

TON

culated)

culated)

LEWIS CO PUD NO 1 COWLITZ FALLS PROJECT NO. 2833 BOUNDARY MARKER DO NOT DISTURB

BUFFER ZONE MANAGEMENT PLAN

COWLITZ FALLS PROJECT
FERC PROJECT NO. 2833
PUBLIC UTILITY DISTRICT NO. 1 OF LEWIS COUNTY
REVISED EXHIBIT K-2
1999
PROJECT BOUNDARY MAP

Scale 1"=600'

0 300 600 1200

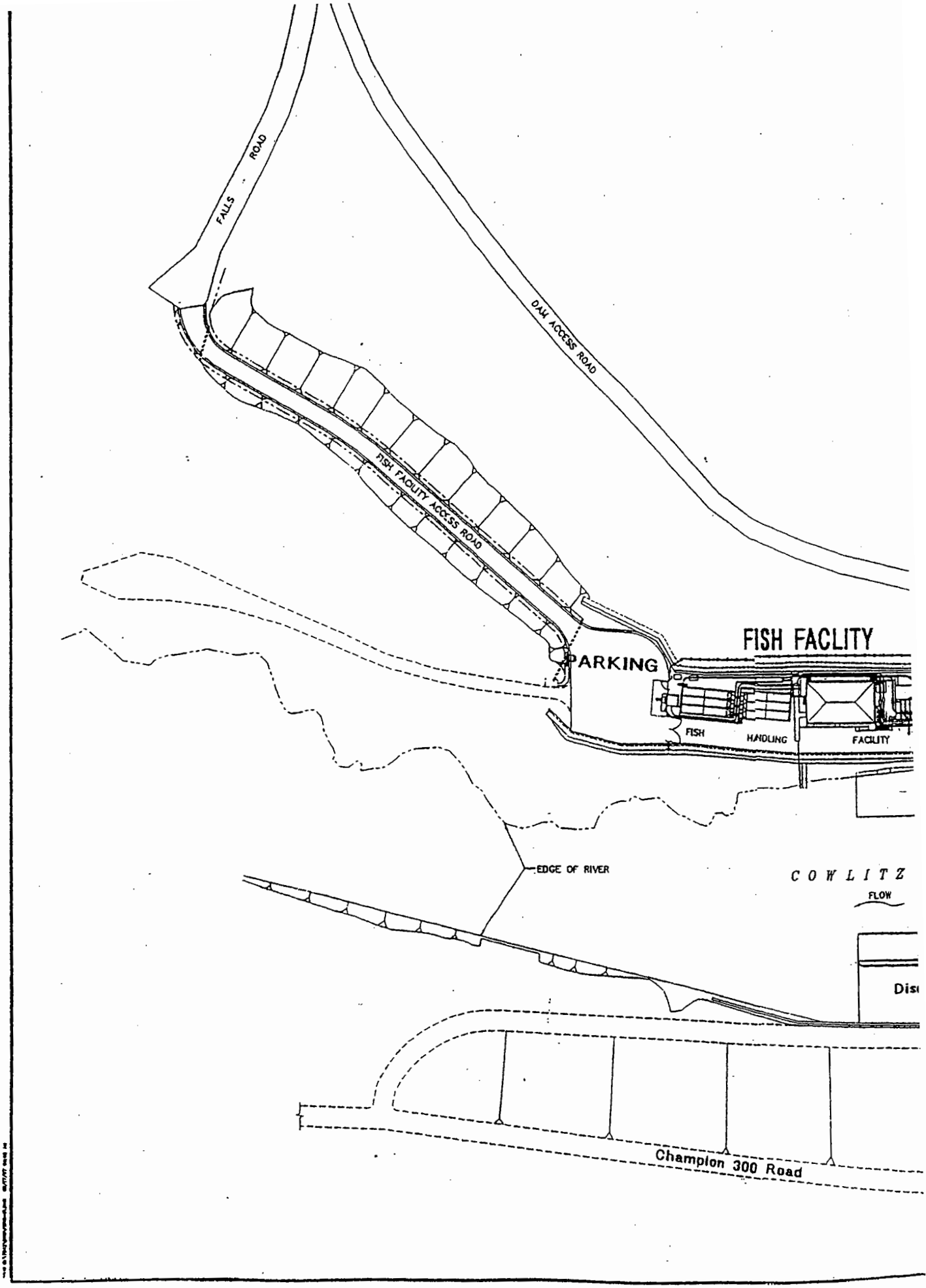
Feb. 7, 2001

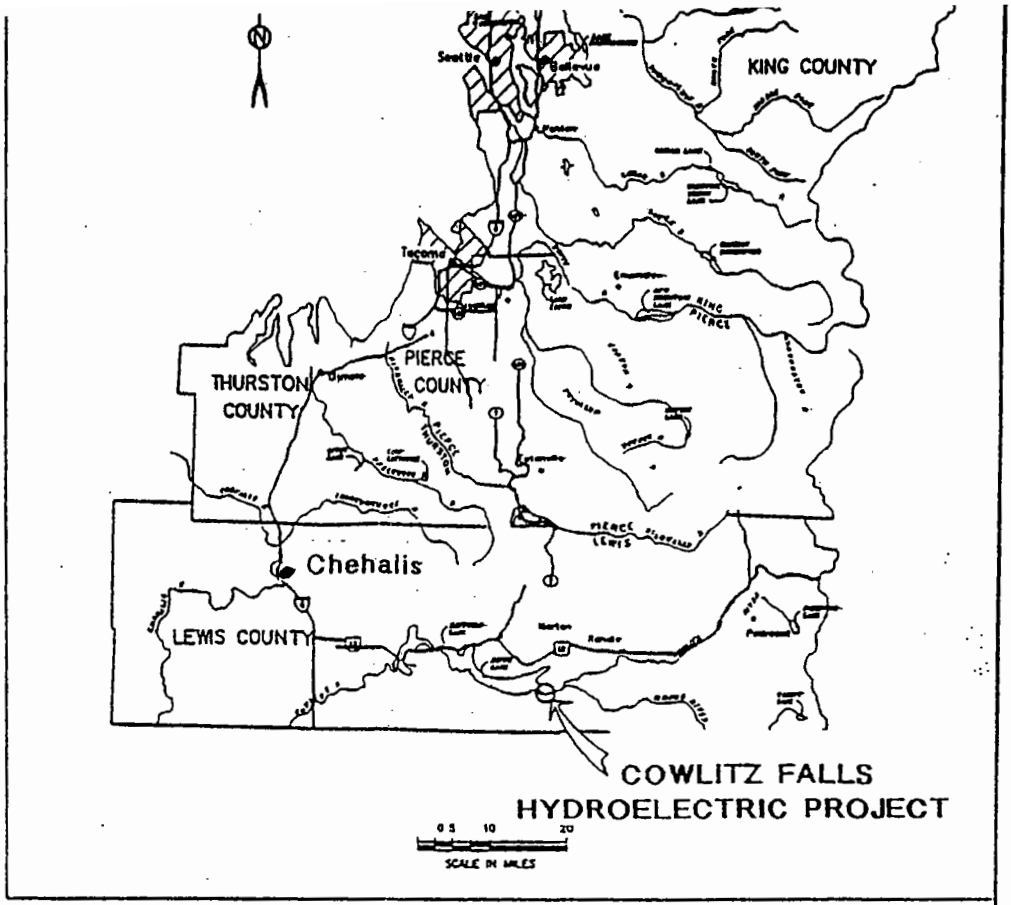
EDWARD A. BUTLER STATE OF WASHINGTON 8190 REGISTERED PROFESSIONAL LAND SURVEYOR Expires 7-12-02

LAND USE DESIGNATIONS

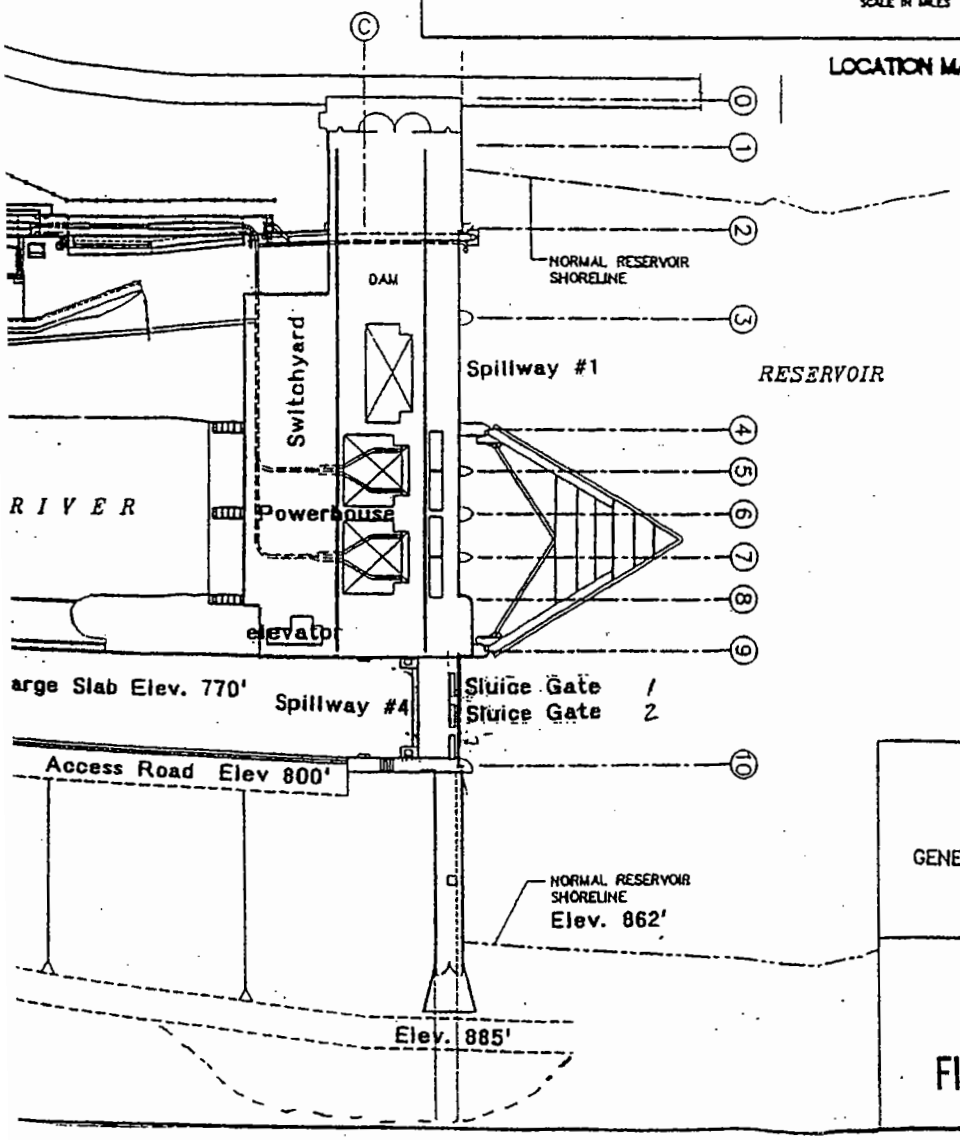
Sheet 2 of 4

Drawing revised for BZMP first update


FALLS ROAD
DAM ACCESS ROAD
FISH FACILITY ACCESS ROAD
PARKING
FISH FACLITY
FISH HANDLING FACILITY
EDGE OF RIVER
COWLITZ
FLOW
Champion 300 Road



LOCATION MAP



COWLITZ FALLS PROJECT
PUBLIC UTILITY DISTRICT NO. 1
OF LEWIS COUNTY

GENERAL PROJECT PLAN WITH FISH FACILITY

SCALE 0 50 100 FEET
1" = 50'-0"

COWLITZ FALLS DAM &

FISH COLLECTION FACILITY

EXHIBIT C

COWLITZ FALLS FISH FACILITY (CFFF)
FISHERIES RESEARCH PLANS
2003 (DRAFT PLANS)

for 12/13/2002 meeting purposes

BACKGROUND

The upper Cowlitz River anadromous fish reintroduction program was initiated in the early 1990's. The plan is based on "trap and haul" whereby adult salmon and steelhead are trucked upstream around the lower river dams and migrating juveniles are collected and transported downstream. This allows the adult fish to utilize over 240 miles of upper river habitat for natural production and subsequently for natural rearing by juvenile fish. The cornerstone of the plan includes collecting downstream migrating juveniles, smolts, at LCPUD's Cowlitz Falls Project so they can be transported downstream.

BPA, LCPUD and their contractors have teamed up since 1994 to evaluate smolt passage. During this period it became apparent that fish collection would need to be improved. In 1996 hydroacoustic evaluation indicated a fish guidance efficiency (FGE) of 95.8%. Mark/recapture evaluations by WDFW indicate much lower fish collection efficiencies (FCE) ranging from 17% to 65%. Fish that are not collected pass downstream and become landlocked in Tacoma's Riffe Lake, contributing to a recreational fishery. Thus, in order for the anadromous fish reintroduction program to be successful, it is necessary to improve FCE. BPA's goal has been to maximize smolt collection. Tacoma Power has contributed to fish passage research in an effort to satisfy downstream survival requirements as identified in its Cowlitz Project Relicensing Settlement Agreement. In each case, the goal is to improve smolt collection over current levels.

Recent studies by the USGS and WDFW have improved our understanding of CFP fish passage. One study estimated one-third of the steelhead smolts rejected the Project's baffle panel entrance to the surface collection system. This problem was resolved in 2000 by redesigning the panel configuration to reduce the vortex behind the baffles, thus smoothing out flows to the gates. Recent radio telemetry evaluations indicate up to 92% of the steelhead and 72% of the chinook smolts are within a few meters of the fish gate entrances but many still reject the gates. Currently 24% of the chinook smolts are being collected.

The 2003 research plans are designed around utilizing the USGS and WDFW expertise and technical skills; i.e. radio telemetry, acoustic camera, flume sampling, etc. Plans for 2003 are listed below and are outlined on the following pages. The goal for 2003 is to focus on smolt behavior in the near zone (within two to three meters of the fish gate) and evaluate if either increased flow through a fish gate or modifying the gate entrance shape has a positive effect.

COWLITZ FALLS FISH FACILITY (CFFF)
FISHERIES RESEARCH PLANS
2003 (DRAFT PLANS)

PROPOSALS

1. 20/40 Cfs Test – Evaluate fish gate passage by steelhead and coho smolts when flow is doubled to 40 cfs through one gate (test) versus the status quo of 20 cfs through each of two gates (control).

2. Modified Gate Entrance Test – Evaluate chinook (and secondarily coho) passage at an eight foot wide by two foot deep gate opening at 40 cfs. Compare test results to 40 cfs through the gate without the modified entrance and to 20 cfs through each of two gates.

3. Blue/Green Light Test (pilot study) – Test blue/green spectrum lights' ability to attract steelhead smolts into the gate openings prior to the major run of steelhead smolts.

4. Tacoma Tests – To be developed (include knife gate test and strobe light tests).

OBJECTIVES

1. 20/40 Cfs Test – Determine if increased flow through one fish gate significantly increases fish collection efficiency (FCE) over the status quo gate configuration.

   Response Variables:

   a. Total fish collection for 24-hour intervals for test and control conditions. The test would begin on May 5 and continue through June 23, 2003.

   b. Evaluate numbers of radio tagged steelhead accepting (and rejecting) fish gates on their first approach and subsequent passage attempts.

   c. Evaluate passage time for fish passing during the two conditions and independently assess times for fish passing on their first attempt.

   d. Evaluate if fewer fish passed alternate routes; i.e. turbine or induction slots in either test or control scenario.

   e. Total marks recaptured during test and control condition.

   f. Develop 2003 FCE estimate from mark recapture and compare to prior years.

Tasks:

a. Install PVC pipes over fish flumes #1 and #3 to allow excess water to spill without the loss of fish.

b. Install radio antennae where appropriate at CFP (USGS lead, WDFW and LCPUD to assist).

c. Radio tag 120 steelhead smolts throughout the middle 80% of the run.

d. PIT tag approximately 350 steelhead smolts.

e. Determine location(s) for acoustic camera placement.

f. Elastermere mark eight to eleven steelhead and coho replicates for mark recapture evaluations.

2. Modified Gate Entrance Test – Determine if a wider gate entrance and/or increased flow increases FGE and reduces the smolt rejection rate observed at gate entrances.

Response Variables:

a. Total fish collection for 24-hour intervals for test and control conditions. The test would begin in early to mid-July and continue through mid- August.

b. Evaluate numbers of radio tagged chinook accepting (and rejecting) fish gates on their first approach and subsequent passage attempts.

c. Evaluate passage time for fish passing during the two conditions and independently assess times for fish passing on their first attempt.

d. Evaluate if fewer fish passed alternate routes; i.e. turbine or induction slots in either test or control scenario.

e. Total marks recaptured during test and control condition.

f. Develop 2003 FCE estimate from mark recapture and compare to prior years.

Tasks:

a. Install the modified gate entrance (fish box) over fish gate #3.

b. Reinstall PVC pipes over fish flumes #1 and/or #3, to allow excess water to spill without the loss of fish.

c. Determine acoustic camera placement to cover both the modified gate entrance and the existing entrance.

d. Radio tag 240 (dependent on Tacoma funding) chinook smolts throughout the middle 80% of the run.

e. Elastermere mark eight to eleven chinook replicates for mark recapture evaluations.

3. Blue/Green Light Test (pilot study) – Perform a pilot study to determine if blue/green spectrum lights have the potential to attract steelhead smolts into gate openings and if they warrant further study.

Response Variables:

a. Test blue/green spectrum lights' ability to attract and increase smolt collection by side-by-side on/off testing using 24-hour flume traps results.

Tasks:

a. Install flume traps in flumes #1 and #2 and operate from April 16 – May 4.

b. Install blue/green spectrum lights in flumes #1and #2.

4. Tacoma Studies:

a. High Velocity Orifice Installation and Velocity Testing. Install March 1 – March 31. Modify existing flared entrance to achieve maximum velocity of 10 fps at flared entrance exit with flap gate in down position. Verify velocity and flow conditions. Keep in place until May 4 for velocity and fish behavior testing. (There may be some required down time to allow separator modifications to be completed).

b. High Velocity Orifice Test (pilot fish study) – Reinstall ~June 23 and operate to ~July 7 during second half of the coho run and first of the chinook run. This study could continue if runoff is sufficient to allow two-turbine operation or if the chinook run develops later (10^{th} percentile of the chinook run has ranged from as early as July 4 to as late as August 1 since 1999). (There may be some required down time to remove the debris deflector and transport it upstream).

c. Strobe Lights (pilot study) – Intended to scare fish into fish flumes (various one day light placements). Install April 1 – April 15, operate until May 4. Located 10 to 30 feet upstream of flume entrance at approximate 2 foot depth. Schedule over one turbine unit, completed prior to May 5. (There may be some unexpected down time to allow separator modifications to be completed).

TIMELINES

March 1 – March 31:
Install modified flume entrance/high velocity orifice opening , test with 20 and 40 cfs flows.
Evaluate with velocity meter

April 1 – April 15:
Operate CFFF 3 days/week (eight hours/day) for steelhead kelt recovery.
Install strobe lights.
Evaluate high velocity orifice with acoustic camera.

April 16 – May 04:

Blue/Green Lights Test
Evaluate Tacoma's Strobe Light Test with acoustic camera
Evaluate high velocity orifice with acoustic camera.

May 05 – June 23:

20/40 Cfs Test

Steelhead mark/recapture 8 - 11 reps (May 5 – May 28)
Steelhead radio tagging, 120 tags (same as above)
Coho mark/recapture 10 – 11 reps (May 19 – June 11)
Acoustic camera video (subsample May 5 – June 11)
Additional 10-12 days for marked smolts to clear reservoir and bays.
PIT tag approximately 350 steelhead

June 23 – July 07:

Tacoma's high velocity orifice test utilizing the acoustic camera and flume sampling.
Possible early placement if flows permit.
(The timing of this test may be adjusted forward if severe drought conditions exist resulting in an earlier than expected emigration).

July 07 (or later) – 90% of chinook run (?)

Radio Telemetry and High Velocity Orifice Test - Start ~ mid July – end of August

Chinook mark/recapture 8 - 11 reps (~ mid July – mid/end of August)
Chinook radio tagging, 240 tags (same as above)
Acoustic camera video (subsample same as above)

COORDINATION NEEDS

- Install PVC separator on surface of two flumes (20/40 test).
- Determine light placement and install lights (Light test).
- Install fish collection traps in flume (Light test).
- Install mod. gate opening box (Systematic installation and removal up to three times/week.
- Install radio telemetry antennae
- Move debris deflector

exam copy
signed

Contract No. DE-MS79-96BP94847
10/20/95

ACCESS, CONSTRUCTION AND OPERATIONS AND MAINTENANCE AGREEMENT AT THE COWLITZ SALMON HATCHERY IN SUPPORT OF THE COWLITZ FALLS DAM MANAGEMENT PLAN

executed by the
UNITED STATES OF AMERICA
DEPARTMENT OF ENERGY
acting by and through the
BONNEVILLE POWER ADMINISTRATION
and
THE CITY OF TACOMA

This Access, Construction, Operations and Maintenance Agreement (Agreement), executed November 21, 1995, by the CITY OF TACOMA ("Tacoma"), a municipal corporation organized and existing under the laws of the State of Washington, for and on behalf of its Department of Public Utilities, Light Division, and the UNITED STATES OF AMERICA ("United States"), Department of Energy, acting by and through the BONNEVILLE POWER ADMINISTRATION ("Bonneville") (the "Parties").

W I T N E S S E T H :

WHEREAS, on November 27, 1951, the Federal Energy Regulatory Commission ("FERC") issued Tacoma License No. 2016 ("FERC License 2016") for the construction , operation and maintenance of the Cowlitz Hydroelectric Project ("Cowlitz Project"); and

WHEREAS, Tacoma is the owner of the real estate situated in Lewis County, Washington, specifically described and designated in Exhibit "A" to this Agreement; which real property is used by the State of Washington in connection with its administration of the Cowlitz Salmon Hatchery ("Hatchery"); and

WHEREAS, Tacoma is signature to an agreement dated August 9, 1967, between Tacoma and the Washington State Department of Fisheries that provides for the construction, operation and maintenance of fish facilities on the Cowlitz River for the production of juvenile salmon from both natural production above Mayfield Dam and from the Cowlitz Salmon Hatchery, that is designed to maintain certain numbers of adult salmon returning to the Cowlitz Salmon Hatchery adult separator facility.

WHEREAS, Bonneville and Lewis County Public Utility District No. 1 ("Lewis") have entered into an agreement whereby Bonneville purchases the power output from the Cowlitz Falls Hydroelectric Project ("Cowlitz Falls Project") until 2032; and

WHEREAS, Bonneville has agreed to fund anadromous fisheries mitigation and anadromous fish collection facilities at the Cowlitz Falls Project under an agreement ("Settlement Agreement") between Bonneville and the Friends of the Cowlitz, Toledo, Washington; and

WHEREAS, Lewis and Bonneville have agreed to Lewis' and FERC's review of such fish collection facilities in connection with the license issued by the FERC to Lewis on June 30, 1986, for the Cowlitz Falls Project ("FERC License No. 2833"); and

WHEREAS, Bonneville, in conjunction with the Cowlitz Falls Technical Advisory Committee, has developed and is in the process of implementing Bonneville's commitments in the Cowlitz Falls Management Plan, dealing with fish issues within the Cowlitz River basin; and

WHEREAS, the Washington Department of Fish and Wildlife ("WDFW") reviewed the Cowlitz Falls Management Plan and, specifically, Bonneville's proposed plans for implementing fish transfer facilities at the Hatchery and determined that such proposals are compatible with the existing operational scheme mandated in the 1967 agreement with Tacoma.

NOW, THEREFORE, the parties hereto mutually agree as follows:

1. Definitions

(a) When used with initial letters capitalized, the following terms will have the meanings set out below.

(1) "Fish Collection Facilities" means the apparatus and equipment owned by Bonneville which are to be installed by Bonneville at the Cowlitz Falls Project pursuant to the Settlement Agreement, and which are designed for the purposes of preventing the passage of migrant juvenile anadromous fish into the turbines of the Cowlitz Falls Project, and to divert, capture and collect such migrant juvenile anadromous fish.

(2) "Fish Transfer Facilities" means the projects at the Hatchery which have been identified by the Cowlitz Falls Technical Advisory Committee and the Cowlitz Falls Fish Facility Technical Committee as necessary to support the orderly transport of anadromous salmonid smolts moving downstream in the Cowlitz River above the Cowlitz Falls Project, and to separate out returning adult salmonids destined for the upper Cowlitz River basin. Such projects include, but are not limited to, building salmonid stress relief ponds, modifying the adult salmonid separator and acquiring vehicles necessary for transferring salmonids.

(3) "Hatchery Costs" means Tacoma's costs, including staff time, for the pre-construction and construction activities associated with capital improvement projects at the Fish Transfer Facilities and all additional costs associated with the operation of the Fish Transfer Facilities.

(4) "WDFW" means the Washington Department of Fish and Wildlife, operator of the Hatchery.

2. **Term**

This Agreement shall become effective as of the date of execution and delivery of this Agreement by both of the Parties. This Agreement shall continue in effect so long as the Fish Collection Facilities are in existence and operating, unless otherwise earlier terminated by written agreement of the Parties.

3. **Grant of Access**

(a) Tacoma hereby grants and conveys to the United States, for the sole and exclusive use of Bonneville, for the Term of this Agreement, for and in consideration of the provisions contained in this Agreement, the right, privilege, and license to enter upon the real property owned by Tacoma specifically set forth in Exhibit "A" for the limited purposes of locating, designing, constructing, operating, maintaining, repairing, rebuilding, and upgrading the Fish Transfer Facilities.

(b) It shall be Bonneville's responsibility to accurately determine the boundary description as set out in Exhibit "A", and to use only such land as needed within said boundaries.

(c) Bonneville is responsible for securing all rights and permits, other than access, if needed for Bonneville's lawful and peaceable use of the property for Fish Transfer Facilities.

(d) If at any time any right herein granted as to the real property set forth in Exhibit "A" shall in any manner jeopardize or impair the Cowlitz Project, then Tacoma shall have the right to withdraw from this Agreement access to or use thereof of any or all such real property for Fish Transfer Facilities under this Agreement.

4. **Right of Entry**

(a) Upon providing Tacoma reasonable prior notice of its intention to enter, Bonneville and its representatives and agents shall have the right to enter onto that portion of the real property specifically set forth in Exhibit "A" for

the limited purposes of locating, designing, constructing, operating, maintaining, repairing, rebuilding, and upgrading the Fish Transfer Facilities.

(b) Tacoma hereby reserves the right in its sole discretion to enter, or authorize any third person or persons to enter, upon any of other real property herein described for any purpose whatsoever, including but not necessarily limited to monitoring of equipment, maintenance and repairs of equipment and facilities, inspection of electrical equipment and facilities, and sampling of the water for any reason. Tacoma represents that in engaging in any of said activities it will use all reasonable care in protecting the rights and privileges herein granted to Bonneville.

5. Ownership and Cost Responsibility

(a) Bonneville shall own the Fish Transfer Facilities, and shall be responsible for paying all costs associated with such Fish Transfer Facilities, including without limitation costs of designing, constructing, operating, maintaining, repairing, rebuilding, and upgrading the Fish Transfer Facilities.

(b) Bonneville assumes and agrees to pay any manufacturers' sales, excise, privilege, or other tax or charge imposed upon, or incident to the construction, operation, maintenance, repair, rebuild, or upgrade of the Fish Transfer Facilities, by any governmental authority, whether by present or future enactment as required by law.

(c) Bonneville agrees to pay Tacoma for Hatchery Costs incurred by Tacoma on behalf of the Cowlitz Falls Project. Tacoma shall invoice Bonneville directly pursuant to the schedule of charges set forth in Exhibit "B". Tacoma shall invoice Bonneville for any additional WDFW staff costs at rates, including overhead, not to exceed the rates charged to Tacoma by WDFW.

(d) Bonneville shall pay Tacoma for Hatchery Costs incurred on behalf of the Cowlitz Falls Project no later than the close of business on the 30th day following the date of receipt of a proper invoice. Tacoma may transmit invoices by fax or other mutually acceptable electronic means, but must

follow promptly with mailed originals. Invoices shall reference the contract number and the contract period covered by this payment. Tacoma shall address invoices for payment to

Manager of Client Support-FCC
Bonneville Power Administration
P O Box 3621
Portland, Or. 97208

Bonneville shall make payment by electronic transfer to a depository identified by Tacoma. Such payments shall be subject to review, audit and approval by Bonneville. Payments to Tacoma pursuant to this agreement may only be offset against other payments or similar obligations due to Bonneville from Tacoma with the mutual written consent of the Parties.

(e) If, pursuant to the Cowlitz Falls Management Plan, additional projects are to be implemented at the Hatchery or on real property owned by Tacoma, the parties may modify this Agreement to incorporate such projects.

6. Cooperation of the Parties

(a) Tacoma will provide to Bonneville such information as may be reasonably necessary to assist Bonneville in obtaining regulatory approvals necessary for the design, construction, operation, maintenance, repair, rebuild, and upgrade of the Fish Transfer Facilities. The Parties shall exchange information, at least annually, regarding planned operation and maintenance activities, and expected costs for the Fish Transfer Facilities at the Cowlitz Project.

(b) Bonneville shall provide Tacoma the final engineering design report of changes or improvements at the Hatchery, which shall include, but not be limited to detailed mechanical, civil and electrical engineering drawings and plans. Bonneville shall submit said plans and drawings no later than ninety (90) days prior to the start of construction activities of the Fish Transfer Facilities. Tacoma shall promptly review and provide comments on the

design drawings, plans and specifications submitted by Bonneville pursuant to this Section 6. Upon completion of the review and comment process, and the resolution of any issues between the Parties, Bonneville shall provide Tacoma with two sets of the revised documents to be submitted to the regulatory agency, and Tacoma shall forward one set of the documents to the appropriate regulatory agency.

7. **FERC License**

Bonneville agrees that it will not seek an amendment or reopening of the FERC License, nor seek or support any effort on behalf of others, to include the Fish Transfer Facilities in the project description as set forth in the FERC License 2016.

8. **Assignment**

(a) Bonneville may assign, or otherwise transfer, without the prior consent of Tacoma, the rights obtained pursuant to this Agreement to any federal agency which has assumed all, or substantially all, of the duties discharged by Bonneville on the date of execution of this Agreement.

(b) Bonneville may assign or otherwise transfer the rights obtained pursuant to this Agreement to any corporation or other entity, other than those specified in Section 8(a), only with the prior written consent of Tacoma, which consent shall not be unreasonably withheld. In the event of such assignment or transfer, Bonneville shall provide Tacoma with written notice of the assignment or transfer, together with a true copy of the instrument of assignment or transfer, not less than thirty (30) days prior to the intended date of execution.

(c) This Agreement shall inure to the benefit of and shall be binding upon the respective successors and assigns of the Parties.

9. Other Matters

(a) Bonneville agrees to conduct its activities upon said real property in a workmanlike manner and according to the recognized practices of the industry and in conformity with the provisions of this Agreement and the Cowlitz Falls Management Plan.

(b) Bonneville shall be liable for and shall reimburse Tacoma for any damage or injury to the Hatchery, the Cowlitz Project or persons arising out of the design, construction, operation, maintenance, repair, rebuild, or upgrade of the Fish Transfer Facilities.

(c) Tacoma shall be responsible for the willful misconduct or sole negligence of its employees and officers occurring within the scope of their employment.

10. Regulatory Approval

(a) Promptly following execution of this Agreement, Tacoma will submit the Agreement to FERC for review of the access and right of entry provisions set forth in Sections 3 and 4.

(b) The Parties understand that performance of the obligations created hereunder is contingent upon successful completion of the FERC review process. In the event that the FERC review process results in terms that are materially inconsistent with this Agreement, the Parties shall promptly make a good faith effort to mutually agree upon a revised Agreement, and resubmit such revised Agreement to FERC for review. In the event that the subsequent FERC review process results in terms which are materially inconsistent with such revised Agreement, either Party may terminate this Agreement by providing written notice of such termination to the other Party.

(c) This Agreement, and any and all activities conducted pursuant to this Agreement, are subject to and must comply with all licenses, permits and regulatory approvals pertaining to the Fish Transfer Facilities. The Parties shall make all reports as may be required by law or regulation to any

governmental authority and shall furnish the other Party a copy of all said reports.

11. Notices

Any notice, demand, approval, proposal, protest, consent, direction, or request provided for in this Agreement shall be effective from the date mailed or transmitted by facsimile or similar means, and shall be directed as follows:

IF TO TACOMA;

Tacoma Public Utilities
Light Division
Natural Resources Manager
3628 South 35th Street
P.O. Box 11007
Tacoma, Washington 98411-0007

IF TO BONNEVILLE

Bonneville Power Administration
Vice President, Generation Supply - MG
P.O. Box 3621
Portland, Oregon 97208-3621

Either Party may change their recipient of notice at any time by designating a new recipient in a letter delivered to the other Party.

12. Waivers

Except as otherwise provided herein or as agreed by the Parties, no provision of this Agreement may be waived except as documented or confirmed in writing. Any waiver at any time by a Party of its right with respect to a default under this Agreement, or with any other matter arising in connection therewith, shall not be deemed a waiver with respect to any subsequent default or matter. Either Party may waive any notice or agree to accept a shorter notice that specified in this Agreement. Such waiver of notice or acceptance of shorter notice by a Party at any

time regarding a notice shall not be considered a waiver with respect to any subsequent notice required under this Agreement.

13. Right to Act

If Bonneville fails to comply with any of the provisions of this Agreement or upon order by FERC, Tacoma shall have the right, upon ninety (90) days' written notice, mailed by certified mail to Bonneville, and upon the failure of Bonneville to take all reasonable steps to correct any such violations within the ninety (90) day period, to terminate this Agreement. While the Fish Transfer Facilities are used to meet the goals of the Cowlitz Falls Management Plan, the Fish Transfer Facilities will remain the cost responsibility of Bonneville. Should the Fish Transfer Facilities no longer be used to meet the goals of the Cowlitz Falls Management Plan, the Fish Transfer Facilities will become the property and cost responsibility of Tacoma to use as Tacoma deems appropriate.

14, DISPUTE RESOLUTION

Pending resolution of a disputed matter, the Parties shall continue performance of their respective obligations pursuant to this Agreement. Disputes regarding any factual matter relating to this Agreement shall be discussed by the authorized representatives who shall use their best efforts to amicably and properly resolve the dispute. Should the authorized representatives be unable to resolve any controversy or claim arising out of or relating to this Agreement, or the breach thereof, the Parties agree that, to the extent allowed by law, the controversy or claim shall be settled by arbitration in accordance with the Commercial Arbitration Rules of the American Arbitration Association, and judgment upon the award rendered by the Arbitrator(s) may be entered in any court having jurisdiction thereof. For purposes of this section Steven J. Klein, Light Superintendent is the authorized representative for Tacoma and Robert Moulton is the authorized representative for Bonneville.

15. No Unspecified Third-Party Beneficiaries

There are no third-party beneficiaries of this Agreement. Nothing contained in this Agreement is intended to confer any right or interest on anyone other than the Parties, their respective successors, assigns and legal representatives.

16. Amendment

No change, amendment or modification of any provision of this Agreement shall be valid unless set forth in a written amendment to this Agreement signed by both Parties.

17. Headings Not Binding

The headings and captions in this Agreement are for convenience only and in no way define, limit, or describe the scope or intent of any provisions or sections of this Agreement.

18. Agreement of the Parties

This Agreement represents the entirety of the agreement between the Parties, and this Agreement supersedes any prior written or oral agreements between the Parties regarding the subject matter of this Agreement.

19. Interpretation of Agreement

The Parties agree that both Parties drafted this Agreement, and that if any ambiguities arise in the later interpretation of this Agreement, such ambiguities shall not be construed against either Party as the sole drafter of the Agreement.

IN WITNESS WHEREOF, the Parties hereto have executed this Agreement.

UNITED STATES OF AMERICA
Department of Energy
Bonneville Power Administration

By J.A. Johansen
Vice President, Generation Supply

Name J.A. Johansen
(Print/Type)

Date 11-21-95

STATE OF OREGON)
)ss.
COUNTY OF MULTNOMAH)

I certify that I know or have satisfactory evidence that J.A. Johansen signed this instrument and acknowledged it to be her free and voluntary act for the uses and purposes mentioned in this instrument.

SUBSCRIBED AND SWORN to before me this 21st day of November 1995.

PLEASE PRINT: Barbara M. Willard
NOTARY PUBLIC in and for the State of Oregon, at Portland
My commission expires: 3-3-98

OFFICIAL SEAL
BARBARA M. WILLARD
NOTARY PUBLIC - OREGON
COMMISSION NO.032576
MY COMMISSION EXPIRES MAR. 03, 1998

CITY OF TACOMA
Department of Public Utilities

By _____
Director of Utilities

Name Mark Crisson
(Print/Type)

Date 11-13-95

Form Approved as to Legality

_____
Assistant City of Tacoma Attorney

STATE OF WASHINGTON)
)ss.
COUNTY OF PIERCE)

I certify that I know or have satisfactory evidence that Mark Crisson signed this instrument and acknowledged it to be his free and voluntary act for the uses and purposes mentioned in this instrument.

SUBSCRIBED AND SWORN to before me this 13th day of Nov. 1995.

LYDIA STEVENSON NOTARY PUBLIC 3-31-98 STATE OF WASHINGTON

Lydia Stevenson
PLEASE PRINT: Lydia Stevenson
NOTARY PUBLIC in and for the State of Washington, residing at Puyallup
My commission expires: March 31, 1998

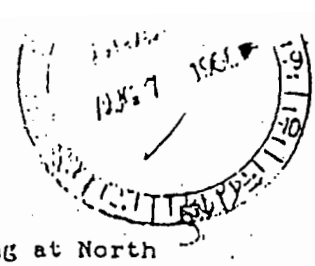
DESCRIPTION OF PROJECT LANDS SUBJECT TO ACCESS RIGHT OF ENTRY

The legal description of City of Tacoma owned land surrounding the Cowlitz Salmon Hatchery and the subject of this Agreement is as stated in the following copies of Quit Claim Deeds filed on said property.

TITLE GUARANTY
Will Call

6054105

QUIT CLAIM DEED



THE GRANTOR, MENASHA CORPORATION, residing at North Bend, Oregon, for and in consideration of Ten Dollars ($10.00) and other valuable consideration, conveys and quit claims to the CITY OF TACOMA, a municipal corporation, the following described real estate, situated in the County of Lewis, State of Washington including any interest therein which Grantor may hereafter acquire, to-wit:

That portion of Government Lots 1 and 2, and the NE 1/4, NW 1/4 of Section 24, Township 12 North, Range 1 East, Lewis County, Washington, lying southerly of the following described line:

Beginning at the NW corner of said Section 24, thence southerly along west line of said Section 24 a distance of 575.60 feet to the T.P.B. thence N 88° 58' E a distance of 275.7 feet; thence S 45° 50' E a distance of 50.00 feet, thence S 69° 38' E a distance of 358.00 feet, thence S 46° 10' E a distance of 520.00 feet; thence S 64° 26' E a distance of 127.50 feet; thence S 83° 49' E a distance of 416.70 feet; thence N 75° 35' E a distance of 361.30 feet; thence S 48° 16' E a distance of 248.00 feet; thence S 66° 29' E a distance of 604.00 feet, more or less, to a point on the east line of said Government Lot 2, - 1,570.00 feet southerly from the N 1/4 corner of said Section 24.

EXCEPT:
Beginning on the right bank of Cowlitz River at the southeast corner of said Lot 2, Section 24, Township 12 North, Range 1 East, Willamette Meridian, and running thence North 350 links, thence West 350 links, thence South 160 links to the right bank of the Cowlitz River, thence South 65° East, up right bank of river to the place of beginning.

CABE PROJECT

TOGETHER WITH a perpetual road easement 60 feet in width plus whatever additional width is necessary to construct and maintain cuts and fills adjacent to said road, being 30 feet wide on each side of line described as follows:

Beginning at a point which is the North quarter corner of said Section 24, Township 12 North, Range 1 East, W.M., thence southerly on the north-south centerline of said section to a point, being the southeast corner of the NE 1/4 NW 1/4 said section thence westerly along the south line of said NE 1/4 NW 1/4 said section a distance of 608.54 feet to a point, thence S 0° 11' 37" West a distance of 531.78 feet to a point, being City of Tacoma Engineer's Station 0 + 00 and the True Point of Beginning of this description, thence N 4° 14' 11" W 1.24' to a point, being the P.C. of a 20° curve to the right having a radius of 286.48 feet, thence on the arc of said 20° curve to the right a

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distance of 250.87 feet to a point (Engr's. Station 2 + 52.11) thence N 45° 56' 21" E 88.04' to a point being the P.C. of a 28° curve to the left having a radius of 204.62 feet thence on the arc of said 28° curve to the left a distance of 325.95 feet to a point (Engr's. Station 6 + 66.10) thence N 45° 19' 34" W, 281.54 feet to a point, being the P.C. of a 30° curve to the left having a radius of 190.99 feet, thence on the arc of said 30° curve to the left a distance of 248.00 feet to a point (Engr's. Station 11 + 98.64) thence S 60° 16' 19" W, 45.50 feet to a point, being the P.C. of a 30° curve to the right having a radius of 190.99 feet thence on the arc of said curve to the right a distance of 190.55 feet to a point (Engr's. Station 14 + 34.69) thence N 62° 33' 50" W, 93.28 feet to a point, being the P.C. of a 10° curve to the left having a radius of 572.96 feet, thence on the arc of said 10° curve to the left a distance of 134.25 feet to a point (Engr's. Station 16 + 62.22) thence N 75° 59' 15" W, 75.93 feet to a point, being the P.C. of a 30° curve to the right having a radius of 190.99 feet, thence on the arc of said 30° curve to the right a distance of 159.36 feet to a point (Engr's. Station 18 + 97.51) thence N 28° 10' 45" W, 127.46 feet to a point, being the P.C. of a 24° curve to the left having a radius of 238.73 feet, thence on the arc of said 24° curve to the left a distance of 158.33 feet to a point (Engr's. Station 21 + 83.30) being a point on the existing road known both as the John Brim County Road and as the Singleton Spencer County Road, said point being 1119.90 feet on a bearing S 58° 04' 50" E of the northwest corner of Section 24, Township 12 North, Range 1 East, W.M., and the end of this line description.

IN WITNESS WHEREOF, said corporation has caused this instrument to be executed by its proper officers and its corporate seal to be hereunto affixed this 25 day of April, 1966.

Description approved: [signature]

MENASHA CORPORATION

By [signature]

By [signature]

STATE OF Wisconsin } ss.
County of Winnebago

On this 25th day of April, 1966, before me, the undersigned, a Notary Public in and for the State of Wisconsin duly commissioned and sworn, personally appeared Donald C. Tanner and [illegible] to me known to be the Vice Pres. and Secretary respectively, of MENASHA CORPORATION, the corporation that executed the foregoing instrument, and acknowledged the said instrument to be the free and voluntary act and deed of said corporation, for the uses and purposes therein mentioned, and on oath stated that they are authorized to execute the said instrument and that the seal affixed is the corporate seal of said corporation.

WITNESS my hand and official seal hereto affixed the day and year first above written.

Form approved:
[signature]
Assistant City Attorney

[signature]
Notary Public in and for the State of Wisconsin, residing at [illegible]

My Commission [illegible]

FINANCE
AUG 7 1968

606684

QUIT CLAIM DEED

IN THE MATTER OF Lewis County Pit & Stockpile Sites, PS-L-154.

THE STATE OF WASHINGTON, for and in consideration of the sum of TWO THOUSAND EIGHT HUNDRED AND NO/100 DOLLARS ($2,800.00), hereby conveys and quitclaims unto the CITY OF TACOMA, a Municipal Corporation of the State of Washington, all its right, title and interest, in and to the following described property situated in Lewis County, State of Washington:

Beginning at a point 575.6 feet South 1°02' East of the Northwest corner of Lot 1, Section 24, Township 12 North, Range 1 East, W.M., said point being on the Westerly boundary line of said Lot 1; thence continuing along said course 353.9 feet; thence South 37°59' East 2120.0 feet to the Easterly boundary of said Lot 1 extended; thence North 0°32' West along said Easterly boundary of said Lot 1 495 feet; thence North 37°59' West 1689.9 feet; thence North 15°03' East 174.0 feet; thence North 45°50' West 50 feet; thence South 88°58' West 275.7 feet to the point of beginning.

ALSO, a perpetual easement for a haul road 40 feet in width, being 20 feet wide on each side of a line described as follows:

Beginning at the Northwest corner of Lot 1, Section 24, Township 12 North, Range 1 East, W.M.; thence South 1°02' East 575.6 feet along the Westerly line of said Lot 1; thence North 88°58' East 275.7 feet; thence South 45°50' East 50.0 feet to the true point of beginning of this description; thence South 81°06' East 465.9 feet; thence South 51°10' East 407 feet; thence South 80°28' East 171.0 feet; thence North 84°34' East 193.3 feet; thence South 63°46' East 119.3 feet; thence North 55°55' East 113.4 feet; thence North 17°51' West 101.5 feet to a county road right of way and the end of this line description.

ALSO, a perpetual easement for a haul road over and across the strip of land 50 feet in width, parallel with and contiguous to that portion of the Northeasterly side of the tract of land hereinabove conveyed which bears North 37°59' West.

The lands being herein conveyed contain an area of 16.1 acres, more or less, and the lands referred to in said easements contain an area of 3.7 acres, more or less, the specific details concerning all of which are to be found within that certain map of definite location now of record and on file in the Office of the Director of Highways at Olympia, Washington, and bearing date of approval January 11, 1955, revised April 10, 1956, and May 29, 1956.

The grantee, for itself, its successors in interest, and assigns, as a part of the consideration hereof, does hereby covenant and agree, as a covenant running with the land, that in the event facilities are constructed, maintained, or otherwise operated on the said property described in this deed, for the accommodation of the traveling public or business users of any Federal-aid highway (such as eating, sleeping, rest, recreation, and vehicle servicing), grantee will not discriminate on the ground of race, color, or national origin against such traveling

public or highway users in their access to and use of the facilities and services so constructed, maintained or otherwise operated, and that the grantee shall maintain and operate such facilities and services in compliance with all other requirements imposed pursuant to Title 15, Code of Federal Regulations, Commerce and Foreign Trade, Subtitle A, Office of the Secretary of Commerce, Part 8 (15 C.F.R., Part 8), and as said Regulations may be amended. In the event of breach of any of the above-nondiscrimination covenants, the State shall have the right to re-enter said lands and facilities thereon, and the above-described lands and facilities shall thereupon revert to and vest in and become the absolute property of the State and its assigns.

The lands herein described are not required for State highway purposes and are conveyed pursuant to the provisions of RCW 47.12.070.

DATED at Olympia, Washington, this 9th day of June, 1966.

STATE OF WASHINGTON

By: Daniel J. Evans
Governor

ATTEST:

By:
Secretary of State

RECORDED FREE - VOL. 2 PAGE
COUNTY OF LEWIS, STATE OF WASHINGTON
JUN 20 AM 8:26
LEWIS COUNTY AUDITOR
BY

APPROVED AS TO FORM:

By: MAY 31 1966
CHARLES E. WATTS
Assistant Attorney General

APPROVED AS TO FORM:

By:
City of Tacoma
Asst. City Attorney

0-9306

Parcel No. 11399

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SCHEDULE OF CHARGES

Natural Resources and Light Engineering Sections charges and cost estimates for Cowlitz Salmon Hatchery improvements and changes are as stated below. Tacoma will bill Bonneville directly based upon hours expended against an annual Work Order plus a Tacoma overhead factor. Materials utilized in maintenance activities will be billed at direct costs, including sales taxes. Tacoma staff billing rates may be subject to change reflecting salary, benefit and overhead cost increases.

PRECONSTRUCTION PHASE - 1995

Resource	Hours	Rate
Fisheries Biologist	40	$40.38
Professional Engineer (EE)	40	$44. 90
Professional Engineer (ME)	50	$51.39
Professional Engineer (CE)	40	$54.39
Clerical	26	$25.04

CONSTRUCTION PHASE - 1995 & 1996

Resource	Hours	Rate
Fisheries Biologist	40	$40.38
Professional Engineer (EE)	40	$44.90
Professional Engineer (ME)	50	$51.39
Professional Engineer (CE)	40	$54.39
Clerical	26	$25.04

POST CONSTRUCTION PHASE - ANNUAL OPERATIONS AND MAINTENANCE COSTS

Capital Costs

Resource	Amount	
Fish planting truck	$175,000	One time cost

Operations

Resource	Hours	Annual costs Rate
Fisheries Biologist	40	$40.38
Utility Worker	173	$44.90
Fish Culturist 2	173	$35.00
Clerical	26	$25.04
Electricity	As-expended	

Routine Maintenance

Resource	Hours	Rate
Mechanic	As-expended	$34.90
Electrician	As-expended	$34.90
Professional Engineer	40	$44.90

Extra-ordinary Maintenance

Extra-ordinary costs for activities covered under this Agreement will be negotiated separately between Bonneville and Tacoma on an as-needed basis.

Note: Rates shown include 49% labor overhead and 15% for administrative overhead for a total markup of 71.3%.

EXHIBIT C

COWLITZ FALLS FISH FACILITY (CFFF)
FISHERIES RESEARCH PLANS
2003 (DRAFT PLANS)

for 12/13/2002 meeting purposes

BACKGROUND

The upper Cowlitz River anadromous fish reintroduction program was initiated in the early 1990's. The plan is based on "trap and haul" whereby adult salmon and steelhead are trucked upstream around the lower river dams and migrating juveniles are collected and transported downstream. This allows the adult fish to utilize over 240 miles of upper river habitat for natural production and subsequently for natural rearing by juvenile fish. The cornerstone of the plan includes collecting downstream migrating juveniles, smolts, at LCPUD's Cowlitz Falls Project so they can be transported downstream.

BPA, LCPUD and their contractors have teamed up since 1994 to evaluate smolt passage. During this period it became apparent that fish collection would need to be improved. In 1996 hydroacoustic evaluation indicated a fish guidance efficiency (FGE) of 95.8%. Mark/recapture evaluations by WDFW indicate much lower fish collection efficiencies (FCE) ranging from 17% to 65%. Fish that are not collected pass downstream and become landlocked in Tacoma's Riffe Lake, contributing to a recreational fishery. Thus, in order for the anadromous fish reintroduction program to be successful, it is necessary to improve FCE. BPA's goal has been to maximize smolt collection. Tacoma Power has contributed to fish passage research in an effort to satisfy downstream survival requirements as identified in its Cowlitz Project Relicensing Settlement Agreement. In each case, the goal is to improve smolt collection over current levels.

Recent studies by the USGS and WDFW have improved our understanding of CFP fish passage. One study estimated one-third of the steelhead smolts rejected the Project's baffle panel entrance to the surface collection system. This problem was resolved in 2000 by redesigning the panel configuration to reduce the vortex behind the baffles, thus smoothing out flows to the gates. Recent radio telemetry evaluations indicate up to 92% of the steelhead and 72% of the chinook smolts are within a few meters of the fish gate entrances but many still reject the gates. Currently 24% of the chinook smolts are being collected.

The 2003 research plans are designed around utilizing the USGS and WDFW expertise and technical skills; i.e. radio telemetry, acoustic camera, flume sampling, etc. Plans for 2003 are listed below and are outlined on the following pages. The goal for 2003 is to focus on smolt behavior in the near zone (within two to three meters of the fish gate) and evaluate if either increased flow through a fish gate or modifying the gate entrance shape has a positive effect.

COWLITZ FALLS FISH FACILITY (CFFF)
FISHERIES RESEARCH PLANS
2003 (DRAFT PLANS)

PROPOSALS

1. 20/40 Cfs Test – Evaluate fish gate passage by steelhead and coho smolts when flow is doubled to 40 cfs through one gate (test) versus the status quo of 20 cfs through each of two gates (control).

2. Modified Gate Entrance Test – Evaluate chinook (and secondarily coho) passage at an eight foot wide by two foot deep gate opening at 40 cfs. Compare test results to 40 cfs through the gate without the modified entrance and to 20 cfs through each of two gates.

3. Blue/Green Light Test (pilot study) – Test blue/green spectrum lights' ability to attract steelhead smolts into the gate openings prior to the major run of steelhead smolts.

4. Tacoma Tests – To be developed (include knife gate test and strobe light tests).

OBJECTIVES

1. 20/40 Cfs Test – Determine if increased flow through one fish gate significantly increases fish collection efficiency (FCE) over the status quo gate configuration.

   Response Variables:

   a. Total fish collection for 24-hour intervals for test and control conditions. The test would begin on May 5 and continue through June 23, 2003.

   b. Evaluate numbers of radio tagged steelhead accepting (and rejecting) fish gates on their first approach and subsequent passage attempts.

   c. Evaluate passage time for fish passing during the two conditions and independently assess times for fish passing on their first attempt.

   d. Evaluate if fewer fish passed alternate routes; i.e. turbine or induction slots in either test or control scenario.

   e. Total marks recaptured during test and control condition.

   f. Develop 2003 FCE estimate from mark recapture and compare to prior years.

Tasks:

a. Install PVC pipes over fish flumes #1 and #3 to allow excess water to spill without the loss of fish.

b. Install radio antennae where appropriate at CFP (USGS lead, WDFW and LCPUD to assist).

c. Radio tag 120 steelhead smolts throughout the middle 80% of the run.

d. PIT tag approximately 350 steelhead smolts.

e. Determine location(s) for acoustic camera placement.

f. Elastermere mark eight to eleven steelhead and coho replicates for mark recapture evaluations.

2. Modified Gate Entrance Test – Determine if a wider gate entrance and/or increased flow increases FGE and reduces the smolt rejection rate observed at gate entrances.

Response Variables:

a. Total fish collection for 24-hour intervals for test and control conditions. The test would begin in early to mid-July and continue through mid- August.

b. Evaluate numbers of radio tagged chinook accepting (and rejecting) fish gates on their first approach and subsequent passage attempts.

c. Evaluate passage time for fish passing during the two conditions and independently assess times for fish passing on their first attempt.

d. Evaluate if fewer fish passed alternate routes; i.e. turbine or induction slots in either test or control scenario.

e. Total marks recaptured during test and control condition.

f. Develop 2003 FCE estimate from mark recapture and compare to prior years.

Tasks:

a. Install the modified gate entrance (fish box) over fish gate #3.

b. Reinstall PVC pipes over fish flumes #1 and/or #3, to allow excess water to spill without the loss of fish.

c. Determine acoustic camera placement to cover both the modified gate entrance and the existing entrance.

d. Radio tag 240 (dependent on Tacoma funding) chinook smolts throughout the middle 80% of the run.

e. Elastermere mark eight to eleven chinook replicates for mark recapture evaluations.

3. Blue/Green Light Test (pilot study) – Perform a pilot study to determine if blue/green spectrum lights have the potential to attract steelhead smolts into gate openings and if they warrant further study.

Response Variables:

a. Test blue/green spectrum lights' ability to attract and increase smolt collection by side-by-side on/off testing using 24-hour flume traps results.

Tasks:

a. Install flume traps in flumes #1 and #2 and operate from April 16 – May 4.

b. Install blue/green spectrum lights in flumes #1 and #2.

4. Tacoma Studies:

a. High Velocity Orifice Installation and Velocity Testing. Install March 1 – March 31. Modify existing flared entrance to achieve maximum velocity of 10 fps at flared entrance exit with flap gate in down position. Verify velocity and flow conditions. Keep in place until May 4 for velocity and fish behavior testing. (There may be some required down time to allow separator modifications to be completed).

b. High Velocity Orifice Test (pilot fish study) – Reinstall ~June 23 and operate to ~July 7 during second half of the coho run and first of the chinook run. This study could continue if runoff is sufficient to allow two-turbine operation or if the chinook run develops later (10^{th} percentile of the chinook run has ranged from as early as July 4 to as late as August 1 since 1999). (There may be some required down time to remove the debris deflector and transport it upstream).

c. Strobe Lights (pilot study) – Intended to scare fish into fish flumes (various one day light placements). Install April 1 – April 15, operate until May 4. Located 10 to 30 feet upstream of flume entrance at approximate 2 foot depth. Schedule over one turbine unit, completed prior to May 5. (There may be some unexpected down time to allow separator modifications to be completed).

TIMELINES

March 1 – March 31:

Install modified flume entrance/high velocity orifice opening , test with 20 and 40 cfs flows.
Evaluate with velocity meter

April 1 – April 15:

Operate CFFF 3 days/week (eight hours/day) for steelhead kelt recovery.
Install strobe lights.
Evaluate high velocity orifice with acoustic camera.

April 16 – May 04:

Blue/Green Lights Test
Evaluate Tacoma's Strobe Light Test with acoustic camera
Evaluate high velocity orifice with acoustic camera.

May 05 – June 23:

20/40 Cfs Test

Steelhead mark/recapture 8 - 11 reps (May 5 – May 28)
Steelhead radio tagging, 120 tags (same as above)
Coho mark/recapture 10 – 11 reps (May 19 – June 11)
Acoustic camera video (subsample May 5 – June 11)
Additional 10-12 days for marked smolts to clear reservoir and bays.
PIT tag approximately 350 steelhead

June 23 – July 07:

Tacoma's high velocity orifice test utilizing the acoustic camera and flume sampling.
Possible early placement if flows permit.
(The timing of this test may be adjusted forward if severe drought conditions exist resulting in an earlier than expected emigration).

July 07 (or later) – 90% of chinook run (?)

Radio Telemetry and High Velocity Orifice Test - Start ~ mid July – end of August

Chinook mark/recapture 8 - 11 reps (~ mid July – mid/end of August)
Chinook radio tagging, 240 tags (same as above)
Acoustic camera video (subsample same as above)

COORDINATION NEEDS

- Install PVC separator on surface of two flumes (20/40 test).
- Determine light placement and install lights (Light test).
- Install fish collection traps in flume (Light test).
- Install mod. gate opening box (Systematic installation and removal up to three times/week.
- Install radio telemetry antennae
- Move debris deflector

TACOMA POWER

3628 South 35th Street
Tacoma, Washington 98409-3192

TACOMA PUBLIC UTILITIES

April 8, 2004

Ms. Michelle Day
NOAA Fisheries
Hydropower Division
525 N.E. Oregon St., Suite 500
Portland, OR 97232

Ms. Lou Ellyn Jones
US Fish and Wildlife Service
510 Desmond Drive S.E., Suite 102
Lacey, WA 98503

Subject: City of Tacoma, Cowlitz River Hydroelectric Project, FERC No. 2016
39th Progress Report on LCPUD/BPA Negotiations

Dear Ms. Day and Mr. Stagner:

Section 8.2.10 of the Cowlitz River Hydroelectric Project Settlement Agreement (Agreement) requires Tacoma Power (Tacoma) to engage in negotiations with Lewis County Public Utility District (LCPUD) and the Bonneville Power Administration (BPA) regarding cooperative efforts to improve downstream fish passage effectiveness at the Cowlitz Falls Project. The Agreement also requires Tacoma to provide a monthly progress report to the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS). In accordance with the Agreement, additional progress reports will be provided each month until negotiations are completed or terminated.

This letter is intended to serve as the 39th progress report covering the period of March 2004. On March 8th, ENSR International provided the revised scope of work to perform field measurements in support of their ongoing computational fluid dynamics modeling work for Cowlitz Falls Dam. On March 19th, Tacoma Power, LCPUD, BPA, and NOAA Fisheries met in Chehalis to discuss implementation of interim measures to enhance juvenile fish collection and to work on an agreement for Tacoma Power's future participation in Fish collection at Cowlitz Falls. A follow-up meeting with Tacoma, LCPUD and BPA has been tentatively scheduled for the end of April.

Please feel free to contact me at (253) 502-8340 with any questions.

Sincerely,

Debbie C. Young
Natural Resources Manager

Cc: Secretary, Federal Energy Regulatory Commission, Washington, D.C.
Federal Energy Regulatory Commission, Portland Regional Office
Official Service List

TACOMA POWER

3628 South 35th Street
Tacoma, Washington 98409-3192

TACOMA PUBLIC UTILITIES

March 8, 2004

Ms. Michelle Day
NOAA Fisheries
Hydropower Division
525 N.E. Oregon St., Suite 500
Portland, OR 97232

Mr. Eugene Stagner
US Fish and Wildlife Service
510 Desmond Drive S.E.
Lacey, WA 98503

Subject: City of Tacoma, Cowlitz River Hydroelectric Project, FERC No. 2016
38th Progress Report on LCPUD/BPA Negotiations

Dear Ms. Day and Mr. Stagner:

Section 8.2.10 of the Cowlitz River Hydroelectric Project Settlement Agreement (Agreement) requires Tacoma Power (Tacoma) to engage in negotiations with Lewis County Public Utility District (LCPUD) and the Bonneville Power Administration (BPA) regarding cooperative efforts to improve downstream fish passage effectiveness at the Cowlitz Falls Project. The Agreement also requires Tacoma to provide a monthly progress report to the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS). In accordance with the Agreement, additional progress reports will be provided each month until negotiations are completed or terminated.

This letter is intended to serve as the 38th progress report covering the period of February 2004. On February 27th, a workshop was conducted at the ENSR office in Redmond on the computational flow dynamics model of the Cowlitz Falls Dam fish flume forebay area. Results were reviewed and ENSR found the USGS data sets inadequate for the model. A proposal is being developed to collect the measurements in April for input into the model.

Please feel free to contact me at (253) 502-8340 with any questions.

Sincerely,

for Debbie C. Young
Natural Resources Manager

cc: Secretary, Federal Energy Regulatory Commission, Washington, D.C.
Federal Energy Regulatory Commission, Portland Regional Office
Official Service List (w/o enclosures)

TACOMA POWER

3628 South 35th Street
Tacoma, Washington 98409-3192

TACOMA PUBLIC UTILITIES

February 12, 2004

Ms. Michelle Day
NOAA Fisheries
Hydropower Division
525 N.E. Oregon St., Suite 500
Portland, OR 97232

Mr. Eugene Stagner
US Fish and Wildlife Service
510 Desmond Drive S.E.
Lacey, WA 98503

Subject: City of Tacoma, Cowlitz River Hydroelectric Project, FERC No. 2016
37th Progress Report on LCPUD/BPA Negotiations

Dear Ms. Day and Mr. Stagner:

Section 8.2.10 of the Cowlitz River Hydroelectric Project Settlement Agreement (Agreement) requires Tacoma Power (Tacoma) to engage in negotiations with Lewis County Public Utility District (LCPUD) and the Bonneville Power Administration (BPA) regarding cooperative efforts to improve downstream fish passage effectiveness at the Cowlitz Falls Project. The Agreement also requires Tacoma to provide a monthly progress report to the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS). In accordance with the Agreement, additional progress reports will be provided each month until negotiations are completed or terminated.

This letter is intended to serve as the 37th progress report covering the period of December 2003. A baseline model of a Cowlitz Falls spill gate forebay has been created by ENSR. ENSR should receive the velocity data needed to calibrate the model from USGS this week.

Please feel free to contact me at (253) 502-8340 with any questions.

Sincerely,

Debbie C. Young
Natural Resources Manager

cc: Secretary, Federal Energy Regulatory Commission, Washington, D.C.
Federal Energy Regulatory Commission, Portland Regional Office
Official Service List (w/o enclosures)

TACOMA POWER

3628 South 35th Street
Tacoma, Washington 98409-3192

TACOMA PUBLIC UTILITIES

January 8, 2004

Ms. Michelle Day
NOAA Fisheries
Hydropower Division
525 N.E. Oregon St., Suite 500
Portland, OR 97232

Mr. Eugene Stagner
US Fish and Wildlife Service
510 Desmond Drive S.E.
Lacey, WA 98503

Subject: City of Tacoma, Cowlitz River Hydroelectric Project, FERC No. 2016
36th Progress Report on LCPUD/BPA Negotiations

Dear Ms. Day and Mr. Stagner:

Section 8.2.10 of the Cowlitz River Hydroelectric Project Settlement Agreement (Agreement) requires Tacoma Power (Tacoma) to engage in negotiations with Lewis County Public Utility District (LCPUD) and the Bonneville Power Administration (BPA) regarding cooperative efforts to improve downstream fish passage effectiveness at the Cowlitz Falls Project. The Agreement also requires Tacoma to provide a monthly progress report to the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS). In accordance with the Agreement, additional progress reports will be provided each month until negotiations are completed or terminated.

This letter is intended to serve as the 36th progress report covering the period of December 2003. A meeting with Tacoma Power staff, ENSR and MWH was held on December 11 to discuss Cowlitz Falls Dam fish collection flume-modification options for 60cfs flume flow and preliminary computational flow dynamics (CFD) modeling tasks.

Please feel free to contact me at (253) 502-8340 with any questions.

Sincerely,

Cynthia Swanberg for

Debbie C. Young
Natural Resources Manager

cc: Secretary, Federal Energy Regulatory Commission, Washington, D.C.
Federal Energy Regulatory Commission, Portland Regional Office
Official Service List (w/o enclosures)

TACOMA POWER

3628 South 35th Street
Tacoma, Washington 98409-3192

TACOMA PUBLIC UTILITIES

December 9, 2003

Ms. Michelle Day
NOAA Fisheries
Hydropower Division
525 N.E. Oregon St., Suite 500
Portland, OR 97232

Mr. Eugene Stagner
US Fish and Wildlife Service
510 Desmond Drive S.E.
Lacey, WA 98503

Subject: City of Tacoma, Cowlitz River Hydroelectric Project, FERC No. 2016
35th Progress Report on LCPUD/BPA Negotiations

Dear Ms. Day and Mr. Stagner:

Section 8.2.10 of the Cowlitz River Hydroelectric Project Settlement Agreement (Agreement) requires Tacoma Power (Tacoma) to engage in negotiations with Lewis County Public Utility District (LCPUD) and the Bonneville Power Administration (BPA) regarding cooperative efforts to improve downstream fish passage effectiveness at the Cowlitz Falls Project. The Agreement also requires Tacoma to provide a monthly progress report to the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS). In accordance with the Agreement, additional progress reports will be provided each month until negotiations are completed or terminated.

This letter is intended to serve as the 35th progress report covering the period of November 2003. During the month comments from LCPUD and BPA on Tacoma's draft plan for downstream fish passage and collection at Riffe Lake and Cowlitz Falls were received. In addition, Tacoma has finalized the terms of a contract with Montgomery Watson Harza to perform computational fluid dynamics modeling to support juvenile fish passage at Cowlitz Falls Dam with the contract having been signed on December 4th.

Please feel free to contact me at (253) 502-8340 with any questions.

Sincerely,

Debbie C. Young
Natural Resources Manager

cc: Secretary, Federal Energy Regulatory Commission, Washington, D.C.
Federal Energy Regulatory Commission, Portland Regional Office
Official Service List

TACOMA POWER

3628 South 35th Street
Tacoma, Washington 98409-3192

TACOMA PUBLIC UTILITIES

November 7, 2003

Ms. Michelle Day
NOAA Fisheries
Hydropower Division
525 N.E. Oregon St., Suite 500
Portland, OR 97232

Mr. Eugene Stagner
US Fish and Wildlife Service
510 Desmond Drive S.E.
Lacey, WA 98503

Subject: City of Tacoma, Cowlitz River Hydroelectric Project, FERC No. 2016
34th Progress Report on LCPUD/BPA Negotiations

Dear Ms. Day and Mr. Stagner:

Section 8.2.10 of the Cowlitz River Hydroelectric Project Settlement Agreement (Agreement) requires Tacoma Power (Tacoma) to engage in negotiations with Lewis County Public Utility District (LCPUD) and the Bonneville Power Administration (BPA) regarding cooperative efforts to improve downstream fish passage effectiveness at the Cowlitz Falls Project. The Agreement also requires Tacoma to provide a monthly progress report to the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS). In accordance with the Agreement, additional progress reports will be provided each month until negotiations are completed or terminated.

This letter is intended to serve as the 34th progress report covering the period of October 2003. During the month LCPUD was sent for review, Tacoma's draft plan for downstream fish passage and collection at Riffe Lake and Cowlitz Falls. In addition Tacoma, completed discussions with Montgomery Watson Harza and ENSR about a proposal to perform computational fluid dynamics modeling to support juvenile fish passage at Cowlitz Falls Dam. Tacoma approved an expenditure of up to $250,000 for their services relative to this project including the modeling. Please feel free to contact me at (253) 502-8340 with any questions.

Sincerely,

for Debbie C. Young
Natural Resources Manager

cc: Secretary, Federal Energy Regulatory Commission, Washington, D.C.
Federal Energy Regulatory Commission, Portland Regional Office
Official Service List (w/o enclosures)

TACOMA POWER

3628 South 35th Street
Tacoma, Washington 98409-3192

TACOMA PUBLIC UTILITIES

October 9, 2003

Ms. Michelle Day
NOAA Fisheries
Hydropower Division
525 N.E. Oregon St., Suite 500
Portland, OR 97232

Mr. Eugene Stagner
US Fish and Wildlife Service
510 Desmond Drive S.E.
Lacey, WA 98503

Subject: City of Tacoma, Cowlitz River Hydroelectric Project, FERC No. 2016
33rd Progress Report on LCPUD/BPA Negotiations

Dear Ms. Day and Mr. Stagner:

Section 8.2.10 of the Cowlitz River Hydroelectric Project Settlement Agreement (Agreement) requires Tacoma Power (Tacoma) to engage in negotiations with Lewis County Public Utility District (LCPUD) and the Bonneville Power Administration (BPA) regarding cooperative efforts to improve downstream fish passage effectiveness at the Cowlitz Falls Project. The Agreement also requires Tacoma to provide a monthly progress report to the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS). In accordance with the Agreement, additional progress reports will be provided each month until negotiations are completed or terminated.

This letter is intended to serve as the 33rd progress report covering the period of September 2003. On September 18, 2003, a meeting was held at LCPUD offices in Chehalis to discuss Tacoma's preliminary 2004 research plan. In addition to Tacoma, representatives of LCPUD, BPA, UNITED STATES Geological Survey, and Washington Department of Fish and Wildlife attended the meeting. Tacoma's exclusionary and passive netting concepts for fish guidance presented at this meeting appeared to be acceptable to the group. Please feel free to contact me at (253) 502-8340 with any questions.

Sincerely,

Debbie C. Young
Natural Resources Manager

cc: Secretary, Federal Energy Regulatory Commission, Washington, D.C.
Federal Energy Regulatory Commission, Portland Regional Office
Official Service List (w/o enclosures)

TACOMA POWER

3628 South 35th Street
Tacoma, Washington 98409-3192

TACOMA PUBLIC UTILITIES

September 9, 2003

Ms. Michelle Day
NOAA Fisheries
Hydropower Division
525 N.E. Oregon St., Suite 500
Portland, OR 97232

Mr. Eugene Stagner
US Fish and Wildlife Service
510 Desmond Drive S.E.
Lacey, WA 98503

Subject: **City of Tacoma, Cowlitz River Hydroelectric Project, FERC No. 2016**
32nd Progress Report on LCPUD/BPA Negotiations

Dear Ms. Day and Mr. Stagner:

Section 8.2.10 of the Cowlitz River Hydroelectric Project Settlement Agreement (Agreement) requires Tacoma Power (Tacoma) to engage in negotiations with Lewis County Public Utility District (LCPUD) and the Bonneville Power Administration (BPA) regarding cooperative efforts to improve downstream fish passage effectiveness at the Cowlitz Falls Project. The Agreement also requires Tacoma to provide a monthly progress report to the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS). In accordance with the Agreement, additional progress reports will be provided each month until negotiations are completed or terminated.

This letter is intended to serve as the 32nd progress report covering the period of August 2003. No testing was done during this period. Tacoma met with Jim Byrd of LCPUD staff at the dam site on August 20th to examine the ramped fish screen used previously and the existing fyke net frames. The modification and use of this equipment as part of Tacoma's 2004 fish research program at Cowlitz Falls Dam was reviewed. The insertion and removal of this equipment during the tests was also discussed. Please feel free to contact me at (253) 502-8340 with any questions.

Sincerely,

Cynthia Svankey for

Debbie C. Young
Natural Resources Manager

cc: Secretary, Federal Energy Regulatory Commission, Washington, D.C.
Federal Energy Regulatory Commission, Portland Regional Office
Official Service List (w/o enclosures)

32nd Report
LCPUD/BPA
Negotiat

Track Shipments
Detailed Results

Printable Version | Quick Help

Tracking number	792325097689	**Reference number**	5657 921.1
Signed for by	T.WOOLARD.	**Delivered to**	Ship'g/Receiv'g
Ship date	Sep 9, 2003	**Delivery location**	WASHINGTON DC
Delivery date/time	Sep 10, 2003 9:22 am	**Service type**	Standard Envelope

Date/time		Status	Location	Comments
Sep 10, 2003	9:22 am	**Delivered**	WASHINGTON DC	
	9:00 am	On FedEx vehicle for delivery	WASHINGTON DC	
	8:52 am	On FedEx vehicle for delivery	WASHINGTON DC	
	7:16 am	Left FedEx Ramp	DULLES VA	
	7:15 am	Arrived at FedEx Destination Location	WASHINGTON DC	
	5:46 am	Arrived at FedEx Ramp	DULLES VA	
	3:50 am	Left FedEx Sort Facility	MEMPHIS TN	
	2:19 am	Left FedEx Sort Facility	MEMPHIS TN	
	1:52 am	Arrived at Sort Facility	MEMPHIS TN	
Sep 9, 2003	7:59 pm	Left FedEx Ramp	SEATTLE WA	
	6:41 pm	Arrived at FedEx Ramp	SEATTLE WA	
	5:56 pm	Left FedEx Origin Location	TACOMA WA	
	3:40 pm	Pickup status	TACOMA WA	Pre-routed meter pkg picked up

You can also track:
- By Alternate
- By Email
- TCN (Gov't

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- FedEx Cust shipments
- FedEx Trad shipments
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Email your detailed tracking results (optional)

Enter your email, submit up to three email addresses (separated by commas), add your message (optional), and click **Send email**.

From
To

Add a message to this email.

Send email

TACOMA POWER

3628 South 35th Street
Tacoma, Washington 98409-3192

TACOMA PUBLIC UTILITIES

Tom Martin

August 12, 2003

Ms. Michelle Day
NOAA Fisheries
Hydropower Division
525 N.E. Oregon St., Suite 500
Portland, OR 97232

Mr. Eugene Stagner
US Fish and Wildlife Service
510 Desmond Drive S.E.
Lacey, WA 98503

Subject: City of Tacoma, Cowlitz River Hydroelectric Project, FERC No. 2016
31st Progress Report on LCPUD/BPA Negotiations

Dear Ms. Day and Mr. Stagner:

Section 8.2.10 of the Cowlitz River Hydroelectric Project Settlement Agreement (Agreement) requires Tacoma Power (Tacoma) to engage in negotiations with Lewis County Public Utility District (LCPUD) and the Bonneville Power Administration (BPA) regarding cooperative efforts to improve downstream fish passage effectiveness at the Cowlitz Falls Project. The Agreement also requires Tacoma to provide a monthly progress report to the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS). In accordance with the Agreement, additional progress reports will be provided each month until negotiations are completed or terminated.

This letter is intended to serve as the 31st progress report covering the period of July 2003. No testing was done during this period. Tacoma met with LCPUD on July 29th. The following issues were discussed: Status of the Cowlitz River Project license; summary of the 2003 fish collection research; LCPUD's 2003 fish collection research and 2004 plans; Tacoma's preliminary plans for 2004 fish collection research; and the planned drawdown at Cowlitz Falls Dam and Tacoma's proposed activities during the drawdown. It was agreed that the existing access agreement could be used again in 2004 with the plan being incorporated as an addendum or exhibit. Please feel free to contact me at (253) 502-8340 with any questions.

Sincerely,

Debbie C. Young
Natural Resources Manager

c: Secretary, Federal Energy Regulatory Commission, Washington, D.C.
Federal Energy Regulatory Commission, Portland Regional Office
Official Service List (w/o enclosures)

TACOMA POWER

3628 South 35th Street
Tacoma, Washington 98409-3192

TACOMA PUBLIC UTILITIES

July 9, 2003

National Marine Fisheries Service
Attention: Steve Fransen
510 Desmond Drive S.E., Suite 103
Lacey, Washington 98503

U.S. Fish and Wildlife Service
Attention: Eugene Stagner
510 Desmond Drive S.E., Suite 102
Lacey, Washington 98503

Subject: City of Tacoma, Cowlitz River Hydroelectric Project, FERC No. 2016
30th Progress Report on LCPUD/BPA Negotiations

Gentlemen:

Section 8.2.10 of the Cowlitz River Hydroelectric Project Settlement Agreement (Agreement) requires Tacoma Power (Tacoma) to engage in negotiations with Lewis County Public Utility District (LCPUD) and the Bonneville Power Administration (BPA) regarding cooperative efforts to improve downstream fish passage effectiveness at the Cowlitz Falls Project. The Agreement also requires Tacoma to provide a monthly progress report to the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS). In accordance with the Agreement, additional progress reports will be provided each month until negotiations are completed or terminated.

This letter is intended to serve as the 30th progress report covering the period of June 2003. There is nothing to report for this period. As previously reported, Tacoma Power has been testing several fish collection concepts during the 2003 out migration period at Cowlitz Falls Dam. The primary idea tested involved increasing the velocity at Flume 3's entrance through the installation of a submerged orifice with a flared approach. Testing on this orifice was again conducted between June 17th and July 1st using USGS's acoustic camera to observe fish behavior. The camera was also used to record fish reactions to strobe lights, pulsing flows, a guide net, and the vibration of flared entrance. Please feel free to contact me at (253) 502-8340 with any questions.

Sincerely,

Debbie C. Young
Natural Resources Manager

c: Secretary, Federal Energy Regulatory Commission, Washington, D.C.
Federal Energy Regulatory Commission, Portland Regional Office
Official Service List (w/o enclosures)

TACOMA POWER

3628 South 35th Street
Tacoma, Washington 98409-3192

TACOMA PUBLIC UTILITIES

June 9, 2003

National Marine Fisheries Service
Attention: Steve Fransen
510 Desmond Drive S.E., Suite 103
Lacey, Washington 98503

U.S. Fish and Wildlife Service
Attention: Eugene Stagner
510 Desmond Drive S.E., Suite 102
Lacey, Washington 98503

Subject: City of Tacoma, Cowlitz River Hydroelectric Project, FERC No. 2016
29th Progress Report on LCPUD/BPA Negotiations

Gentlemen:

Section 8.2.10 of the Cowlitz River Hydroelectric Project Settlement Agreement (Agreement) requires Tacoma Power (Tacoma) to engage in negotiations with Lewis County Public Utility District (LCPUD) and the Bonneville Power Administration (BPA) regarding cooperative efforts to improve downstream fish passage effectiveness at the Cowlitz Falls Project. The Agreement also requires Tacoma to provide a monthly progress report to the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS). In accordance with the Agreement, additional progress reports will be provided each month until negotiations are completed or terminated.

This letter is intended to serve as the 29th progress report covering the period of May 2003. There is nothing to report for this period. Please feel free to contact me at (253) 502-8340 with any questions.

Sincerely,

Debbie C. Young
Natural Resources Manager

c: Secretary, Federal Energy Regulatory Commission, Washington, D.C.
Federal Energy Regulatory Commission, Portland Regional Office
Official Service List (w/o enclosures)

TACOMA POWER

3628 South 35th Street
Tacoma, Washington 98409-3192

TACOMA PUBLIC UTILITIES

May 12, 2003

Steve Fransen
National Marine Fisheries Service
510 Desmond Drive S.E., Suite 103
Lacey, Washington 98503

Eugene Stagner
U.S. Fish and Wildlife Service
510 Desmond Drive S.E., Suite 102
Lacey, Washington 98503

Subject: **City of Tacoma, Cowlitz River Hydroelectric Project, FERC No. 2016**
28th Progress Report on LCPUD/BPA Negotiations

Gentlemen:

Section 8.2.10 of the Cowlitz River Hydroelectric Project Settlement Agreement (Agreement) requires Tacoma Power (Tacoma) to engage in negotiations with Lewis County Public Utility District (LCPUD) and the Bonneville Power Administration (BPA) regarding cooperative efforts to improve downstream fish passage effectiveness at the Cowlitz Falls Project. The Agreement also requires Tacoma to provide a monthly progress report to the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS). In accordance with the Agreement, additional progress reports will be provided each month until negotiations are completed or terminated.

This letter is intended to serve as the 28th progress report covering the period of April 2003. The Access Agreement, including Exhibit C draft plans, has been signed by all three parties. During April the modeling of modified flume entrance was completed and the flume modified per the modeling results. The modified flume was installed and tested during the last week of April. The tests included variable flows and the use of strobe lights. Please feel free to contact me at (253) 502-8340 with any questions.

Sincerely,

Debbie C. Young
Natural Resources Manager

cc: Secretary, FERC
Official Service List (w/o enclosures)

TACOMA POWER

3628 South 35th Street
Tacoma, Washington 98409-3192

TACOMA PUBLIC UTILITIES

March 18, 2003

Steve Fransen
National Marine Fisheries Service
510 Desmond Drive S.E., Suite 103
Lacey, Washington 98503

Eugene Stagner
U.S. Fish and Wildlife Service
510 Desmond Drive S.E., Suite 102
Lacey, Washington 98503

Subject: City of Tacoma, Cowlitz River Hydroelectric Project, FERC No. 2016
26th Progress Report on LCPUD/BPA Negotiations

Gentlemen:

Section 8.2.10 of the Cowlitz River Hydroelectric Project Settlement Agreement (Agreement) requires Tacoma Power (Tacoma) to engage in negotiations with Lewis County Public Utility District (LCPUD) and the Bonneville Power Administration (BPA) regarding cooperative efforts to improve downstream fish passage effectiveness at the Cowlitz Falls Project. The Agreement also requires Tacoma to provide a monthly progress report to the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS). In accordance with the Agreement, additional progress reports will be provided each month until negotiations are completed or terminated.

This letter is intended to serve as the 26th progress report covering the period of February and March 2003. The Access Agreement, including Exhibit C draft plans, was signed by BPA and Tacoma and sent to LCPUD for their signature. Exhibit C (attached) is the fisheries research plans for actions at the Cowlitz Falls Fish Collection Facility in 2003. Tacoma Power's proposed a program of financial and logistical support to LCPUD for the 2003 fisheries research actions and evaluations, as outlined in the January 30th letter, has been verbally accepted by Mike Kohn. Tacoma Power is proceeding with those five support measures. Finalization of the agreement is expected in March 2003. Please feel free to contact me at (253) 502-8340 with any questions.

Sincerely,

Debbie C. Young
Natural Resources Manager

Attachment
cc: Secretary, FERC
Official Service List (w/o enclosures)

TACOMA POWER

3628 South 35th Street
Tacoma, Washington 98409-3192

TACOMA PUBLIC UTILITIES

January 6, 2003

Steve Fransen
National Marine Fisheries Service
510 Desmond Drive S.E., Suite 103
Lacey, Washington 98503

Eugene Stagner
U.S. Fish and Wildlife Service
510 Desmond Drive S.E., Suite 102
Lacey, Washington 98503

Subject: City of Tacoma, Cowlitz River Hydroelectric Project, FERC No. 2016
24th Progress Report on LCPUD/BPA Negotiations

Gentlemen:

Section 8.2.10 of the Cowlitz River Hydroelectric Project Settlement Agreement (Agreement) requires Tacoma Power (Tacoma) to engage in negotiations with Lewis County Public Utility District (LCPUD) and the Bonneville Power Administration (BPA) regarding cooperative efforts to improve downstream fish passage effectiveness at the Cowlitz Falls Project. The Agreement also requires Tacoma to provide a monthly progress report to the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS). In accordance with the Agreement, additional progress reports will be provided each month until negotiations are completed or terminated.

This letter is intended to serve as the 24th progress report covering the period November and December 2002. During the months represented by this report, one meeting was held between LCPUD and Tacoma on December 13, 2002 and a draft Access Agreement was transmitted from LCPUD to Tacoma for review. Exhibit C of the Access Agreement includes the fisheries research plans for actions at the Cowlitz Falls Fish Collection Facility in 2003. The meeting on December 13 was to review the draft research plans for 2003 prior to their finalization in conjunction with the signing of the Access Agreement. Tacoma continues to work with LCPUD on the Access Agreement and will participate as a signatory prior to starting any improvements/modifications at Cowlitz Falls Dam. The parties intend to finalize the Access Agreement in January 2003. Please feel free to contact me at (253) 502-8340 with any questions.

Sincerely,

Debbie C. Young
Natural Resources Manager

cc: Secretary, FERC
Official Service List

24th Report - Cowlitz LCPUD BPA Negotiations.doc

TACOMA POWER

3628 South 35th Street
Tacoma, Washington 98409-3192

TACOMA PUBLIC UTILITIES

November 13, 2002

Steve Fransen
National Marine Fisheries Service
510 Desmond Drive S.E., Suite 103
Lacey, Washington 98503

Eugene Stagner
U.S. Fish and Wildlife Service
510 Desmond Drive S.E., Suite 102
Lacey, Washington 98503

Gentlemen:

Subject: City of Tacoma, Cowlitz River Hydroelectric Project, FERC No. 2016
23rd Progress Report on LCPUD/BPA Negotiations

Section 8.2.10 of the Cowlitz River Hydroelectric Project Settlement Agreement (Agreement) requires Tacoma Power (Tacoma) to engage in negotiations with Lewis County Public Utility District (LCPUD) and the Bonneville Power Administration (BPA) regarding cooperative efforts to improve downstream fish passage effectiveness at the Cowlitz Falls Project. The Agreement also requires Tacoma to provide a monthly progress report to the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS).

This letter is intended to serve as the 23rd progress report. In accordance with the Agreement, additional progress reports will be provided each month until negotiations are completed or terminated. This letter includes a corrected version of discussion notes of the Cowlitz Falls Dam tour that occurred on October 2. During the month represented by this report, one meeting was held between LCPUD and Tacoma on October 30, 2002. Tacoma agreed to a work with LCPUD on an agreement before starting any improvements/modifications. The parties intend to finalize plans for any agreed to modifications by January 2003. Please feel free to contact me at (253) 502-8340 with any questions.

Sincerely,

Debbie C. Young
Natural Resources Manager

Enclosure

Cc: Secretary, FERC
Official Service List

g/mary/debbie/23rd report – Cowlitz LCPUD BPA negotiations

Martin, Thomas

From: Rottler, Dan
Sent: Monday, July 07, 2003 3:44 PM
To: Martin, Thomas
Cc: Moore, Kim
Subject: Cowlitz Falls Summary - 7/7/03

As you requested, the following may be appropriate for the update you plan to circulate to interested agencies:

Tacoma Power tested several fish collection concepts during the 2003 outmigration period at Cowlitz Falls Dam. The primary idea tested involved increasing the velocity at Flume 3's entrance to 8-9 fps through the installation of a 2' x 2' submerged orifice with a flared approach. The flared orifice was installed and fish behavior observations made with USGS's acoustic camera from 4/25 to 5/2 and from 6/17 to 7/1. In addition, WDFW conducted flume sampling from 4/23 to 5/2, 6/20 to 6/25, and 7/2 to 7/5 that provided a quantitative evaluation of the flared orifice. USGS's acoustic camera was also used to record fish reactions to strobe lights, pulsing flows, a guide net, and the vibration of flared entrance.

Please let me know if you need anything additional.

Dan
X8605

DATE: October 8, 2002

TO: See Below

FROM: Dan Rottler, Professional Engineer, Generation

SUBJECT: Cowlitz Falls Dam Tour - October 2, 2002 ~~Meeting Minutes~~Discussion Notes

ATTENDEES

Richard Berdan	Steve Fischer	Mark LaRiviere
Pat McCarty	Dean McLeod	Kim Moore
Dan Rottler	Dave Stier	Jim Byrd – LCPUD
Steve Grega – LCPUD	Mike Kohn – LCPUD	John Serl - WDFW

DISCUSSION

Jim explained run-of-river project operations. Three employees, on rotating shifts, staff the ~~p~~Project from 7:30 a.m. to 4 p.m., 7 days per week. BPA has requested no special generation production but to the maximize~~um~~ the MWh per day with the available water~~a~~ (week ahead forecast with (no peaking requested except in an emergency). The two turbines have a total combined capacity of approximately 10,000 cfs. The normal reservoir level is between elevation 860' and 862' with a setpoint of 861.5' that is normally maintained. Currently, in low flow mode of operation at a minimum generation level of approx. 12 MW. This represents about 8 hours of generation per day during this time period. The average flow seen from river throughout a typical year is 4,500 cfs which provides for 1 turbine operation near its nameplate on average. In February 1996~~November 1995~~, the peak discharge from Cowlitz Falls Dam was over 10~~5~~3,000 cfs. When the project needs to pass more than turbine capacity, they operate the following equipment as flow increases: 1.) open sluice gates 2.) open spillgate #1 3.) close sluice gates and open spillgate #4. They provided us a handout which documented the frequency of reser oir spills (May and June w/ most spills). When the river flow at Randle exceeds 15,000 cfs, they are required b the FERC license to drawdown reservoir by 8 to 10 feet. Normally, one or two drawdowns occur each year between October 31 and March 31, but have ranged between zero and six in any one year. ~~One year, they had to do as many as 13 drawdowns. Jim indicated that they have had to drawdown as early as 10/31 before.~~

They conduct an annual silt survey from the dam to Randle ~~R~~bridge but have not noted any significant change in river cross sectional area (silt shifts around in channel but doesn't appear to be filling it). At 27,000 cfs, sluicing of silt is triggered at dam. The sluice gates pass little debris. Spillgate #1 passes majority of debris on the North side of river. The debris damages the seals on their spillgates if mismanaged. A 500 ton steel debris barrier that draws nine (9') feet is installed in front of Spillgates #2 and #3 ~~(4.5 feet of water in bottom wet chamber, outer perimeter chamber(s) are dry)~~ which have fish attraction gates and flumes. During a large flood event, ~~They open~~ the boat barrier is open ~~now~~ so ~~that~~ they Project can deal with debris one at a time rather than all at once. Other methods or options for debris handling or collecting were discussed. (Note: For safety, ~~N~~nobody is allowed past boat barrier w/o all spillgates tagged out of service which poses an operation's problem when turbines are at full capacity. They rake

turbine intakes once per week. They have 4 5-foot tall by 40 35-foot wide flap gates on outboard bays that have been ineffective at passing debris.

The fish collection facility is operated from mid-April to mid-August in a typical year. Approx. 10% of turbine flow goes through induction slots for a maximum of 1,000 cfs at full load (500 cfs per ~~slot~~unit). They have performed flow measurements to verify and document this rate. The induction slots had been covered when fish collection facility was not operating but the covers failed during 1996 flood conditions. The covers were removed and the slots are now covered with grate~~ding~~ covers instead ~~that needs~~that need to be cleaned annually. Flash Technology had installed strobe lights on the top of this grating (approx. 35 feet below water surface) pointing upward to discourage ~~fish~~steelhead from entering induction slots. The desired results were not achieved with the strobe lights. ~~due to turbidity of water, silting of lenses blocking light, wrong type of light dispersement, and/or potentially misapplication of technology (i.e. inappropriate locations)~~Speculation exist of what may have been factors in the poor performance of the lights but no data exist to verify these hypothesis.

The total fish attraction flow of 80 cfs ~~is~~is designed to be divided between two spillgates (#2 and #3) that have two entrance flumes each (20 cfs per flume). After the flow and fish are conveyed from the dam, this bypass flow is too large for the fish handling system. Therefore, all but 10 cfs is allowed to drain by gravity through a ~~secondary~~ dewatering flume. Water drained from the flume can either be pumped ~~15 feet vertically~~ back to the reservoir, conserving ~~about 72.5 feet of~~ head for power generation, or allowed to flow downstream to the river through drain pipes. During the fish evaluation discussion, the PUD's biologist commented that 90% to 92% of the steelhead smolts and 72% of the chonook smolts are getting behind the baffle panels and within a few meters of the fish gates. This year, they experimented with increasing flow to 40 cfs (measured at 44 cfs) through one of the fish gates~~flumes~~. The preliminary results of this experiment indicated that 74% of the fish collected (1,000 fish over 7 days) were now coming through this particular flume. A larger fish sample is needed to verify these results (2003) for standard operation.

~~New~~ A modified baffle panel configuration made significant improvements to fish collection. ~~steelhead stopped going through induction slots.~~ Discussed repeating the 40 cfs tests, the inclined ~~grate~~screen and Harza's elevator idea for crowding fish into flumes after they enter spillgate forebays. During high flow periods, fish collection efficiency ~~goes to~~ is reduced. The fish collection system is not in operation during reservoir drawdown time of the year. ~~zero, due to drawdown, so they have been looking into the possibility of a venturi system marketed by Gordon Burns of Natural Solutions.~~

Steve-LCPUD indicated that it would be desirable to have a Summer 2003 plan for any fish collection improvements/modifications proposed by Tacoma Power by January 2003. He also indicated that he would ask his superiors whether he could share Harza plans of the fish collection facility and Bechtel Engineering plans of the debris barrier with us. All attendees toured the fish collection facility, reservoir locations and dam (see pictures on TPU network at Ltengcom on 'Fs101' G:\Drottler\Cowlitz Falls Project).

c: Tacoma Power Attendees
Max Emrick

****
*** TX REPORT ***
****

TRANSMISSION OK

TX/RX NO	0961
CONNECTION TEL	913607402455
CONNECTION ID	
ST. TIME	11/12 17:21
USAGE T	02'34
PGS.	6
RESULT	OK

TACOMA POWER
TACOMA PUBLIC UTILITIES

STEVEN J. KLEIN, SUPERINTENDENT
3628 South 35th Street
PO Box 11007
Tacoma Washington 98411-0007
(253) 502-8000

FAX TRANSMITTAL COVER SHEET

TO: Dave Miller — NAME — DATE: 11-12-02

Lewis Co. PuD — COMPANY — TIME:

FROM: Debbie Young — NUMBER OF PAGES INCLUDING COVER: 6

(253) 502-8340 — SECTION / D.I.D. PHONE NO. or EXT. — 360 740-2455 FAX NO.

SUBJECT/COMMENTS:

rcvd verbal approval of text from Dave Miller via voice mail 11/13/02

Proposed update letter, for your review

Mary 253/502-8412
OPERATOR/SENDER

Lewis County
PUBLIC UTILITY DISTRICT
COWLITZ FALLS PROJECT
1379 FALLS ROAD, RANDLE, WA 98377 • P.O. BOX AJ, MORTON, WA 98356
(360) 497-5351 • FAX (360) 497-5352 • e-mail: cowlitzfalls@lewiscounty.com

November 4, 2002

Mr. Pat McCarty
Tacoma Power
3628 So. 35th St.
Tacoma, WA 98409-3192

Dear Mr. McCarty,

We wish to thank you and your staff for taking the time to learn more about the Cowlitz Falls Hydroelectric Project and its relationship to downstream fish collection. Our tour and informal discussion was designed to acquaint TPU personnel with the operation of the Project and the efforts that have been made to collect downstream migrants.

We received a copy of Dan Rottler's draft discussion notes from the Cowlitz Falls Project tour of October 2, 2002 and were asked to comment on the information contained in the notes. After reviewing the notes, we are providing general comments contained in this letter and a marked-up copy of the draft notes (attached) to clear up any misunderstanding of Project and fish facility operation.

Overall the notes reflected most of what was covered during the informal discussion. We are concerned however that a version of the tour notes (October 8, 2002) was submitted to Tacoma Power's Relicensing Service List as Progress Report #22, one day prior to your request for our review (October 9, 2002). It is obvious that the mailing sequence was reversed and we are concerned this negates any possibility for LCPUD to correct and accurately record the discussion and tour. Hopefully, these corrected discussion notes will be included in the official record and, an effective protocol developed to document future meetings.

General Comments to the draft discussion notes:

- One topic that was discussed at length was the types, quantity and management of debris collected upstream of the Project. We pointed out that collection of debris in the Cowlitz Falls Reservoir would be very difficult due to the velocity of the flow and the amount of debris that accompanies the larger floods. It seems appropriate to include some discussion regarding debris and its' management.
- During the tour we discussed and visited several sites for releasing adult salmon during Project drawdowns. A suggestion to amend the current boat ramp release site Agreement between Tacoma Power and LCPUD was discussed.

Lewis PUD PUBLIC UTILITIES DISTRICT County

- The discussion regarding Natural Solutions was only to inform you that Gordon Burns had talked with us and was considering Cowlitz Falls among other projects to test his system. We also wanted to inform you that he would be contacting Tacoma soon to consider a preliminary test in Riffe Lake.
- During the fish evaluation discussions we raised the point that 90 – 92% of the steelhead smolts and 72% of the chinook smolts are getting behind the baffle panels and within a few meters of the fish gates. We feel this is one of the more important points brought up during the discussion. We believe this is the last big hurdle towards improving fish collection.

We hope these comments will provide a more accurate representation of the discussion and tour to those on the service list. With a cooperative effort, we can assist Tacoma's Cowlitz River Project in fulfilling its license obligations in regards to downstream migrant collection. We are looking forward to working with Tacoma to improve the fish collection at the Cowlitz Falls Project. Please call Mike Kohn at 360-497-5026 if you have any questions.

Sincerely,

Jim Byrd
Project Superintendent

JB/lt
Enclosure

cc: Dave Muller
Steve Grega
Mike Kohn

Mailed 10/9/02

TACOMA POWER

3628 South 35th Street
Tacoma, Washington 98409-3192

TACOMA PUBLIC UTILITIES

October 8, 2002

Steve Fransen
National Marine Fisheries Service
510 Desmond Drive S.E., Suite 103
Lacey, Washington 98503

Eugene Stagner
U.S. Fish and Wildlife Service
510 Desmond Drive S.E., Suite 102
Lacey, Washington 98503

Gentlemen:

Subject: City of Tacoma, Cowlitz River Hydroelectric Project, FERC No. 2016
22nd Progress Report on LCPUD/BPA Negotiations

Section 8.2.10 of the Cowlitz River Hydroelectric Project Settlement Agreement requires Tacoma Power to engage in negotiations with Lewis County PUD and The Bonneville Power Administration (BPA) regarding cooperative efforts to improve downstream fish passage effectiveness at the Cowlitz Falls Project. The agreement also requires Tacoma to provide a monthly progress report to the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS).

This letter is intended to serve as the 22nd progress report. In accordance with the agreement, additional progress reports will be provided each month until negotiations are completed or terminated. During the month represented by this report, a site visit to Cowlitz Falls to view downstream collection facilities occurred on October 1, 2002. A summary of the site visit is attached. Tacoma agreed to propose some possible improvements/modifications. The parties intend to finalize plans for any agreed to modifications by January 2003. Please feel free to contact me at (253) 502-8340 with any questions.

Sincerely,

Debbie C. Young
Natural Resources Manager

Cc: Secretary, FERC
Official Service List

DATE: October 1, 2002

LOCATION: Cowlitz Falls Dam, Randle, Washington

PARTICIPANTS: See Below

SUBJECT: Fish Collection at Cowlitz Falls Dam

ATTENDEES:

Tacoma Power		LCPUD	WDFW
Richard Berdan	Kim Moore	Jim Byrd	John Serl
Dean McLeod	Mark LaRiviere	Steve Grega	
Dave Stier	Pat McCarty	Mike Kohn	
Steve Fischer	Dan Rottler		

A site visit to Lewis County PUD's Cowlitz Falls Hydroelectric Project occurred on the above date. Engineers, managers and biologists from Tacoma Power, Lewis County PUD and the Washington Department of Fish and Wildlife met to discuss project operations, fish collection facilities and debris handling methods.

FINDINGS:

Jim Byrd explained the run-of-river project operations. Three employees staff the project from 7:30 am to 4 p.m., 7 days per week. BPA has requested the maximum MWh per day with a week ahead forecast (no peaking requested except in an emergency). The two turbines have a total combined capacity of 10,000 cfs. The normal reservoir level is between 860' and 862' with a set point of 861.5' that is normally maintained. When the project needs to pass more than turbine capacity, they operate the following equipment as flow increases: 1.) open sluice gates 2.) open spill gate #1 3.) close sluice gates and open spill gate #4. A handout was provided which documented the frequency of reservoir spills (May and June with most spills). When the Cowlitz River flow at Randle exceeds 15,000 cfs, they are required by their FERC license to draw down reservoir by 8 to 10 feet. They have had to do as many as 13 draw downs in a year, and the earliest a draw down has occurred was on October 31.

An annual silt survey from Cowlitz Falls Dam to the bridge at Randle has not noted any significant change in river cross sectional area (silt shifts around in channel but doesn't appear to be filling it). At 27,000 cfs, sluicing of silt is triggered at the dam. The sluice gates pass little debris.

Spill gate #1 passes majority of debris on the North side of river. The debris damages the seals on their spill gates if mismanaged. A 500 ton steel debris barrier that draws nine (9') feet is installed in front of Spill gates #2 and #3 (4.5 feet of water in bottom wet chamber) where the fish attraction flumes are located. Rather than wait until the boat barrier fails the project opens the barrier as debris accumulates to deal with debris one at a time rather than all at once. Nobody is allowed downstream of the boat barrier unless all spill gates are tagged out of service, posing an operation problem when turbines are at full capacity. They rake turbine intakes once per week. The 4 foot tall by 40 foot wide flap gates on outboard bays have been ineffective at passing debris.

The fish collection facility is operated from mid- April to mid-August in a typical year. Approx. 10% of turbine flow goes through induction slots for a maximum of 1,000 cfs at full load. They have performed flow measurements to verify and document this rate. The induction slots had been covered when fish collection facility was not operating but the covers failed during flood conditions. The covers were removed and the slots are now covered with grating instead that needs to be cleaned annually.

The 80 cfs total fish attraction flow is divided between two spill gates with two entrance flumes each (20 cfs per flume). After the flow and fish are conveyed from the dam, this bypass flow is too large for the fish handling system. Therefore, all but 10 cfs is allowed to drain by gravity through a secondary dewatering flume. Water drained from the flume can either be pumped 15 feet vertically back to the reservoir, conserving about 72.5 feet of head for power generation or allowed to flow downstream to the river through drain pipes. In 2002 they experimented with increasing flow to 40 cfs (measured at 44 cfs) through one of the flumes. The preliminary results of this experiment indicated that 74% of the fish collected (1,000 fish over 7 days) were now coming through this particular flume. A larger fish sample is needed to verify these results for standard operation.

New baffle panel configuration made significant improvements to fish collection - steelhead stopped going through induction slots. Ideas discussed by the participants included an inclined grate and Harza Engineering idea of an elevator crowding fish into flumes after they enter spill gate forebays. During high flow periods, fish collection efficiency goes to near zero so they have been looking into the possibility of a venturi system marketed by Gordon Burns of Natural Solutions.

Steve Grega indicated that it would be desirable to have a 2003 plan for any fish collection improvements/modifications proposed by Tacoma Power by January 2003. He also indicated that he would ask his superiors whether he could share Harza Engineering plans. All attendees toured the fish collection facility, reservoir locations and dam.

TACOMA POWER

3628 South 35th Street

Tacoma, Washington 98409-3192

TACOMA PUBLIC UTILITIES

September 9, 2002

Steve Fransen
National Marine Fisheries Service
510 Desmond Drive S.E., Suite 103
Lacey, Washington 98503

Eugene Stagner
U.S. Fish and Wildlife Service
510 Desmond Drive S.E., Suite 102
Lacey, Washington 98503

Gentlemen:

Subject: City of Tacoma, Cowlitz River Hydroelectric Project, FERC No. 2016
21st Progress Report on LCPUD/BPA Negotiations

Section 8.2.10 of the Cowlitz River Hydroelectric Project Settlement Agreement requires Tacoma Power to engage in negotiations with Lewis County PUD and The Bonneville Power Administration (BPA) regarding cooperative efforts to improve downstream fish passage effectiveness at the Cowlitz Falls Project. The agreement also requires Tacoma to provide a monthly progress report to the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS).

This letter is intended to serve as the 21st progress report. In accordance with the agreement, additional progress reports will be provided each month until negotiations are completed or terminated. During the month represented by this report, a site visit to Cowlitz Falls was scheduled to follow up on discussions at the July 17th meeting. Please feel free to contact me at (253) 502-8340 with any questions.

Sincerely,

Debbie C. Young
Natural Resources Manager

Cc: Secretary, FERC
Official Service List

TACOMA POWER

3628 South 35th Street
Tacoma, Washington 98409-3192

TACOMA PUBLIC UTILITIES

August 9, 2002

Steve Fransen
National Marine Fisheries Service
510 Desmond Drive S.E. #103
Lacey, Washington 98503

Eugene Stagner
U.S. Fish and Wildlife Service
510 Desmond Drive S.E. #102
Lacey, Washington 98503

Gentlemen:

Subject: City of Tacoma, Cowlitz River Hydroelectric Project, FERC No. 2016
20th Progress Report on LCPUD/BPA Negotiations

Section 8.2.10 of the Cowlitz River Hydroelectric Project Settlement Agreement requires Tacoma Power to engage in negotiations with Lewis County PUD and The Bonneville Power Administration (BPA) regarding cooperative efforts to improve downstream fish passage effectiveness at the Cowlitz Falls Project. The agreement also requires Tacoma to provide a monthly progress report to the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS).

This letter is intended to serve as the 20th progress report. In accordance with the agreement, additional progress reports will be provided each month until negotiations are completed or terminated. During the month represented by this report, a meeting between Tacoma Power, Lewis County PUD, and BPA occurred on July 17th. The meeting minutes are enclosed. Please feel free to contact me at (253) 502-8340 with any questions.

Sincerely,

Debbie C. Young
Natural Resources Manager

Enclosure

Cc: Secretary, FERC
Official Service List

Draft Meeting Summary

Location:	TPU Administration Building
Date and Time:	July 17, 2002 – 10:00 to 12:00 p.m.
Participants:	Lewis County PUD: Dave Muller, Mike Kohn, Eric Redman Bonneville Power: Doug Williams, Geoffrey Kronick Tacoma Power: Pat McCarty, Debbie Young, Mark LaRiviere
Subject:	Fish Collection at/near Cowlitz Falls Dam

Pat McCarty began the meeting by suggesting the discussion follow the draft meeting agenda by reporting on Tacoma's and Lewis County PUD's fish activities for the last year or so, an update on Tacoma's License Status, and a discussion of possibilities for working together on a joint solution.

Mark LaRiviere discussed the louver analysis and hydroacoustic tagging work performed at the Mayfield separator, the preliminary results of the fish survival studies at Mayfield and the net tests at the upper end of Riffe Lake.

Mike Kohn discussed the studies this year at the Cowlitz Falls collection facility including the preliminary results from directed flow work, the use of acoustic camera, and higher flows in the flume entrance.

Debbie Young described the FERC license status and the 401 water quality certificate challenge.

Pat McCarty described a concept of using exclusionary netting and debris collection in Lake Scanewa to improve the collection efficiencies at Cowlitz Falls. He requested that LCPUD allow Tacoma's engineers and biologists access to LCPUD's facilities and records so that the concept could be further explored. Dave Muller agreed with the request and stated that Mike Kohn would be the primary contact for Tacoma and that Steve Grega or Jim Byrd should be notified of any work or investigation involving project operations.

The meeting ended with a request of Tacoma to keep Mike Kohn informed of Fish Technical Committee activities, which Mark LaRiviere agreed to do. All parties agreed to continue meeting relative to working toward a joint solution. Tacoma proposed cost-sharing discussions should be deferred until such time that more substantive data becomes known upon which to base a joint funding arrangement.

It was agreed that the next meeting would occur after some results were obtained from the analysis of the netting concept described above.

C: Kim Moore

TACOMA POWER

3628 South 35th Street
Tacoma, Washington 98409-3192

TACOMA PUBLIC UTILITIES

July 8, 2002

Steve Fransen
National Marine Fisheries Service
510 Desmond Drive S.E. #103
Lacey, Washington 98503

Eugene Stagner
U.S. Fish and Wildlife Service
510 Desmond Drive S.E. #102
Lacey, Washington 98503

Gentlemen:

Subject: City of Tacoma, Cowlitz River Hydroelectric Project, FERC No. 2016
19th Progress Report on LCPUD/BPA Negotiations

Section 8.2.10 of the Cowlitz River Hydroelectric Project Settlement Agreement requires Tacoma Power to engage in negotiations with Lewis County PUD and The Bonneville Power Administration (BPA) regarding cooperative efforts to improve downstream fish passage effectiveness at the Cowlitz Falls Project. The agreement also requires Tacoma to provide a monthly progress report to the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS).

This letter is intended to serve as the 19th progress report. In accordance with the agreement, additional progress reports will be provided each month until negotiations are completed or terminated. During the month represented by this report, there have been no meetings between Tacoma Power, Lewis County PUD, and BPA. A meeting has been scheduled for July 17, 2002. Please feel free to contact me at (253) 502-8340 with any questions.

Sincerely,

Debbie C. Young
Natural Resources Manager

Cc: Secretary, FERC
Official Service List

TACOMA POWER

3628 South 35th Street
Tacoma, Washington 98409-3192

TACOMA PUBLIC UTILITIES

June 12, 2002

Steve Fransen
National Marine Fisheries Service
510 Desmond Drive S.E. #103
Lacey, Washington 98503

Eugene Stagner
U.S. Fish and Wildlife Service
510 Desmond Drive S.E. #102
Lacey, Washington 98503

Gentlemen:

Subject: City of Tacoma, Cowlitz River Hydroelectric Project, FERC No. 2016
18th Progress Report on LCPUD/BPA Negotiations

Section 8.2.10 of the Cowlitz River Hydroelectric Project Settlement Agreement requires Tacoma Power to engage in negotiations with Lewis County PUD and The Bonneville Power Administration (BPA) regarding cooperative efforts to improve downstream fish passage effectiveness at the Cowlitz Falls Project. The agreement also requires Tacoma to provide a monthly progress report to the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS).

This letter is intended to serve as the 18th progress report. In accordance with the agreement, additional progress reports will be provided each month until negotiations are completed or terminated. During the month represented by this report, there have been no meetings between Tacoma Power, Lewis County PUD, and BPA. Negotiations reached an impasse, and Tacoma believed there was agreement to wait for the Biological Opinion to be issued by NMFS. Tacoma regrets the offense taken by Lewis County and BPA as described in their letter dated May 16, 2002, and we will be happy to entertain new discussion. We have proposed a meeting for July. Please feel free to contact me at (253) 502-8310 with any questions.

Sincerely,

Debbie C. Young
Natural Resources Manager

Cc: Secretary, FERC
Official Service List

TACOMA POWER

3628 South 35th Street

Tacoma, Washington 98409-3192

TACOMA PUBLIC UTILITIES

April 8, 2002

Steve Fransen
National Marine Fisheries Service
510 Desmond Drive S.E. #103
Lacey, Washington 98503

Eugene Stagner
U.S. Fish and Wildlife Service
510 Desmond Drive S.E. #102
Lacey, Washington 98503

Gentlemen:

Subject: City of Tacoma, Cowlitz River Hydroelectric Project, FERC No. 2016
17th Progress Report on LCPUD/BPA Negotiations

Section 8.2.10 of the Cowlitz River Hydroelectric Project Settlement Agreement requires Tacoma Power to engage in negotiations with Lewis County PUD and The Bonneville Power Administration regarding cooperative efforts to improve downstream fish passage effectiveness at the Cowlitz Falls Project. The agreement also requires Tacoma to provide a monthly progress report to the National Marine Fisheries Service and U.S. Fish and Wildlife Service.

This letter is intended to serve as the 17th progress report. In accordance with the agreement, additional progress reports will be provided each month until negotiations are completed or terminated. During the month represented by this report, there has been no new progress on attempts by Tacoma Power to reach agreement with Lewis County and the BPA. Please feel free to contact me at (253) 502-8340 with any questions.

Sincerely,

Debbie C. Young
Natural Resources Manager

Cc: Secretary, FERC
Official Service List

TACOMA POWER

3628 South 35th Street
Tacoma, Washington 98409-3192

TACOMA PUBLIC UTILITIES

March 11, 2002

Steve Fransen
National Marine Fisheries Service
510 Desmond Drive S.E. #103
Lacey, Washington 98503

Eugene Stagner
U.S. Fish and Wildlife Service
510 Desmond Drive S.E. #102
Lacey, Washington 98503

Gentlemen:

Subject: City of Tacoma, Cowlitz River Hydroelectric Project, FERC No. 2016
15th and 16th Progress Reports on LCPUD/BPA Negotiations

Section 8.2.10 of the Cowlitz River Hydroelectric Project Settlement Agreement requires Tacoma Power to engage in negotiations with Lewis County PUD and The Bonneville Power Administration regarding cooperative efforts to improve downstream fish passage effectiveness at the Cowlitz Falls Project. The agreement also requires Tacoma to provide a monthly progress report to the National Marine Fisheries Service and U.S. Fish and Wildlife Service.

This letter is intended to serve as the 15th and 16th progress reports. In accordance with the agreement, additional progress reports will be provided each month until negotiations are completed or terminated. During the months represented by this report, there has been no new progress on attempts by Tacoma Power to reach agreement with Lewis County and the BPA. Please feel free to contact me at (253) 502-8340 with any questions.

Sincerely,

Debbie C. Young
Natural Resources Manager

Cc: Secretary, FERC
Official Service List

TACOMA POWER

3628 South 35th Street

Tacoma, Washington 98409-3192

TACOMA PUBLIC UTILITIES

January 8, 2002

Steve Fransen
National Marine Fisheries Service
510 Desmond Drive S.E. #103
Lacey, Washington 98503

Eugene Stagner
U.S. Fish and Wildlife Service
510 Desmond Drive S.E. #102
Lacey, Washington 98503

Gentlemen:

Subject: City of Tacoma, Cowlitz River Hydroelectric Project, FERC No. 2016
14th Progress Report on LCPUD/BPA Negotiations

Section 8.2.10 of the Cowlitz River Hydroelectric Project Settlement Agreement requires Tacoma Power to engage in negotiations with Lewis County PUD and the Bonneville Power Administration regarding cooperative efforts to improve downstream fish passage effectiveness at the Cowlitz Falls Project. The agreement also requires Tacoma to provide a monthly progress report to the National Marine Fisheries Service and U.S. Fish and Wildlife Service.

This letter is intended to serve as the 14th progress report. In accordance with the agreement, additional progress reports will be provided each month until negotiations are completed or terminated. During the month represented by this report, there has been no new progress on attempts by Tacoma Power to reach agreement with Lewis County and the BPA. Please feel free to contact me at (253) 502-8340 with any questions.

Sincerely,

Debbie C. Young
Natural Resources Manager

Cc: Secretary, FERC
Official Service List

TACOMA POWER

3628 South 35th Street
Tacoma, Washington 98409-3192

TACOMA PUBLIC UTILITIES

December 4, 2001

Steve Fransen
National Marine Fisheries Service
510 Desmond Drive S.E. #103
Lacey, Washington 98503

Eugene Stagner
U.S. Fish and Wildlife Service
510 Desmond Drive S.E. #102
Lacey, Washington 98503

Gentlemen:

Subject: City of Tacoma, Cowlitz River Hydroelectric Project, FERC No. 2016
13th Progress Report on LCPUD/BPA Negotiations

Section 8.2.10 of the Cowlitz River Hydroelectric Project Settlement Agreement requires Tacoma Power to engage in negotiations with Lewis County PUD and the Bonneville Power Administration regarding cooperative efforts to improve downstream fish passage effectiveness at the Cowlitz Falls Project. The Agreement also requires Tacoma to provide a monthly progress report to the National Marine Fisheries Service and U.S. Fish and Wildlife Service.

This letter is intended to serve as the 13th progress report. In accordance with the Agreement, additional progress reports will be provided each month until negotiations are completed or terminated. During the month represented by this report, there has been no new progress on attempts by Tacoma Power to reach agreement with Lewis County and the BPA. Please feel free to contact me at (253) 502-8340 with any questions.

Sincerely,

Debbie C. Young
Natural Resources Manager

Cc: Secretary, FERC
Official Service List

Bcc: P. McCart[redacted]e, M. Wicke, D. Clarke, P. Klatt

TACOMA POWER

3628 South 35th Street
Tacoma, Washington 98409-3192

TACOMA PUBLIC UTILITIES

November 13, 2001

Steve Fransen
National Marine Fisheries Service
510 Desmond Drive S.E. #103
Lacey, Washington 98503

Eugene Stagner
U.S. Fish and Wildlife Service
510 Desmond Drive S.E. #102
Lacey, Washington 98503

Gentlemen:

Subject: City of Tacoma, Cowlitz River Hydroelectric Project, FERC No. 2016
11th and 12th Combined Progress Reports on LCPUD/BPA Negotiations

Section 8.2.10 of the Cowlitz River Hydroelectric Project Settlement Agreement requires Tacoma Power to engage in negotiations with Lewis County PUD and the Bonneville Power Administration regarding cooperative efforts to improve downstream fish passage effectiveness at the Cowlitz Falls Project. The Agreement also requires Tacoma to provide a monthly progress report to the National Marine Fisheries Service and U.S. Fish and Wildlife Service.

This letter is intended to serve as a combined 11th and 12th progress report. In accordance with the Agreement, additional progress reports will be provided each month until negotiations are completed or terminated. During the two months represented by this report, there has been no new progress on attempts by Tacoma Power to reach agreement with Lewis County and the BPA. Please feel free to contact me at (253) 502-8340 with any questions.

Sincerely,

Debbie C. Young
Natural Resources Manager

Cc: Secretary, FERC
Official Service List

TACOMA POWER

3628 South 35th Street
Tacoma, Washington 98409-3192

TACOMA PUBLIC UTILITIES

Debbie C. Young
Tacoma Power
PO Box 11007
Tacoma WA 98411

September 14, 2001

Steve Fransen
National Marine Fisheries Service
510 Desmond Drive S.E., Suite 103
Lacey, Washington 98503

Eugene Stagner
U.S. Fish and Wildlife Service
510 Desmond Drive S.E., Suite 102
Lacey, Washington 98503

Gentlemen:

Subject: City of Tacoma, Cowlitz River Hydroelectric Project, FERC No. 2016, 10th Progress Report on LCPUD/BPA Negotiations

Section 8.2.10 of the Cowlitz River Hydroelectric Project Settlement Agreement requires Tacoma Power to engage in negotiations with Lewis County PUD (LCPUD) and the Bonneville Power Administration (BPA) regarding cooperative efforts to improve downstream passage effectiveness at the Cowlitz Falls Project. The Agreement also requires Tacoma Power to provide a monthly progress report to the National Marine Fisheries Service and the U.S. Fish and Wildlife Service. This letter is intended to serve as the 10th progress report. In accordance with the Agreement, additional progress reports will be provided each month until negotiations are completed or terminated.

Tacoma Power intervened and provided comments on LCPUD's license amendment request for temporary flow modification. Tacoma provided comments stating the need to consider possible effects on future downstream fish collection or collection testing that may occur during the modification. Feel free to contact me at (253) 502-8340 with any questions.

Sincerely,

Debbie C. Young
Natural Resources Manager

Cc: Secretary of FERC
Official Service List

TACOMA POWER

3628 South 35th Street
Tacoma, Washington 98409-3192

TACOMA PUBLIC UTILITIES

August 8, 2001

Steve Fransen
National Marine Fisheries Service
510 Desmond Drive S.E., Suite 103
Lacey, WA 98503

Eugene Stagner
U.S. Fish and Wildlife Service
510 Desmond Drive S.E., Suite 102
Lacey, WA 98503

Gentlemen:

Subject: City of Tacoma, Cowlitz River Hydroelectric Project, FERC No. 2016 Ninth Progress Report on LCPUD/BPA Negotiations

Section 8.2.10 of the Cowlitz River Hydroelectric Project Settlement Agreement (Agreement) requires Tacoma Power to engage in negotiations with Lewis County PUD (LCPUD) and the Bonneville Power Administration (BPA) regarding cooperative efforts to improve downstream fish passage effectiveness at the Cowlitz Falls Project. The Agreement also requires Tacoma Power to provide a monthly progress report to the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS).

This letter is intended to serve as the ninth progress report. In accordance with the Agreement, additional progress reports will be provided each month until negotiations are completed or terminated. There is no new progress to report on Tacoma Power's attempts to reach agreement with LCPUD and BPA. Feel free to contact me at (253) 502-8340 with any questions.

Sincerely,

Debbie C. Young
Natural Resources Manager

Cc: Secretary, FERC
Official Service List

TACOMA POWER

3628 South 35th Street
Tacoma, Washington 98409-3192

TACOMA PUBLIC UTILITIES

Toby Freeman
Tacoma Power
PO Box 11007
Tacoma WA 98411

July 17, 2001

Steve Fransen
National Marine Fisheries Service
510 Desmond Drive S.E., Suite 103
Lacey, WA 98503

Eugene Stagner
U.S. Fish and Wildlife Service
510 Desmond Drive S.E., Suite 102
Lacey, WA 98503

Gentlemen:

Subject: City of Tacoma, Cowlitz River Hydroelectric Project, FERC No. 2016
Eighth Progress Report on LCPUD/BPA Negotiations

Section 8.2.10 of the Cowlitz River Hydroelectric Project Settlement Agreement (Agreement) requires Tacoma Power to engage in negotiations with Lewis County PUD (LCPUD) and the Bonneville Power Administration (BPA) regarding cooperative efforts to improve downstream passage effectiveness at the Cowlitz Falls Project. The Agreement also requires Tacoma Power to provide a monthly progress report to the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS). This letter is intended to serve as the eighth progress report. In accordance with the Agreement, additional progress reports will be provided each month until negotiations are completed or terminated.

There is no new progress to report on Tacoma Power's attempts to reach agreement with LCPUD and BPA. Feel free to contact me at (253) 502-8340 with any questions.

Sincerely,

for Debbie C. Young
Natural Resources Manager

Cc: Secretary, FERC
Official Service List

TACOMA POWER

3628 South 35th Street
Tacoma, Washington 98409-3192

TACOMA PUBLIC UTILITIES

June 8, 2001

Douglas L. Williams
Bonneville Power Administration
Mail Drop 1399
P.O. Box 968
Richland, WA 99352-0968

Dave Muller, Manager
Lewis County Public Utility District
321 N.W. Pacific Avenue
P.O. Box 330
Chehalis, WA 98532-0330

Dear Mr. Williams and Mr. Muller:

I received your letter dated May 2, 2001. Thank you for responding to my letters of March 22 and March 28, 2001. I have chosen to address your response to Tacoma Power's request for funding for a 1500-gallon fish transport truck in a separate letter, as it pertains to the Bonneville Power Administration's (BPA's) compliance with our 1995 agreement and does not involve Lewis County PUD (LCPUD).

I was disappointed to read your response to our proposal for sharing resources in a smolt salvage operation this summer. In your letter you stated that the "trapping effort is a Tacoma Power obligation" and that LCPUD and BPA expect to be reimbursed for any role they might play in the operation. Tacoma Power does not view the proposed smolt salvage operation as any single party's obligation, per se, but as an opportunity for the various interested parties to cooperatively take advantage of this unique opportunity to dramatically improve smolt collection this summer. Unless all interested parties are working together, it is unlikely any salvage operation will be possible.

Feel free to contact me at (253) 502-8340 if you have any questions.

Sincerely,

Debbie C. Young
Natural Resources Manager

Bonneville Power Administration
Mail Drop 1399
P.O. Box 968
Richland, Washington 99352-0968

POWER BUSINESS LINE

May 2, 2001

In reply refer to: PGCM/Richland

Debbie C. Young
Natural Resources Manager
Tacoma Power
3628 South 35 Street
P.O. Box 11007
Tacoma, WA 98409

Dear Ms. Young:

The Bonneville Power Administration (Bonneville) and Lewis County PUD (LCPUD) are in receipt of your letters concerning the Cowlitz River Spring Chinook Smolt Trapping Operation (March 22, 2001) and BPA Contract No. DE-MS79-96BP94847 – Activities at the Cowlitz Salmon Hatchery in Support of the Cowlitz Falls Dam Fishery Management Plan (March 28, 2001). Bonneville and LCPUD have and will continue to provide assistance and cooperate with Tacoma Power and other agencies in their efforts.

The March 22, 2001, letter requested our participation in a "salvage" operation. The operation was proposed by NMFS at a recent Cowlitz Fisheries Technical Committee meeting. The proposed salvage operation consists of trapping spring chinook smolts below Cowlitz Falls Dam this summer. Bonneville and LCPUD will provide assistance in the trapping operation; however, the work, cost contribution, and operation would be provided on a cost reimbursable basis, as this trapping effort is a Tacoma Power obligation.

Your letter of March 28, 2001, requested funding for the purchase, operations and maintenance (O&M) of a 1500-gallon fish transport truck. You noted the success of the Reintroduction Program, which resulted in the need for additional resources including the fish transport truck. Bonneville and LCPUD are pleased with the progress and success of the Program and that the Cowlitz Falls Project has provided a positive contribution. As discussed, Bonneville recognizes the need for smolt transportation from the Fish Collection Facility to the lower river. However, our understanding is that the additional resources, namely the fish transport truck, is the result of the need to transport additional adults from the lower river to the upper basin and that minimal fish haul requirements are related to smolt transport. As such, Bonneville will make a one-time contribution of 50

contribution of 50 percent of the purchase cost of a fish transport truck. Bonneville will also make a one-time contribution to Tacoma Power's Salmon Hatchery Fishery Operation by donating the acclimation ponds.

Bonneville and LCPUD appreciate Tacoma Power's coordination of the above requests, however, future coordination and funding requests should be addressed in the context of a greater package agreement consistent with negotiations of an acceptable cost-sharing arrangement as provided by the Settlement Agreement.

If you have any questions, please contact Dave Muller (360-740-2411) or Doug Williams (509-372-5088).

Sincerely,

Douglas L. Williams
Bonneville Power Administration
Cowlitz Falls Project

Dave Muller
Lewis County Public Utility District
Manager

cc:
Service List (Rev.12/7/00)

TACOMA POWER

3628 South 35th Street
Tacoma, Washington 98409-3192

TACOMA PUBLIC UTILITIES

June 8, 2001

Steve Fransen
National Marine Fisheries Service
510 Desmond Drive S.E., Suite 103
Lacey, WA 98503

Eugene Stagner
U.S. Fish and Wildlife Service
510 Desmond Drive S.E., Suite 102
Lacey, WA 98503

Gentlemen:

Subject: City of Tacoma, Cowlitz River Hydroelectric Project, FERC No. 2016;
Seventh Progress Report on LCPUD/BPA Negotiations

Section 8.2.10 of the Cowlitz River Hydroelectric Project Settlement Agreement (Agreement) requires Tacoma Power to engage in negotiations with Lewis County PUD (LCPUD) and the Bonneville Power Administration (BPA) regarding cooperative efforts to improve downstream passage effectiveness at the Cowlitz Falls Project. The Agreement also requires Tacoma Power to provide a monthly progress report to the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS). This letter is intended to serve as the seventh progress report. In accordance with the Agreement, additional progress reports will be provided each month until negotiations are completed or terminated.

There is no new progress to report on Tacoma Power's attempts to reach agreement with LCPUD and BPA. However, Tacoma Power did receive a response (enclosed) from LCPUD and BPA to our March 22, 2001, letter proposing a cooperative spring chinook smolt "salvage" operation. Tacoma's June 8, 2001, response to LCPUD and BPA is also enclosed. Feel free to contact me at (253) 502-8340 with any questions.

Sincerely,

Debbie C. Young
Natural Resources Manager

Enclosure

Cc: Secretary, FERC
Official Service List

TACOMA POWER

3628 South 35th Street
Tacoma, Washington 98409-3192

TACOMA PUBLIC UTILITIES

May 9, 2001

Steve Fransen
National Marine Fisheries Service
510 Desmond Drive S.E., Suite 103
Lacey, WA 98503

Eugene Stagner
U.S. Fish and Wildlife Service
510 Desmond Drive S.E., Suite 102
Lacey, WA 98503

Gentlemen:

Subject: City of Tacoma, Cowlitz River Hydroelectric Project, FERC No. 2016; Sixth Progress Report on LCPUD/BPA Negotiations

Section 8.2.10 of the Cowlitz River Hydroelectric Project Settlement Agreement (Agreement) requires Tacoma Power to engage in negotiations with the Lewis County Public Utility District (LCPUD) and the Bonneville Power Administration (BPA) regarding cooperative efforts to improve downstream passage effectiveness at the Cowlitz Falls Project. The Agreement also requires Tacoma Power to provide a monthly progress report to the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS). This letter is intended to serve as the sixth progress report. In accordance with the Agreement, additional progress reports will be provided each month until negotiations are completed or terminated.

There is no new progress to report on Tacoma Power's attempts to reach agreement with LCPUD and BPA. However, Tacoma Power did manufacture and work with LCPUD and BPA to install a rounded flume entrance on the Cowlitz Falls Fish Collection Facility (CFFCF). This modification will be studied to evaluate its impact on the collection efficiency of the CFFCF.

Feel free to contact me at (253) 502-8340 with any questions.

Sincerely,

for Debbie C. Young
Natural Resources Manager

Enclosure

cc: Secretary, FERC
Official Service List

TACOMA POWER

3628 South 35th Street

Tacoma, Washington 98409-3192

TACOMA PUBLIC UTILITIES

April 9, 2001

Steve Fransen
National Marine Fisheries Service
510 Desmond Drive S.E., Suite 103
Lacey, WA 98503

Eugene Stagner
U.S. Fish and Wildlife Service
510 Desmond Drive S.E., Suite 102
Lacey, WA 98503

Gentlemen:

Subject: **City of Tacoma, Cowlitz River Hydroelectric Project, FERC No. 2016, Fifth Progress Report on LCPUD/BPA Negotiations**

Section 8.2.10 of the Cowlitz River Hydroelectric Project Settlement Agreement (Agreement) requires Tacoma Power to engage in negotiations with Lewis County PUD (LCPUD) and the Bonneville Power Administration (BPA) regarding cooperative efforts to improve downstream passage effectiveness at the Cowlitz Falls Project. The Agreement also requires Tacoma Power to provide a monthly progress report to the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS). This letter is intended to serve as the fifth progress report. In accordance with the Agreement, additional progress reports will be provided each month until negotiations are completed or terminated.

There is no new progress to report on Tacoma Power's attempts to reach agreement with LCPUD and BPA. However Tacoma Power did mail a letter to BPA (copy enclosed) on March 22, 2001, proposing a cooperative spring chinook smolt "salvage" operation. To date there has been no response.

Feel free to contact me at (253) 502-8340 with any questions.

Sincerely,

Debbie C. Young
Natural Resources Manager

Enclosure

cc: Secretary, FERC
Official Service List

TACOMA POWER

3628 South 35th Street
Tacoma, Washington 98409-3192

TACOMA PUBLIC UTILITIES

March 22, 2001

Mr. Douglas L. Williams
Project Manager/COTR
Bonneville Power Administration
P.O. Box 968 M/D 1399
Richland, Washington 99352-0968

Dear Mr. Williams:

Subject: Cowlitz River Spring Chinook Smolt Trapping Operation

At the most recent Cowlitz Fisheries Technical Committee (FTC) meeting the National Marine Fisheries Service (NMFS) representative, Steve Fransen, suggested the idea of a smolt trapping operation below Cowlitz Falls Dam this coming summer. The concept was termed a "salvage" operation for chinook smolts and anticipated that the low level of Riffe Lake and the low flows from the upper Cowlitz River basin during the summer of 2001 presented a unique opportunity to operate a smolt capture trap that would not otherwise be feasible with transportable in-stream trapping equipment.

If a suitable trap can be borrowed for a short term, Tacoma Power would support a multi-agency effort of collecting and transporting these Cowlitz River ESA listed fish. The cooperation of all agencies or utilities having a vested interest in improving or protecting spring chinook populations in the upper Cowlitz River basin is held as critical to the success of this effort. Tacoma is prepared to share in a cooperative effort if the Bonneville Power Administration, Lewis County PUD, and Washington Department of Fish and Wildlife agree and can provide resources.

Project planners estimate the trap would need to operate between June and August 2001, and that it must be located near to road access. Tacoma suggests the following sharing of responsibilities to support this unique project:

TACOMA POWER	BPA / LCPUD	WDFW
✓ Borrow and transport traps ✓ Assemble and set up traps ✓ Project coordination ✓ Trap maintenance ✓ Transport collected fish ✓ Disassemble & return traps	✓ Trap operations, i.e., manpower and equipment to operate traps including: emptying, enumerating, marking and recordkeeping.	✓ All permits ✓ Pathology checks

Tacoma's investment in time and cost in this project would be substantial, and prior to any action we need confirmation of the cooperation of the other agencies. Please contact Mark LaRiviere at (253) 502-8767 at your earliest convenience to discuss this proposal.

Sincerely,

Debbie C. Young
Natural Resources Manager

cc: Steve Fransen, NMFS
Mike Kohn, LCPUD
Charlie Morrill, WDFW

TACOMA POWER

3628 South 35th Street
Tacoma, Washington 98409-3192

TACOMA PUBLIC UTILITIES

FILE

March 9, 2001

Steve Fransen
National Marine Fisheries Service
510 Desmond Drive S.E., Suite 103
Lacey, WA 98503

Eugene Stagner
U.S. Fish and Wildlife Service
510 Desmond Drive S.E., Suite 102
Lacey, WA 98503

Subject: City of Tacoma, Cowlitz River Hydroelectric Project, FERC No. 2016
Fourth Progress Report on LCPUD/BPA Negotiations

Gentlemen:

Section 8.2.10 of the Cowlitz River Hydroelectric Project Settlement Agreement (Agreement) requires Tacoma Power to engage in negotiations with Lewis County PUD (LCPUD) and the Bonneville Power Administration (BPA) regarding cooperative efforts to improve downstream passage effectiveness at the Cowlitz Falls Project. The Agreement also requires Tacoma Power to provide a monthly progress report to the National Marine Fisheries Service (NMFS) and the US Fish and Wildlife Service (USFWS). This letter is intended to serve as the fourth progress report. In accordance with the Agreement, additional progress reports will be provided each month until negotiations are completed or terminated.

The last progress report, provided to you on February 8, 2001, included a letter from Tacoma Power to LCPUD proposing actions and evaluations at the Cowlitz Falls Fish Collection Facility for 2001. Enclosed is LCPUD's response dated February 22, 2001. Feel free to contact me at (253) 502-8340 with any questions.

Sincerely,

Debbie C. Young
Natural Resources Manager

Enclosure

cc: Secretary, FERC
Official Service List

Lewis County
PUBLIC UTILITY DISTRICT
321 N.W. PACIFIC AVE. CHEHALIS WA • P.O. BOX 330
CHEHALIS, WASHINGTON 98532-0330
1-800-562-5612 • (360) 748-9261 • FAX (360) 740-2455

February 22, 2001

Ms. Debbie Young
Tacoma Public Utilities
P.O. Box 11007
Tacoma, WA 98409

Dear Ms. Young:

Subject: Fish Passage Research at the Cowlitz Falls Project in 2001

We received your letter dated February 9, 2001, proposing several alternatives for assisting Lewis County PUD (LCPUD) with its anadromous fish passage evaluations at the Cowlitz Falls Project. Some of the actions proposed fit well with this year's research plans, and some may be applicable in the future. Based on your Settlement Agreement and our mutual ESA needs, we believe a cooperative research program for this year is in the best interests of both parties.

This year's research focuses on improving fish guidance through the baffle panels and fish flap gates. In addition, we plan to evaluate the survival of steelhead and cutthroat smolts through the Project reservoir. We recently received BPA and LCPUD Commission approvals to proceed with the first objective, "evaluate flared fish flume entrance performance in improving FCE" as described in the December 14, 2000 USGS proposal and Task 4.3 to evaluate reservoir survival. We will also repeat some aspects of the creel evaluation (i.e., mitigation trout predation on anadromous species). These research issues are critical to addressing the research needs identified in our Biological Assessment.

Your proposal to assist BPA and LCPUD includes five specific actions to attempt to improve the fish collection at CFP and an offer to support the program by providing $40,000 to $70,000 for the purchase of juvenile radio tags. We would like to accept the offer to engineer and fabricate the rounded flume entrances and the purchase of 200 radio tags; however, we believe more discussion is needed relative to the other specific actions. Currently, we have ordered 100 radio tags and agreed to contribute funds to the USGS to cover Objective #1 and Task 4.3 for this year's evaluations. The 200 radio tags should be

Lewis PUD PUBLIC UTILITIES DISTRICT County

ordered as soon as possible to ensure timely delivery based on the lead time Lotek indicates it needs. If you wish to place an order with Lotek, please see the attachment which provides the specifications provided by Dan Feil of the USGS.

In order to coordinate your proposed actions most effectively and efficiently, BPA and LCPUD suggest a meeting to discuss options and procedures for implementing these actions. Please give me a call at 360-740-2411 or Mike Kohn at 360-497-5026 to arrange a meeting date.

Sincerely,

David J. Muller
Manager

DJM/cb
Attachment

cc: Mike Kohn

United States Department of the Interior

U. S. GEOLOGICAL SURVEY
BIOLOGICAL RESOURCES DIVISION
COLUMBIA RIVER RESEARCH LABORATORY
5501-A Cook-Underwood Road
Cook, WA 98605 USA
(509) 538-2299

February 5, 2001

Mike Kohn
Lewis County Public Utilities District
Cowlitz Falls Project
1379 B Falls Road
Randle, Washington 98377

Mike,

Please use the following radio tag specifications for 2001 tag orders. These specs will cover tags for steelhead and cutthroat only.

MCFT-3GM coded transmitters (quantity 300)
2.0 sec pulse rate
150.000 MHz range
2000 code set
SAVA antenna
Channels 1-10 with tags spread evenly over 10 channels
No duplicate codes

Any additional tags purchased for coho or chinook will have different specifications. If you have any questions give me a call.

Sincerely,

Dan Feil

Dan Feil
Research Fishery Biologist

TACOMA POWER

3628 South 35th Street
Tacoma, Washington 98409-3192

TACOMA PUBLIC UTILITIES

February 9, 2001

Steve Fransen
National Marine Fisheries Service
510 Desmond Drive S.E., Suite 103
Lacey, WA 98503

Eugene Stagner
U.S. Fish and Wildlife Service
510 Desmond Drive S.E., Suite 102
Lacey, WA 98503

Subject: City of Tacoma, Cowlitz River Hydroelectric Project, FERC No. 2016
Third Progress Report on LCPUD/BPA Negotiations

Gentlemen:

Section 8.2.10 of the Cowlitz River Hydroelectric Project Settlement Agreement (Agreement) requires Tacoma Power to engage in negotiations with Lewis County PUD (LCPUD) and the Bonneville Power Administration (BPA) regarding cooperative efforts to improve downstream passage effectiveness at the Cowlitz Falls Project. The Agreement also requires Tacoma Power to provide a monthly progress report to the National Marine Fisheries Service (NMFS) and the US Fish and Wildlife Service (USFWS). This letter is intended to serve as the third progress report. In accordance with the Agreement, additional progress reports will be provided each month until negotiations are completed or terminated.

The last progress report, provided to you on January 5, 2001, described a meeting held in Tacoma on December 19, 2000, with representatives of LCPUD, BPA and Tacoma Power in attendance. At that meeting it was decided that Tacoma Power would distribute a proposed scope of work for actions and evaluations at the Cowlitz Falls Fish Collection Facility for 2001. This scope of work would be based on the U.S. Geological Survey's preliminary proposal for FY 2001 funding, and the November 21, 2000, technical meeting.

Enclosed is a letter from Tacoma Power to LCPUD proposing actions and evaluations at the Cowlitz Falls Fish Collection Facility for 2001. Feel free to contact me at (253) 502-8340 with any questions.

Sincerely,

Debbie C. Young
Natural Resources Manager

Enclosures

cc: Secretary, FERC; Official Service List

TACOMA POWER

3628 South 35th Street
Tacoma, Washington 98409-3192

TACOMA PUBLIC UTILITIES

January 8, 2001

Steve Fransen
National Marine Fisheries Service
510 Desmond Drive S.E., Suite 103
Lacey, WA 98503

Eugene Stagner
U.S. Fish and Wildlife Service
510 Desmond Drive S.E., Suite 102
Lacey, WA 98503

Subject: City of Tacoma, Cowlitz River Hydroelectric Project, FERC No. 2016
Second Progress Report on LCPUD/BPA Negotiations

Gentlemen:

Section 8.2.10 of the Cowlitz River Hydroelectric Project Settlement Agreement (Agreement) requires Tacoma Power to engage in negotiations with Lewis County PUD (LCPUD) and the Bonneville Power Administration (BPA) regarding cooperative efforts to improve downstream passage effectiveness at the Cowlitz Falls Project. The Agreement also requires Tacoma Power to provide a monthly progress report to the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS). This letter and enclosures are intended to serve as the second progress report. In accordance with the Agreement, additional progress reports will be provided each month until negotiations are completed or terminated.

The first progress report was provided to you on December 7, 2000. On December 19, 2000, a meeting was held in Tacoma with representatives of LCPUD, BPA and Tacoma Power in attendance (see enclosed meeting summary). The purpose of this and any subsequent meetings will be to identify which technical measures will be proposed to improve collection efficiencies at or near Cowlitz Falls Dam and how the cost of implementing these measures will be shared by the parties.

Feel free to contact me at (253)502-8340 with any questions.

Sincerely,

Debbie C. Young
Natural Resources Manager

Enclosures

cc: Secretary, FERC
Official Service List

MEETING SUMMARY

Date & Time: December 19, 2000 – 10:00 a.m. to 2:00 p.m.

Location: Tacoma Public Utilities Administration Building

Participants:

Lewis County PUD:	Mike Kohn, Dave Muller, Eric Redman
Bonneville Power:	Geoffrey Kronick
Tacoma Power:	Patrick McCarty, Debbie Young, Toby Freeman, Mark LaRiviere, Gail Greely

Subject: Juvenile Anadromous Fish Collection At/Near Cowlitz Falls Dam

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Pat McCarty began the meeting by suggesting that the discussion follow the draft meeting agenda (attached). Eric Redman indicated the agenda might not be appropriate in light of a recent meeting between Bonneville Power Administration (BPA) and Lewis County PUD No. 1 (LCPUD) and suggested the meeting begin instead by discussing two potential paths for pursuing improvements to downstream anadromous fish collection at/near Cowlitz Falls Dam.

The first path Eric described was an approach whereby the three parties work collaboratively to identify the most prudent approach to improving downstream collection. The second path Eric presented was that the three parties work together to develop a set of principles that Tacoma Power (Tacoma) would follow as it explored alternatives for meetings its downstream collection responsibilities as outlined in the Settlement Agreement. Eric proposed the following principles:

- Tacoma should be able to use the Cowlitz Falls Fish Collection Facility (CFFCF) to meet its goals and mitigation requirements.
- No capital costs from the existing facility should be borne by Tacoma.
- Assuming the CFFCF continues to operate, O&M costs at current levels would continue to be borne by BPA.
- Tacoma would bear the incremental cost of meeting the obligations outlined in the Settlement Agreement and its Section 7 consultation, while BPA/LCPUD would bear the incremental cost of meeting the obligations resulting from their Section 7 consultation; there is potential overlap between these obligations. This will require a commitment by Tacoma to bear costs associated with modifications to the Cowlitz Falls facilities and structure (CFFCF or Cowlitz Falls Dam) or operations at Cowlitz Falls Dam (including power generation losses).

Currently there is no agreement in place to allow Tacoma to use Cowlitz Falls Dam to meet its collection responsibilities. Eric then explained that LCPUD and BPA were concerned about the level of participation by Tacoma at the November 21 technical meeting, the inclusion in the December 7 progress report of a summary of the conversation between Doug Williams (BPA) and Pat McCarty (Tacoma) on December 4, and the rumor that Tacoma was independently exploring fish screen installation at

Cowlitz Falls Dam. He also explained that because Cowlitz Falls Dam is not a federal project, BPA participation with respect to fisheries measures at the project is different from its responsibilities with respect to the regional fish and wildlife plan. BPA is therefore more concerned about the costs of fisheries measures and the impacts on power generation at Cowlitz Falls Dam.

LCPUD and BPA reiterated their desire to work cooperatively with Tacoma, however they were concerned with the impression that Tacoma may be pursuing CFFCF solutions/improvements without the involvement of LCPUD and BPA. The two latter agencies expressed concern that the November 21, 2000, technical meeting and follow-up discussion may have moved ahead of the parties' prioritization of the measures. LCPUD and BPA believe that now that identification of measures has been completed, future steps will be to prioritize measures based on science, cost and probability of success.

Tacoma staff assured LCPUD and BPA that it was committed to working collaboratively. Tacoma staff also explained that there was broad participation in the November 21 meeting because the topic was of great interest, and since the meeting was held in Tacoma, it was convenient for Tacoma staff to attend. Tacoma staff went on to explain that the Settlement Agreement required Tacoma to provide a progress report on these negotiations to NMFS and USFWS within four months of the effective date of the Settlement Agreement. Tacoma felt that the lack of participation thus far by BPA in the negotiations was significant, and therefore chose to include the conversation summary. Regarding fish screens, Tacoma staff had heard that the U.S. Army Corps of Engineers might be scrapping fish screens that could be a cost-effective component of the solution to improving performance at the CFFCF. Tacoma staff simply had made some inquiries as to the availability of these screens.

After a brief recess to allow Tacoma to consider the BPA/LCPUD comments, the meeting continued with a discussion regarding Section 7 consultation for Cowlitz Falls Dam. Eric explained that LCPUD and BPA do not anticipate incurring many additional fisheries costs or responsibilities as a result of their Section 7 consultation for salmon and steelhead, but believe there may be a need to provide upstream passage for adult cutthroat. Eric also discussed his view that the Endangered Species Act may not require support for reintroduction of a listed species. Dave Muller explained that LCPUD and BPA are working on a rewrite of their Biological Assessment for late January 2001 in order to continue informal consultation with the agencies.

The discussion then moved to the November 21 technical meeting and the scope of actions and evaluations at the CFFCF being considered for 2001. Mike Kohn distributed the U.S. Geological Survey's (USGS) preliminary proposal for FY 2001 funding (attached). The measures that were proposed for evaluation by the USGS were fairly consistent with the "simple fixes" identified at the November 21 meeting.

A significant action identified at the November 21 technical meeting was removal of the debris deflector during fish outmigration periods. After a long discussion, Dave Muller explained that if the presence of the debris deflector was determined to be impacting collection efficiencies, there would be engineering, FERC license, and permitting issues to deal with before it could be modified or removed. Dave indicated that there were problems encountered when they moved the debris deflector earlier this year. He said he would discuss the issue with project personnel and would report back to Tacoma with

possible considerations and/or options for modification and future moves. Dave noted that there are streamflow and project license considerations associated with removal and/or modification of the debris deflector that will involve more in-depth engineering analysis (LCPUD has initiated an Hydraulic Project Approval (HPA) and Biological Assessment (BA) for temporary removal for 2001).

Eric noted that Tacoma is free to investigate fish collection (in particular, chinook) with removal of the debris deflector, and LCPUD/BPA will try to be helpful in those investigations. However, upon review of the data, logic does not suggest that removal of the debris deflector would be as big a benefit to fish collection efficiency as perhaps some have assumed. LCPUD explained that the data collected to date does not demonstrate that the debris deflector is impacting steelhead collection, and that 94 percent of the fish come within two meters of the baffle openings. The radio telemetry data for chinook is still being evaluated by the USGS, but does not currently suggest significant improvement with the debris deflector removed. Eric stated that LCPUD and BPA would allow Tacoma to propose, study and investigate debris deflector removal, however removal of the debris deflector is not a Cowlitz Falls Dam fish and wildlife responsibility. Eric felt Tacoma should be responsible for any costs incurred by removing the debris deflector as, even with the debris deflector in place, Eric believes chinook can pass Cowlitz Falls Dam safely; the fish simply would end up in Riffe Lake.

The meeting continued with a discussion regarding the outmigration timing of hatchery reared spring chinook versus the outmigration timing of naturally produced and "mimics" fish. Mike Kohn stated historical run timing of wild chinook was very different from the timing of hatchery produced fish currently observed at Cowlitz Falls Dam. Mike stated that baseline data would be collected at the Cowlitz Falls Dam in 2001 to evaluate timing, etc., of natural produced offspring from the 204 adult spring chinook released in 2000. Fyke netting is scheduled for October and November 2001, based on juvenile chinook catch observed at the Mayfield trap. The fish collection/fish passage survival likely will vary significantly, and studies conducted to date may be of little value if the program changes.

After some discussion, Tacoma requested a brief recess to develop a proposed scope of work for 2001 based on the USGS proposal and the November 21 technical meeting. Tacoma returned to explain that more discussion would be needed before a 2001 scope of work could be proposed. It was decided Tacoma would provide a proposal to LCPUD and BPA in early January 2001, with the next meeting to be scheduled in mid to late January 2001.

The meeting ended after identifying the following action items:

- Dave Muller will report back to Tacoma with considerations and options for modification and future removal of the debris deflector.
- Tacoma will distribute a scope of work for 2001 based on the USGS proposal and the November 21 technical meeting.
- Tacoma will distribute a draft meeting summary and schedule the next meeting.

Attachments

Freeman, Toby

From: McCarty, Pat
Sent: Thursday, December 14, 2000 4:20 PM
To: Young, Debbie ; LaRiviere, Mark; Freeman, Toby ; 'Gail Greely' (E-mail)
Subject: Draft Agenda for PUD Meeting

Any comments on the following? I would like to send it to Muller tomorrow.

DRAFT AGENDA

1. Review Settlement Agreement Provisions & Schedule
2. Review results from the following meetings:
    a. Army Corps Annual Research Review Meeting
    b. November 21st Biologist & Engineer meeting on collection improvement options.
    c. December 14th meeting on proposed 2001 modifications and studies at Cowlitz Falls.
    d. FERC Section 7 consultation meetings regarding Cowlitz Falls
3. Develop Tentative Agreement for cost sharing of 2001 modifications & studies
4. Identify next steps & next meeting date

PRELIMINARY PROPOSAL FOR FY 2001 FUNDING

Evaluation of Baffle Panel and Fish Flume Entrance Modifications to Increase Fish Collection Efficiency at Cowlitz Falls Dam, Washington

Principal Investigator: Dan H. Feil

Project Leader(s): Dennis W. Rondorf
U.S. Geological Survey
Columbia River Research Laboratory
5501A Cook-Underwood Road
Cook, WA 98605
(509) 538-2299; FAX (509) 538-2843

Charles F. Morrill
Washington Department of Fish and Wildlife
Fish Program
600 Capitol Way North
Olympia, WA 98501-1091
(360) 902-2747; FAX (360) 902-2183

Submitted to: Mike Kohn
LCPUD/Bonneville Power Administration
Cowlitz Falls Project
1379 B Falls Road
Randle, Washington 98377
(360) 740-2449

Administrative Contact: Michele F. Beeman
U.S. Geological Survey
Columbia River Research Laboratory
5501A Cook-Underwood Road
Cook, WA 98605
(509) 538-2299; FAX (509) 538-2843

Performance Period: January 1, 2001 through September 30, 2001
Date of Submission: December 14, 2000

PROJECT SUMMARY

Background: Improving fish collection efficiency (FCE) at Cowlitz Falls Dam (CFD) is key to the overall success of the Cowlitz Falls Anadromous Reintroduction Program. Smolt FCE during FY2000 ranged from a low of 12.6% for chinook, to a high of 79.0% for steelhead. Although, FCE has been well below the targeted 95% for all species, significant improvements were made in FY2000 using low-cost, high-benefit structural changes (baffle panels), and innovative technologies (directed flow) to improve FCE at CFD. Residence times of radio-tagged fish at Cowlitz Falls Dam have been exceptionally long compared to times observed at mainstem dams on the Columbia River. One observation is that smolts tend to delay entry into the fish collection flumes, thereby increasing their forebay residence time. Radio-telemetry data from CFD indicate that as residence time increases, so does the likelihood that fish will pass via turbine routes (Darland et al. 1999). This observation indicates the present fish flume entrance configuration may be improved to reduce residence times and significantly boost FCE.

We propose to reconfigure the fish collection flume entrances and baffle panels and determine the effect on FCE of smolts at CFD using underwater video, radio telemetry monitoring and flume netting. We will test the hypothesis that restructuring the hydraulic characteristics near the flume entrances will decrease forebay residence time, and increase FCE for steelhead, coho, and chinook. We will also test the hypothesis that using the horizontal C-slot closed baffle panel configuration during lower summer discharges will increase surface flow over the top of baffle panel B and provide sufficient attraction flow into the collection area to significantly increase FCE over the horzontal C-slot open configuration. During the late-summer, when low discharge necessitates single-turbine operation, we will use the most effective baffle panel configuration, as determined during the summer, and continue testing the performance of flared flume entrances in improving chinook FCE. We also propose to continue the investigation of using innovative technologies to improve FCE and determine the feasibility of using various methods of estimating reservoir survival.

OBJECTIVES

The following objectives are listed in chronological order and not by order of importance.

Objective 1: Evaluate flared fish flume entrance performance in improving FCE (spring/steelhead).

Objective 2: Evaluate baffle panel configuration performance in improving FCE during summer discharges (summer/coho).

Objective 3: Evaluate flared fish flume entrance performance in improving FCE during late-summer discharges with single turbine operation (late-summer/chinook).

Objective 4: Continue investigation of innovative technologies to improve FCE and feasibility of reservoir survival estimation methods (ongoing).

PROJECT DESCRIPTION

Objective 1: Evaluate flared fish flume entrance performance in improving FCE.

Approach: We propose to modify two of the four fish flume entrances by adding flared or fluted extensions upstream of the existing entrances. Evaluating the performance of the proposed modifications will consist of modifying one flume entrance over each turbine, then using radio telemetry techniques to obtain fish behavior information around the modified (test) and standard (control) flume entrances. Flume netting will also be utilized to obtain overall performance of the flared entrances relative to the standard entrances as measured by total numbers of smolts collected by each flume. Addition of flared extensions to the existing entrances will uniformly distribute the acceleration of water into the flumes thereby creating a smoother entrance flow and maximizing effective width of the existing flume entrances. By creating a uniform increase in flow entering the flumes, it is hypothesized that juvenile salmonids will enter the flumes more readily with reduced hesitation around the entrances as seen in previous years with the current entrance configuration. Others have had good success with this design, for example, Haro et al (1998) showed significant increases in the passage of Atlantic salmon smolts using a modified weir designed to provide a uniform flow increase approaching the weir (flume entrance in this case). Also, Ruggles and Ryan (1964) found that transitions in water velocity influenced the efficiency of experimental bypasses for coho, sockeye, and chinook salmon smolts.

We also propose that, given the apparent success of baffle panel modifications in improving FCE during FY2000, the baffle panels over **both** turbines be configured with the horizontal C-slot open configuration (Figure 1) during the spring flared flume entrance test. Sample size (200 preferred) for this objective will depend on funding level (radio tags ≈ $190.00 ea).

Task 1.1: Develop a conceptual flared flume design for surface collector entrances to restructure acceleration and turbulence upstream of the collector entrances.

Task 1.2: Fabricate and install flared extensions to the flume entrances 1 (turbine 1) and 3 (turbine 2). **(USGS or LCPUD ??)**

Task 1.3: Conduct a preliminary test with underwater cameras to examine steelhead behavioral near the test and control flume entrances.

Task 1.4: Assess water velocity patterns associated with flume entrance modifications using an acoustic Doppler current profiler (ADCP) and acoustic Doppler velocimeter (ADV).

Task 1.5: Assess juvenile steelhead behavior relative to test and control flume entrances using radio telemetry.

Task 1.6: Evaluate overall performance of the flared entrances using flume netting.

Objective 2: Evaluate baffle panel configuration performance in improving FCE during summer discharges.

Approach: We propose to test two different baffle panel configurations to determine their effectiveness in increasing FCE during lower, summer discharges (< 3 kcfs per turbine). Turbine unit 1 baffle panels will be configured with the horizontal C-slot open and turbine unit 2 baffle panels will be configured with the horizontal C-slot closed. Water velocity data collected during FY2000 indicated that the horizontal C-slot closed configuration created higher water velocities in the upper 4 m of the water column as water passed over the top of the B baffle panel than the horizontal C-slot open configuration. Sharp downward water vectors near the tainter gate/flume entrance evident with the horizontal C-slot closed configuration were of concern and it was speculated that these hydraulic conditions may actually hinder fish collection during higher spring discharges. However, during the summer as discharges decrease, the horizontal C-slot closed configuration may be more effective in attracting fish (coho) into the collection area by creating a stronger surface flow over the top of the B panel. Also turbine loading will decrease thus reducing the relative proportion of discharge entering the turbines via the induction slot, thereby minimizing the strong downward water vectors near the tainter gate/flume entrances, yet maximizing the surface attraction flow over the B panel. Radio telemetry techniques will be used to monitor fish behavior around baffle panel entrances and collection area with flume netting providing an overall estimate of baffle panel performance. Sample size (200 preferred) for this objective will depend on funding level (radio tags ≈ $190.00 ea).

Flume entrance modifications tested in objective 1 will be left in place for objective 2, thereby extending the flared flume test (within turbine comparisons) while allowing us to test the efficiency of baffle panel configuration (between turbine comparisons) in improving FCE over a range of lower, summer discharge conditions.

Task 2.1: Assess juvenile coho behavior relative to baffle panel configuration using radio telemetry

Task 2.2: Evaluate overall performance of baffle panel configurations using flume netting.

Objective 3: Evaluate flared fish flume entrance performance in improving FCE during late-summer discharges with single turbine operation.

Approach: We propose to continue testing flared flume entrances through the late-summer season to determine their effectiveness in collecting chinook. We will make in-season recommendations of baffle panel configuration for single turbine operation using flume-netting results from objective 2 testing. This approach will result in flared flume entrance testing for all three migrant species (steelhead, coho, chinook), while also providing an opportunity to fine tune baffle panel configuration for optimal performance over the range of discharges encountered through the collection season. Sample size (200 preferred) for this objective will depend on funding level (radio tags ≈ $190.00 ea).

Task 3.1: Recommend baffle panel configuration for single turbine operation based on in-season results of objective 2 testing.

Task 3.2: Assess juvenile chinook behavior relative to test and control flume entrances using radio telemetry.

Task 3.3: Evaluate overall performance of the flared entrances using flume netting.

Objective 4: Continue investigation of innovative technologies to improve FCE and feasibility of reservoir survival estimation methods.

Approach: This objective will focus on the review and/or small scale testing of technologies or ideas that may improve FCE at CFD. We propose to redesign the net pen strobe light test to determine if steelhead may exhibit a dose/response behavior relative to strobe lights. Preliminary results from 2000 testing indicate that steelhead moved closer to the strobe light when they were operating. Although these results are preliminary and could change with further analysis, we are concerned that our test design was sub-optimal. We would like to further examine the use of strobe lights and/or blue green lighting to either repel or attract juvenile salmonids.

Some interest has been expressed in determining the survival of juvenile salmonids in Lake Scanewa. This objective will also address this interest by exploring the feasibility of extracting through reservoir survival from radio-tagged fish releases in Lake Scanewa. Methods of smolt survival estimation in the Snake and Columbia rivers have focused largely on mark-recapture techniques using PIT-tagged fish releases. Recently, some effort has been directed at using mark-recapture methods with radio-tagged fish releases to estimate fish survival. The advantage afforded by this method is that it allows researchers to set up multiple recapture sites (radio telemetry detection sites) within a reservoir rather than using a dam as the recapture site, as is the case with PIT-tagged fish releases. Initial results for survival estimation using radio-tagged releases indicate similar estimates of survival when compared to PIT-tagged fish releases. This method may be of use in determining through reservoir survival on the Cowlitz River.

Task 4.1: Redesign and conduct net pen strobe light test to determine dose/response behavior with steelhead.

Task 4.2: Review the use of blue-green light to attract juvenile salmonids to passage routes at dams.

Task 4.3: Examine the feasibility of extracting reservoir survival estimates from radio-tagged fish releases.

SCHEDULE

Research activities under this proposal are scheduled to begin in January and to be completed by September 30, 2001. Information displayed in Table 1 identifies a draft schedule of activities outlined in this proposal to be implemented at CFD.

A separate proposal will be submitted to the Walla Walla District U.S. Army Corps of Engineers (USACE) to continue the directed flow study at CFD. Funding of the USACE proposal will require integration to accomplish the objectives of both this and the USACE funded proposal. We believe that both studies can be integrated without compromising either proposal. Also, funding of the USACE proposal will necessitate the removal of the debris barrier during the summer months (July/August) for directed flow testing. If the LCPUD does not agree to remove the debris barrier for directed flow testing, USACE funding will likely be declined by the USGS.

Table 1.- Draft schedule of USGS research activities at CFD during FY2001.

	Jan	Feb	Mar	April	May	June	July	Aug	Sept
Develop a conceptual flared flume design	X	X							
Fabricate and install flared flumes			X	X					
Configure baffle panels				X		X	X		
Objective 1					X	X			
Objective 2						X	X		
Objective 3							X	X	
Objective 4				X	X	X	X	X	

REFERENCES

Darland, T.J., S.D. Evans, G.L. Rutz, B.J. Hausmann, D.H. Feil, D.W. Rondorf, N.S. Adams, C.F. Morrill, and J.D. Serl. 2000. Test of Concept to Improve Fish Guidance Using Induced Water Currents at Cowlitz Falls Dam, Washington. Draft report to the U.S. Army Corps of Engineers, Walla Walla, Washington.

Haro, A., M. Odeh, J. Noreika, and T. Castro-Santos. 1998. Effects of water acceleration on downstream migratory behavior and passage of Atlantic salmon smolts and juvenile American shad at surface bypasses. Transactions of the American Fisheries Society 127:118-127.

Rugles, C.P., and P. Ryan. 1964. An investigation of louvers as a method of guiding juvenile Pacific salmon. Can. Fish. Cult. 33. 68pp.

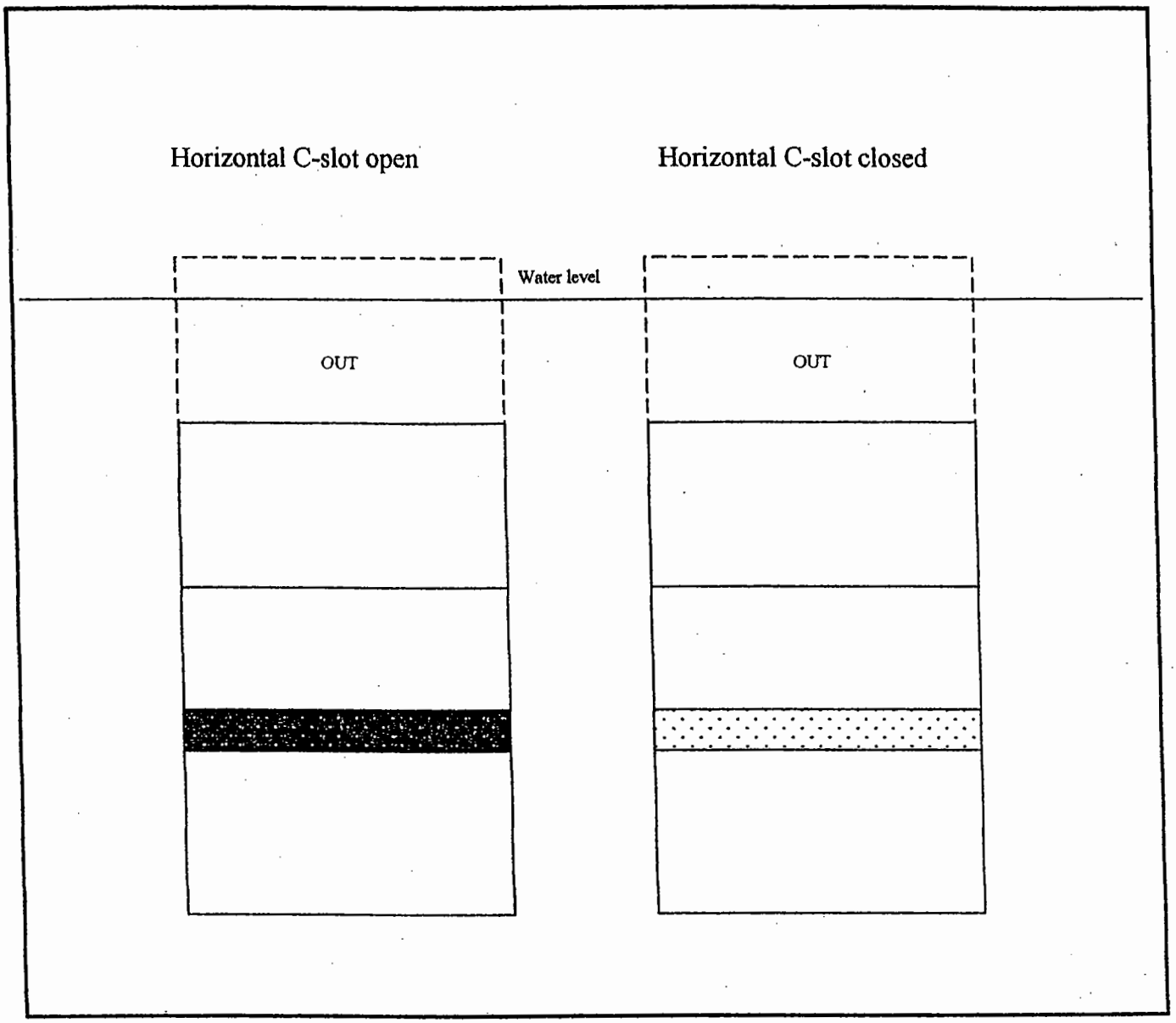

Figure 1.- Proposed baffle panel configurations for 2001 testing.

TACOMA POWER

3628 South 35th Street

Tacoma, Washington 98409-3192

TACOMA PUBLIC UTILITIES

December 7, 2000

Steve Fransen
National Marine Fisheries Service
510 Desmond Drive S.E., Suite 103
Lacey, WA 98503

Eugene Stagner
U.S. Fish and Wildlife Service
510 Desmond Drive S.E., Suite 102
Lacey, WA 98503

Subject: City of Tacoma, Cowlitz River Hydroelectric Project, FERC No. 2016 -- First Progress Report on LCPUD/BPA Negotiations

Gentlemen:

Section 8.2.10 of the Cowlitz River Hydroelectric Project Settlement Agreement (Agreement) requires Tacoma Power to engage in negotiations with Lewis County PUD (LCPUD) and the Bonneville Power Administration (BPA) regarding cooperative efforts to improve downstream passage effectiveness at the Cowlitz Falls Project. The Agreement also requires Tacoma Power to provide a progress report to the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS) within four months. This letter with enclosures is intended to serve as the first progress report. In accordance with the Agreement, additional progress reports will be provided each month until negotiations are completed or terminated.

Approximately one month after reaching agreement, Tacoma Power began making arrangements for the first meeting with LCPUD and BPA. On October 18, 2000, representatives of LCPUD met with Tacoma Power (see enclosed meeting summary). There were no BPA representatives in attendance. The meeting provided an opportunity for all participants to review pertinent sections of the Agreement, current performance of the Cowlitz Falls Fish Collection Facility (CFFCF), and the status of each utility's respective Section 7 consultations. In addition, meeting participants discussed who should participate and how future meetings should be conducted.

It was decided that the next meeting should not be held until after the U.S. Army Corps of Engineers Anadromous Fish Evaluation Program, Annual Research Review Meeting held in Portland, Oregon, November 13-15, 2000, and the BPA/LCPUD informal Section 7 consultation meeting with NMFS and USFWS on November 17, 2000. In addition, prior to the next meeting it was decided that the parties' fisheries biologists, Mike Kohn and Mark LaRiviere should meet with biologists and engineers from Harza Engineering Company (Harza) to identify possible technical measures to improve fish collection efficiency.

On November 21, 2000, Mike Kohn and Mark LaRiviere met with two engineers from Harza and a biologist from Mobrand Biometrics, a subcontractor to Harza. Mike Kohn invited representatives of the U.S. Geologic Survey (USGS) and the Washington Department of Fish and Wildlife (WDFW) to attend the meeting and share their expertise in fish passage and their knowledge of CFFCF performance. Also in attendance were additional staff from Tacoma Power, including Tacoma Power's lead civil engineer (see enclosed meeting summary).

Meeting participants shared the most recent information gathered through the various studies conducted at, above and below Cowlitz Falls Dam. Participants then discussed possible technical measures to improve downstream migrant collection efficiencies at three locations: upstream of, downstream of, and at Cowlitz Falls Dam. In addition, meeting participants identified the measures most likely to have a significant influence on fish passage survival.

The next meeting will take place in Tacoma on December 19, 2000. In attendance will be Dave Muller and Mike Kohn from LCPUD with their attorney Eric Redman, and Pat McCarty, Debbie Young, Mark LaRiviere and Toby Freeman from Tacoma Power with their attorney Gail Greely. Representatives of BPA are not planning to attend (see enclosed telephone conversation summary). The purpose of this meeting and any subsequent meetings will be to identify which technical measures will be proposed to improve collection efficiencies at or near Cowlitz Falls Dam and how the cost of implementing these measures will be shared by the parties.

Feel free to contact me at (253) 502-8340 with any questions.

Sincerely,

Debbie C. Young
Natural Resources Manager

Enclosures

cc: Secretary, FERC
Official Service List

Meeting Summary

Location:	TPU Administration Building
Date and Time:	October 18, 2000 – 1:30 to 4:00 p.m.
Participants:	Lewis County PUD: Dave Muller, Mike Kohn, Eric Redman Tacoma Power: Pat McCarty, Mark LaRiviere, Toby Freeman
Subject:	Juvenile Anadromous Fish Collection at/near Cowlitz Falls Dam

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The meeting began with a discussion about the goals for Fish Passage Survival (FPS) presented in the Cowlitz River Hydroelectric Project Settlement Agreement. The Agreement describes a goal of 95% FPS, with 75% FPS being adequate only after employing the best available technology.

Mike Kohn and Mark LaRiviere then provided a report on current collection efficiency at the Cowlitz Falls Fish Collection Facility. Collection efficiency varies by species, but is averaging 60% for steelhead and 25% for coho and chinook. The USGS has been conducting studies of the Fish Collection Facility and will be presenting their most recent findings the week of November 13 at the annual Corps of Engineers review.

Toby Freeman explained that Tacoma Power filed a draft Biological Assessment with the FERC in August. Dave Muller explained that Lewis County PUD had prepared a draft Biological Assessment that was being rewritten based on informal consultation with the federal agencies. The parties also discussed ESA Section 10 activities being conducted by WDFW relating to hatchery management, genetics management and R&D for collection, marking and transportation. No party believed that negotiations need to be delayed until after Section 7 and 10 consultations are complete.

Meeting participants then discussed how negotiations should proceed. It was agreed future meetings will continue to include the six individuals in attendance with the possible addition of an attorney for Tacoma Power and a representative of the Bonneville Power Administration. If the need was identified, a mediator could provide assistance with negotiations in the future. It was also agreed the next meeting would best be held after the USGS presentations and after BPA/LCPUD informal consultation on November 17, 2000. Toby Freeman will arrange a meeting for early December.

Prior to the next meeting, Mark LaRiviere and Mike Kohn will meet with biologists and engineers from Harza Engineering to identify all possible technical measures to improve collection efficiency at three locations: upstream, downstream , and at Cowlitz Falls Dam. The benefits and risks of each alternative will be identified as a possible factor in allocating cost responsibility.

MEETING SUMMARY

Location: TPU Administration Building, Room 2B

Date & Time: November 21, 2000 --- 9:00AM to 2:00PM

Subject: Identify Technical Measures to Improve Collection Efficiencies At or Near Cowlitz Falls Dam

Participants:

Mark LaRiviere, Tacoma Power
Pat McCarty, Tacoma Power
Toby Freeman, Tacoma Power
Debbie Young, Tacoma Power
Steve Fischer, Tacoma Power
Kevin Malone, Mobrand Biometrics
Dave Thompson, Harza Engineering
Dan Turner, Harza Engineering
Charlie Morrill, WDFW
John Serl, WDFW
Dennis Rondorff, USGS
Dan Feil, USGS
Mike Kohn, Lewis County PUD No. 1

The purpose of the meeting was to develop a listing of all possible technical measures to improve downstream migrant collection efficiencies at three locations: upstream of, downstream of, and at Cowlitz Falls Dam (CFD). The overall goal of 95% fish passage survival (FPS) from the head of Lake Scanewa to the Cowlitz River below the Barrier Dam for outmigrant juveniles was explained. John Serl reported on year 2000 field study mean fish collection efficiency (FCE) results: steelhead = 65%; coho = 45%; and spring chinook = 24%. These values should be viewed as minimums because mark-recapture estimates have an underestimation bias. Overall survival of smolts collected at the Cowlitz Falls Fish Collector Facility (CFFCF) and released into the Cowlitz River below the Barrier Dam was over 99% in 1999.

To calculate FPS from the head of Lake Scanewa to the Cowlitz River below the Barrier Dam, the individual components would include: survival through Lake Scanewa, FCE at Cowlitz Falls Dam and transport/stress relief pond survival rates. Only reservoir survival has not been studied to date, and studies will be done in 2001. Tacoma Power's Settlement Agreement (SA) has tiered FPS goals from the head of Lake Scanewa to the Cowlitz River below the Barrier Dam (adjusted for natural mortality): 95% initially, then 75%.

Upstream: The idea of fishing paired Merwin traps in Lake Scanewa was presented. Due to debris loads and higher flows, the nets could be deployed only after July 4, and remain until flows increase in the fall. The goal is to collect spring chinook migrants and use this data to evaluate the feasibility for a gulper or a drum screen structure. Reservoir survivals calculated in 2000 from radio tag

detections at the dam were estimates: steelhead = 95%, coho = 67%, and spring chinook = 67%. Dennis Rondorff warned about assuming too much from these radio tag results and that referring to the results as "reservoir survivals" may be misleading. He described the complicated studies and model used on the Mid-Columbia River to calculate survivals. The Cowlitz Falls Project work is not as involved.

Predation in Lake Scanewa was recognized as an issue. Northern pike minnow, smallmouth and largemouth bass, black crappie and resident rainbow (mitigation trout) are present. Study results from a WDFW survey in 2000 suggests that large mitigation trout alone could consume 17,000 smolts, mostly coho and age zero chinook smolts. The study will be repeated in 2001 to verify that result and further determine the impact of planted mitigation trout on naturally produced downstream migrants.

Other upstream actions listed included a drum screen structure/facility and a "gulper" similar to one proposed downstream of CFD. Collection facilities located above CFD should be in Lake Scanewa below the confluence of the Cispus and Cowlitz Rivers. If located near enough to the dam, the juveniles could be piped directly to the CFFCF for transportation downstream.

Upstream Measures:

Merwin trap
Drum screens
Baker Lake style gulper

Downstream: Mark LaRiviere presented a brief sketch of the radio tag research done at the Taidnapam Park bridge in 2000. Tagged steelhead and chinook smolts released from or passing CFD were detected at the bridge to discern lateral and depth distribution in the river/reservoir. Very preliminary findings were that the steelhead were surface oriented, that the chinook were deeper in the water column, and that both species tended to follow the thalwag.

Downstream collection actions are described in Tacoma's relicensing documents. A Baker Lake style gulper, Merwin traps and/or a series of inclined plane traps in the Cowlitz River above the influence of the Riffe Lake reservoir were presented as possibilities. A separate juvenile handling and transportation facility would need to be developed, probably in the vicinity of Taidnapam Park.

Downstream Measures:

Baker Lake style gulper
Merwin trap
Inclined plane traps (in series)

At Cowlitz Falls Dam: Dennis Rondorff, Dan Feil and John Serl described research activities and preliminary 2000 results of work at CFD aimed at improving fish collection efficiency (FCE) and understanding more about directed flow, hydraulics, and the efficiency of strobe lights. Most of the data are still being analyzed by the USGS.

General findings or understandings from the data collected so far are summarized as follows:

- During the spring, surface collection for steelhead and cutthroat is high, and with only a few "tweaks" (simple fixes), it is felt success can be achieved.
- Coho FCE remains a challenge and more work is needed focusing on flows between 6,000 and 10,000 cfs.
- Potential changes to current operations at CFD could include baffle panel changes and directed flow in the spring; screens, baffle panel changes and directed flow in the summer; and screens and directed flow in the fall.
- Solutions to improve the FCE in the spring period may not necessarily be the same solutions needed to improve or stabilize FCE during the other seasons.
- The debris deflector at CFD is, in the opinion of some fish passage experts, "the single biggest impediment to surface collection at Cowlitz Falls Dam." The debris deflector was moved in July 2000 during directed flow tests. There is no permanent moorage/docking location in Lake Scanewa (although permits are in process to develop a new docking station) and moving the deflector is very difficult. Lewis County PUD would prefer to leave it in place and make adjustments or changes (such as splitting it in half) while it is still attached to the dam.
- It may be possible to cut holes or ports in the submerged portion of the debris deflector, or to make other structural changes while remaining in place, to lessen its impact on forebay hydraulics and surface collection FCE.
- Changing the baffle panel configuration to the "C-horizontal opening" resulted in a distribution with about 75% of the smolts collected through the new configuration and 25% through the "standard" opening for the two turbine operation period with steelhead and coho. This may be the best action easily taken to improve FCE for steelhead and coho.
- Simple fixes ("tweaks") may be the best actions possible for improving steelhead and cutthroat FCE, however it is unknown what is needed for improving subyearling chinook FCE.
- If smolted chinook yearlings were available during the spring for FCE testing at CFD, the value to chinook of simple fixes implemented for steelhead and coho could be determined.

- Modifying the entrances to the existing surface collection flumes could improve FCE. Establishing other surface collection sites at CFD (spillways 1, 4, and emergency) was proposed.
- The directed flow research shows good results, even "amazing," said Dennis Rondorff. Total facility catch during this study was 39% greater with the small mixers and 17% greater with the large mixers compared to the OFF condition over 14 three-day blocks. Smolt catch during this period was comprised of 85% chinook and 14% coho. The value is getting these fish into the "zone of influence," or near the baffle panel opening and improving their "opportunity of discovery" for the fish collection system.

Discussions and listings of various actions to improve FCE resulted in the following proposed measures at Cowlitz Falls Dam:

<u>"Tweaks" or simple fixes</u>

- Baffle panel configuration ("C-horizontal " or "BCD")
- Close one baffle panel opening and close one flume entrance
- Rounded flume entrance – minor
- Lights in flume entrance

The five actions listed below were identified by Dave Thompson, Dan Turner and Kevin Malone as their first choices for improving Cowlitz Falls Dam FCE.

- Remove debris deflector
- Flow modifications deep/J-occlusion plates
- Rounded flume entrance – major
- Flapgate flow collection and screening
- Hybrid system – screens and surface collection

<u>Other actions</u>

- Change debris deflector into a behavioral guidance structure
- Debris deflector ports/structural changes
- Forebay directed flow
- Baffle panel directed flow
- Modify dual flume entrances to single entrances
- Submersible traveling screens/bar screens
- Flow modifications deep/trash rack plates
- Forebay behavioral guidance structure (BGS)

Operational changes listed but not discussed included eliminating drawdowns (increasing Randle gauge limit that triggers drawdowns), limiting generation to flows of 6,000 cfs or less, and eliminating the debris deflector.

TELEPHONE CONVERSATION RECORD

Date: 12-4-00 **Time:** 3:00 pm

To: Doug Williams, BPA **From:** Pat McCurley

Representing: Cowlitz Falls Project **Representing:** Tacoma Power

Phone: 509-372-5088 **Phone:** 253-502-8336

Subject: Cowlitz Falls Negotiations

Discussion: I called Doug to make sure he was aware of the upcoming negotiation meeting between Tacoma and Lewis PUD scheduled for Dec. 19. Doug said he was aware of the meeting and had talked w/ Dave Moller about it. I asked if he planned to participate in the negotiations and he replied that he was comfortable w/ Lewis PUD & Eric Redmond representing BPA's interests. I pointed out the fact that BPA and LCPUD may have conflicting interests in parts of the negotiation. Doug replied that he may participate in future negotiations and cited weather conditions as a factor in not coming to this meeting. Doug also noted that BPA would still have to carefully review any agreement before signing on.

ENSR International
9521 Willows Road NE
Redmond, WA 98052

425-881-7700
FAX 425-883-4473
www.ensr.com

November 6, 2003

Mr. Daniel P. Turner, P.E.
Project Manager
MWH Americas, Inc.
2375-130th Ave. NE
Suite 200
Bellevue, WA 98005

RE: Revised Proposal forTacoma Power Utilities Cowlitz Relicensing Project Engineering and Fisheries Consultant Services – Task Order No. 3
ENSR Proposal Number 03830-A22 (Rev. 1)

Dear Dan:

This letter revises our proposal to perform consulting and computational fluid dynamics (CFD) modeling services to support juvenile fish passage improvements at the Cowlitz Falls Project following the request made during our phone conversation on October 30, 2003. Our original proposal was presented in our letter of September 29, 2003. This proposal focuses on development of a computational fluid dynamics model that may be used to investigate an improved transition between the fish collection baffle panel slots upstream from the tainter gates and the entrances to the fish transport flumes in the tops of the tainter gates later in 2004.

BACKGROUND

A number of studies have been performed at the Cowlitz Falls Project by Tacoma Power Utilities (TPU) and others in attempts to understand and improve performance of the juvenile fish collection facilities.

The original design of these facilities was developed through extensive hydraulic model testing by ENSR and design studies by MWH. The design called for an attraction flow of 250 cfs from each fish collection baffle slot to pass through a wedge-shaped fish screen. Within these screens, the flow-field that accelerated as flow was bled off through the screen until the remaining 40 cfs flow and fish reached the fish collection flume entrance at the tainter gate. Early in the implementation of the collection system, the screens were abandoned prior to completion of the proposed iterative field investigation of their porosity distribution and the accelerating flow field.

Now, fish that pass through the baffle slots enter the water body between the slots and the gates and must find their way to the flume entrances, while avoiding diving through the induction slots into the turbines, and navigating through an extremely complex three-dimensional flow field. There are no means of excluding the fish from the attraction flow that is drafted into the induction

slots. Fish tend to mill and hold in this transition region and they have not readily chosen passage into the fish collection flume entrances. In some cases, after holding, they may still dive through the induction slots into the turbine flow or even move back upstream into the forebay through the baffle slots. TPU has experimented with a control gate and fairings on a flume entrance to make the entrance flow field more attractive. TPU has also experimented with strobe lights in an attempt to move fish to the flume entrances.

TPU now wishes to investigate the design and operation of this transition zone from the baffle slots to the flume entrances in a systematic way to gain understanding of the fish behavior and develop a design that will readily move fish into the collection flumes. The proposed scope of work described in the following sections is designed to meet this objective.

SCOPE OF WORK

100 – Kick Off Workshop

Gaining a clear understanding of the past work is an important first step. We understand that TPU staff will collect the reports and other documentation of past studies, review results in detail, and develop conclusions on the effects of past structural and operational changes on biological performance of the facilities. TPU staff will present these findings in a one-day workshop at TPU's offices attended by members of the MWH/ENSR team. At the workshop, ENSR will lead a discussion of the possible hydrodynamic and other structure and operation-related performance issues that have affected the results. ENSR will also facilitate brainstorming of concepts for performance improvement and ranking the resulting alternatives.

200 – Computational Fluid Dynamics Model Preparation

The transition region between the fish attraction slots in the bulkheads and the flume entrances is the home of a very complex three-dimensional flow field. Flow is introduced through two baffle panel slots and withdrawn through two turbine bulkhead (flow induction) slots and two collection flume entrances. The region has irregularly shaped flow boundaries formed by the planar baffle panels and pier sides, the curved spillway crest and radial gates, and the water surface. Fish interact behaviorally with these boundaries and the flow fields in ways that are not yet totally understood. Recent investigations by Goodwin and Nestler of the US Army Corps of Engineers Engineering Research and Development Center (ERDC) at Lower Granite Dam (as yet unpublished) have shown promise in gaining this understanding. These studies indicated fish navigate using a behavioral rule set that works well in natural free-flowing rivers, but is confounded by flow impoundments upstream from dams and even more so when enclosed in hydraulic structures. Some basic behavioral rules they have found are that fish follow flow field unless they encounter areas of increasing fluid strain above a certain threshold level. The nine components of strain at any point in a flow field can be calculated given a

detailed map of the velocities in the flow field. Once they encounter this threshold strain, they then move in the direction of increasing velocity, which may not necessarily be in the direction of flow. The strongest velocity gradient may be almost perpendicular to the flow direction.

Understanding why fish have reacted as they have in past studies of the flow field in the baffle panel slot/flume entrance transition region and predicting how they will react to future changes in geometry and operation will benefit from detailed mapping of the flow field.

Predicting the flow patterns, velocity magnitudes, and directions in this region to gain this understanding cannot be achieved in enough detail for existing conditions nor at all for future conditions through field measurements. This level of detail and prediction can only be reasonably provided through hydraulic modeling. Until recently the appropriate tool for such an investigation would have been a physical scale model, such as that employed for the previously reference Cowlitz fish collection facility design studies. Even in a physical model the data collection effort would be extensive and costly. Recent advances in computer modeling techniques, software, and hardware now allow analysis of complex flow fields using full three-dimensional computational fluid dynamics (CFD) modeling as a practical engineering tool rather than as a research tool. Advancement of the design concepts developed as described earlier in this proposal to the level required for confident field implementation will benefit greatly from CFD modeling. The following sections of this proposal describe the development and application of a CFD model of this transition region.

201 – Grid Development

The model grid will encompass the entire region bounded by the baffles, piers, spillway crest and radial gates. The inflow boundaries will be a uniform approach flow field upstream from the baffle slots. This boundary condition will allow the appropriate velocity profile through the baffle slots to be developed by the model geometry and turbulence simulation. The outflow boundaries will be discharge boundaries at the induction slots and the control gates in the flume entrances. The pressures at these boundaries will be adjusted to give the correct discharge distribution among the outlets.

An unstructured model grid consisting of about 500,000 cells ranging in size from about 3 to 12 inches should achieve the precision required to satisfy the project objectives.

The grid will be developed from AutoCad drawings of the structures using a grid generation software package, which contains powerful, highly-automated tools for geometry acquisition, grid generation, grid optimization, and pre-processing.

202 – Field Data Collection

For calibration and verification of the model, it will be necessary to have field data, three-dimensional velocity measurements made at several locations within the model domain, for two

separate and different operating conditions, i.e. differing flow withdrawal rates through the induction slot.

These data will be acquired using a three-dimensional (3-D) Acoustic Doppler Velocimeter (ADV), deployed on four vertical transects within the model domain using a twenty-foot long aluminum pole. The pole will be deployed from a floating work platform moored in the area between the bulkhead and radial gate, which TPU has employed for other studies. Access to the work platform and logistical support will be provided by TPU.

The data acquisition will require two separate trips to the site. During the first 1- day visit, the ENSR project engineer will plan the data acquisition effort with TPU field staff. The ENSR engineer supported by an ENSR field technician will make the actual measurements during a second two-day visit. The first day will be used for equipment set-up and testing and the second for data acquisition.

Data will be acquired at the 16 measurement positions for two different operation conditions. Approximately 5 minutes of data will be recorded at each position to characterize the long-term average and variability of the velocities (turbulence). Project operations data (flows and water levels) will be provided by project personnel.

203 – Calibration and Verification

We will use one of the robust CFD codes that ENSR regularly applies to model hydraulic structures. The models can address the complex geometry of hydraulic structures by using an unstructured mesh in conjunction with efficient finite-volume methods to solve the full three-dimensional Reynolds Averaged Navier-Stokes equations and a range of state-of-the-art turbulence models. We would employ the second order κ-ε turbulence model, which is commonly used in hydraulic engineering.

The model will be calibrated by adjusting the grid size in critical areas or by changing boundary roughness until it is possible to reproduce field velocity data taken at several locations inside the model domain within the variability of the field data. The calibrated model will then be verified by comparing computed results to a separate field data set.

300 – Reporting

301 – Technical Memorandum

ENSR will prepare a brief technical memorandum summarizing the results of the kickoff workshop, the field data collection effort at Cowlitz Falls, and the preparation of the CFD model. The model grid will be presented through isometric graphics and results of the CFD model calibration runs will be documented through cross-sectional plots of model isovels and streamlines, plus tabulated comparison of the model and field results.

302 – Follow-up Workshop

The memorandum will be presented to TPU in a one-day meeting at TPU's offices. Also at that meeting an additional brainstorming session will be held to generate further ideas on facility modifications that may be developed through application of the CFD model. At the conclusion of the workshop, the next steps to flesh out concepts to the level that they may be investigated using the CFD model will be decided upon. Following the workshop, it will be possible to develop the scope and cost for further these analyses of the concepts.

STAFF

The work will be performed under the supervision and review of Mr. Charles "Chick" Sweeney, P.E., Hydraulic Engineering Program Manager. Mr. Sweeney will participate in the workshop and lead the planning analysis, consulting, and reporting activities, with support, as required, from ENSR engineering, technical and administrative staff.

SCHEDULE

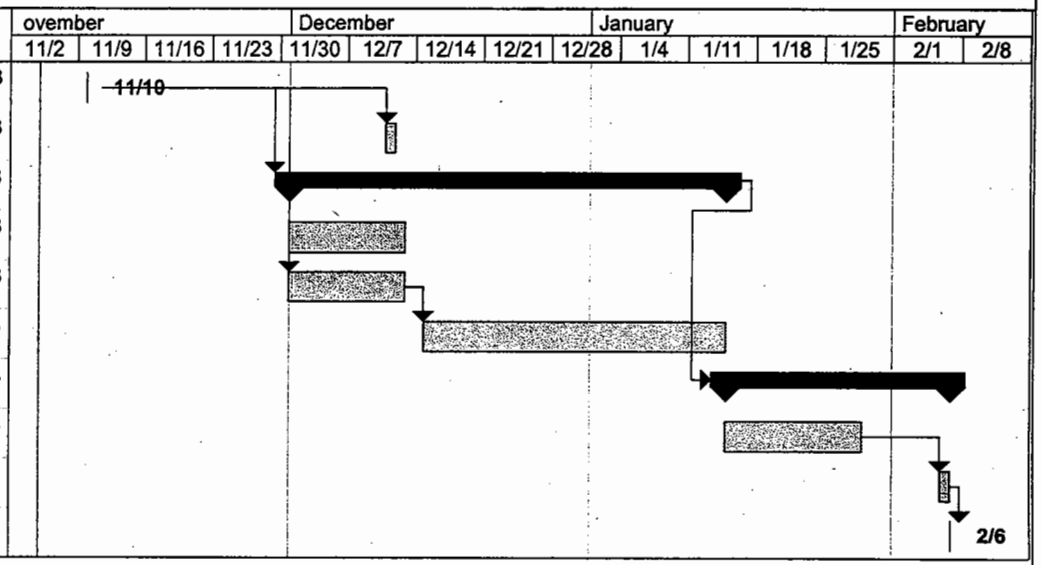
A tentative schedule for the proposed work is included as Figure 1. The kick off workshop has been included at its presently scheduled date of December 11, 2003. The commencement of model grid preparation, the field data collection efforts, and the follow-up workshop are based on availability of the necessary personnel.

ESTIMATED COST

Our cost estimate for performing the work described above is summarized in Table 1. This work will be performed on a time and materials basis under the terms and conditions and at the rates

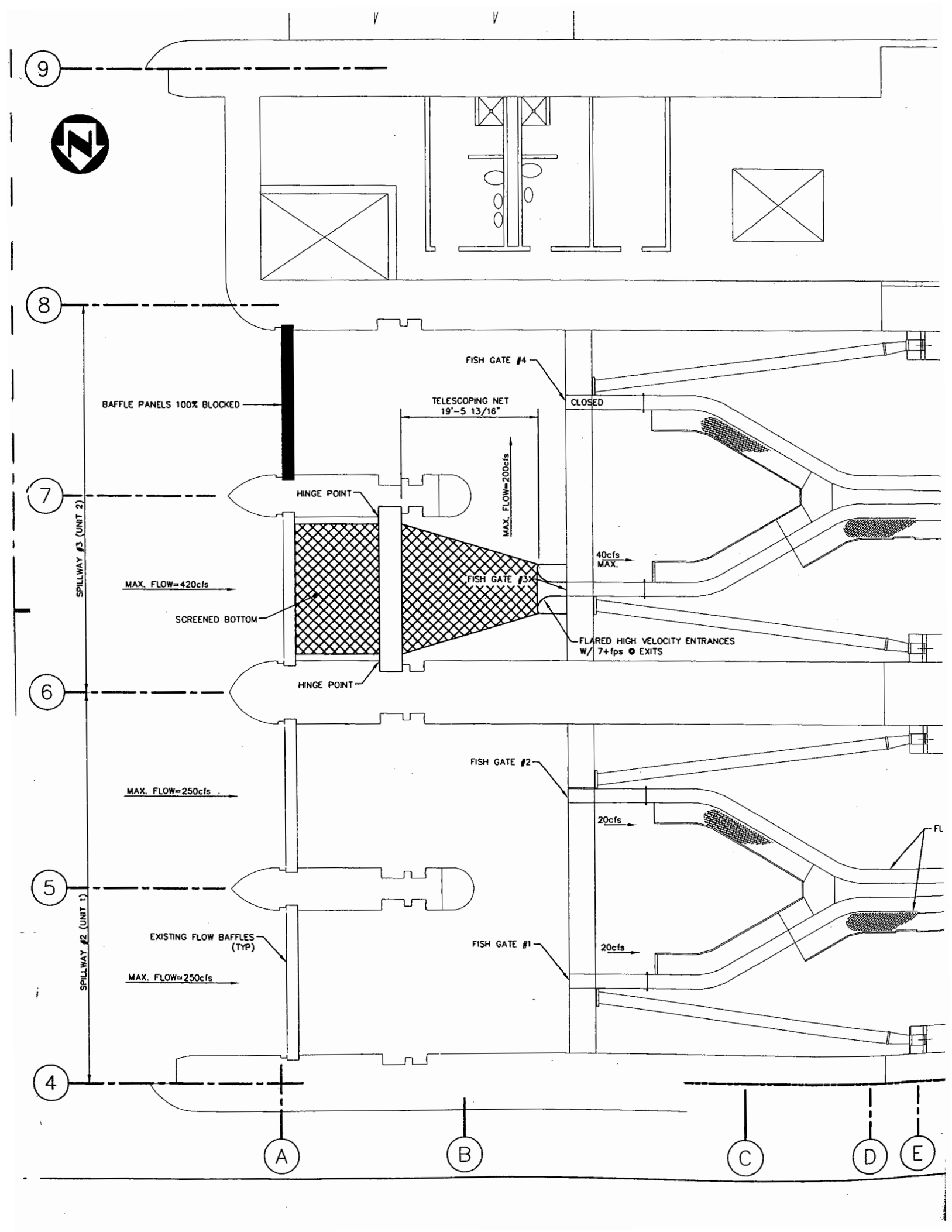
Figure 1 (Rev. 1)
Cowlitz Re-licensing Project Engineering and Fisheries Consultant Services - task Order No. 3
Proposed Schedule

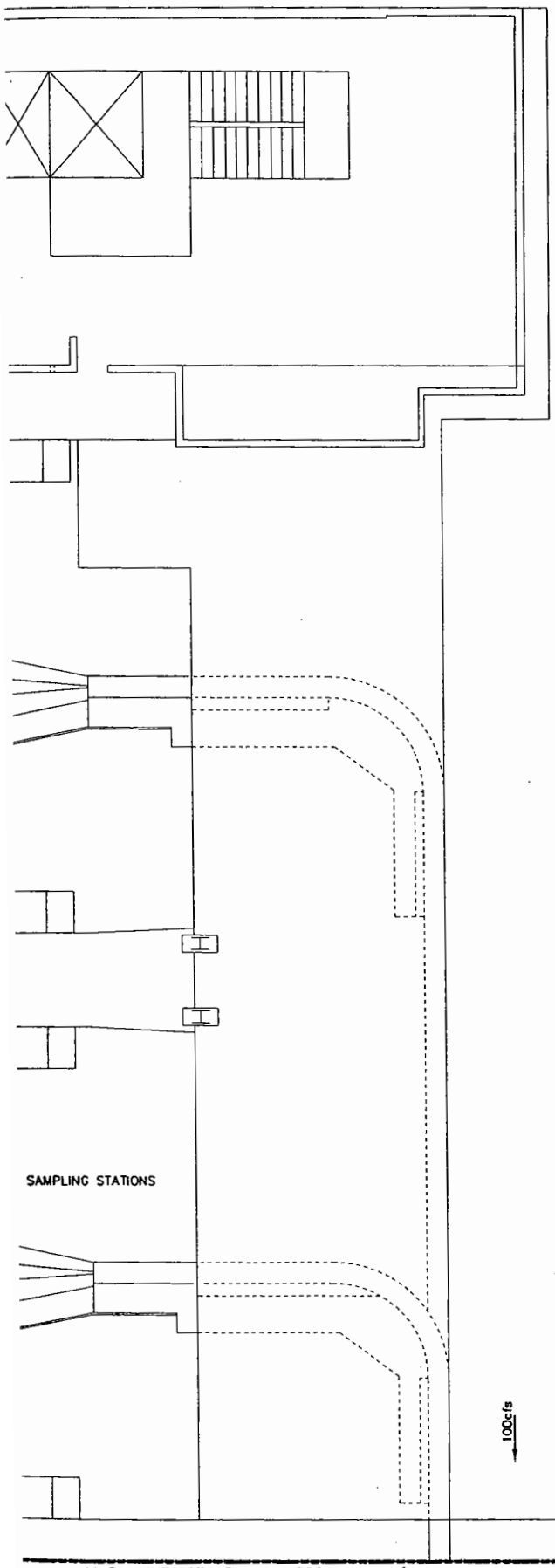
ID	Task Name	Duration	Start
1	Notice to Proceed	0 days	Mon 11/10/03
2	100 - Kick-off Workshop	1 day	Thu 12/11/03
3	**200 - CFD Model Preparation**	**25 days**	**Mon 12/1/03**
4	201 - Grid Preparation	10 days	Mon 12/1/03
5	202 - Field Data Collection	10 days	Mon 12/1/03
6	203 - Calibration & Verification	15 days	Mon 12/15/03
7	**300 - Reporting**	**17 days**	**Thu 1/15/04**
8	301 - Technical Memorandum	10 days	Thu 1/15/04
9	302 - Follow-up Workshop	1 day	Fri 2/6/04
10	400 - Start CFD Model Application	0 days	Fri 2/6/04

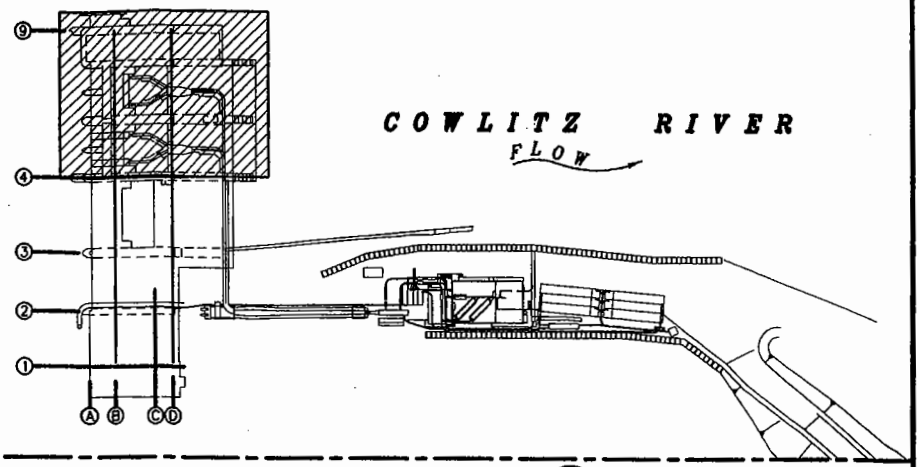


Project: 03830-014-TO-03_092403
Date: Wed 11/5/03

Task
Split
Progress
Milestone
Summary
Rolled Up Task
Rolled Up Split
Rolled Up Milestone
Rolled Up Progress
External Tasks
Project Summary


9
8
7
6
5
4
A
B
C
D
E
FISH GATE #4
CLOSED
BAFFLE PANELS 100% BLOCKED
TELESCOPING NET
19'-5 13/16"
MAX. FLOW=200cfs
HINGE POINT
SPILLWAY #3 (UNIT 2)
MAX. FLOW=420cfs
SCREENED BOTTOM
40cfs
MAX.
FISH GATE #3
FLARED HIGH VELOCITY ENTRANCES
W/ 7+fps EXITS
HINGE POINT
FISH GATE #2
MAX. FLOW=250cfs
20cfs
SPILLWAY #2 (UNIT 1)
EXISTING FLOW BAFFLES
(TYP)
FISH GATE #1
MAX. FLOW=250cfs
20cfs





KEY PLAN

NO.	DATE	REVISION DESCRIPTION	DRAWN	CHECKED	STAMPED

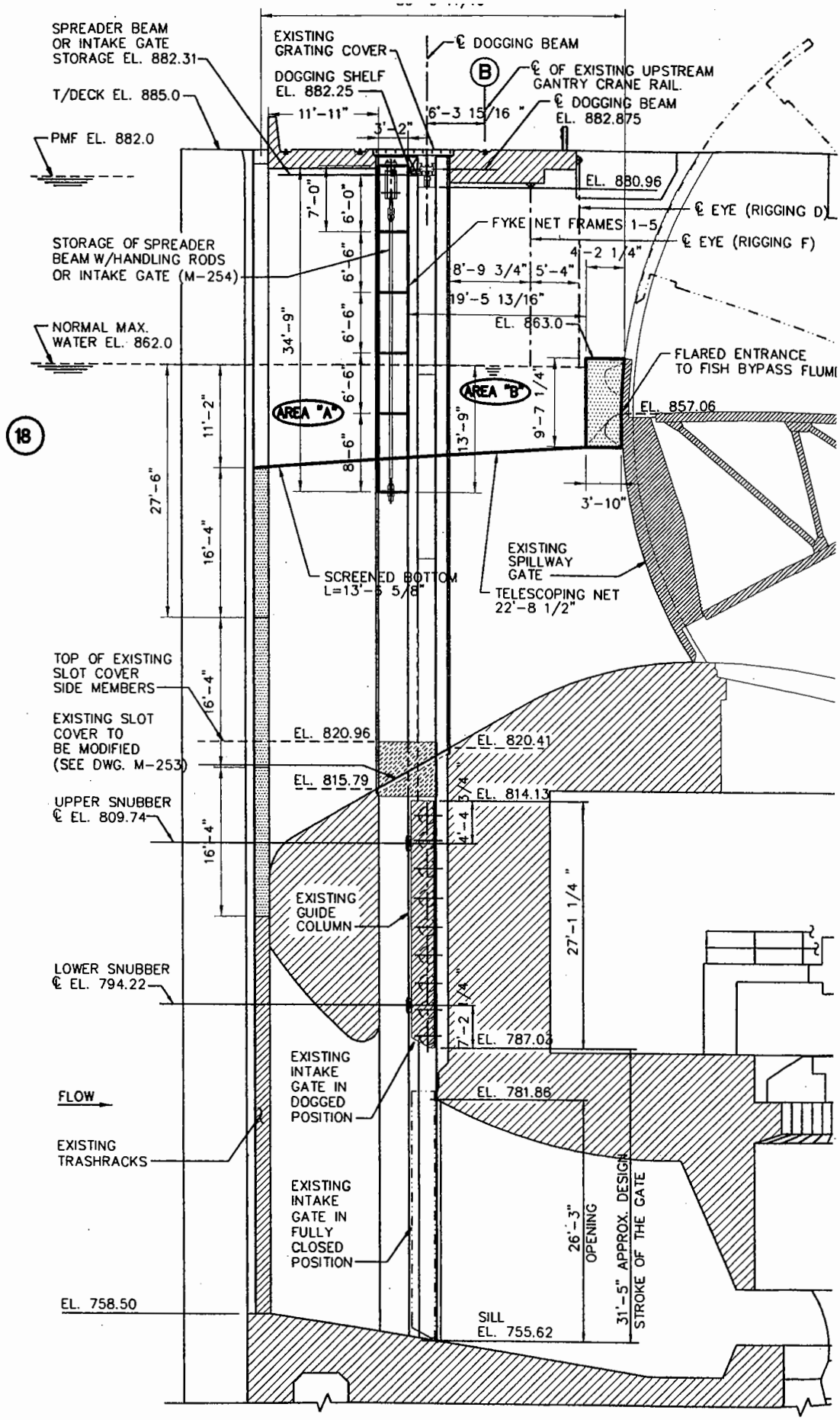
CITY OF TACOMA
DEPARTMENT OF PUBLIC UTILITIES
LIGHT DIVISION

SCOPE OF APPROVAL

COWLITZ FALLS DAM
PRELIMINARY CONCEPT: SURFACE BYPASS COLLECTOR (S.B.C.)

REVIEWED	DESIGNED	FIELD BOOK
APPROVED SUPERVISING ENGINEER	10/23/03 DATE	1/8"-1'-0" SCALE
APPROVED APPROVING ENGINEER	DRAWING NO. A SHEET OF	

DRAWN	CHECKED	REV. NO.
JCS		



SECTION THROUGH ℄ OF INTAKE OPENING

AREA "A"

NORTH SIDE NET AREA= 158.78 s.f.
SOUTH SIDE NET AREA= 158.78 s.f.
BOTTOM NET AREA= 278.56 s.f.

TOTAL NET AREA "A"= 596.12 s.f.

AREA "B"

NORTH SIDE NET AREA= 181.58 s.f.
SOUTH SIDE NET AREA= 181.58 s.f.
BOTTOM NET AREA= 245.69 s.f.

TOTAL AREA "B"= 608.85 s.f.

TOTAL AREA "A"+"B"= 1204.97 s.f.

NO.	DATE	REVISION DESCRIPTION	DRAWN	CHECKED	STAMPED

CITY OF TACOMA
DEPARTMENT OF PUBLIC UTILITIES
LIGHT DIVISION

SCOPE OF APPROVAL

COWLITZ FALLS
PRELIMINARY CONCEPT:
SURFACE BYPASS COLLECTOR (S.B.C.)

DRAWN	CHECKED	REV. NO.
JCS		

REVIEWED
SUPERVISING ENGINEER

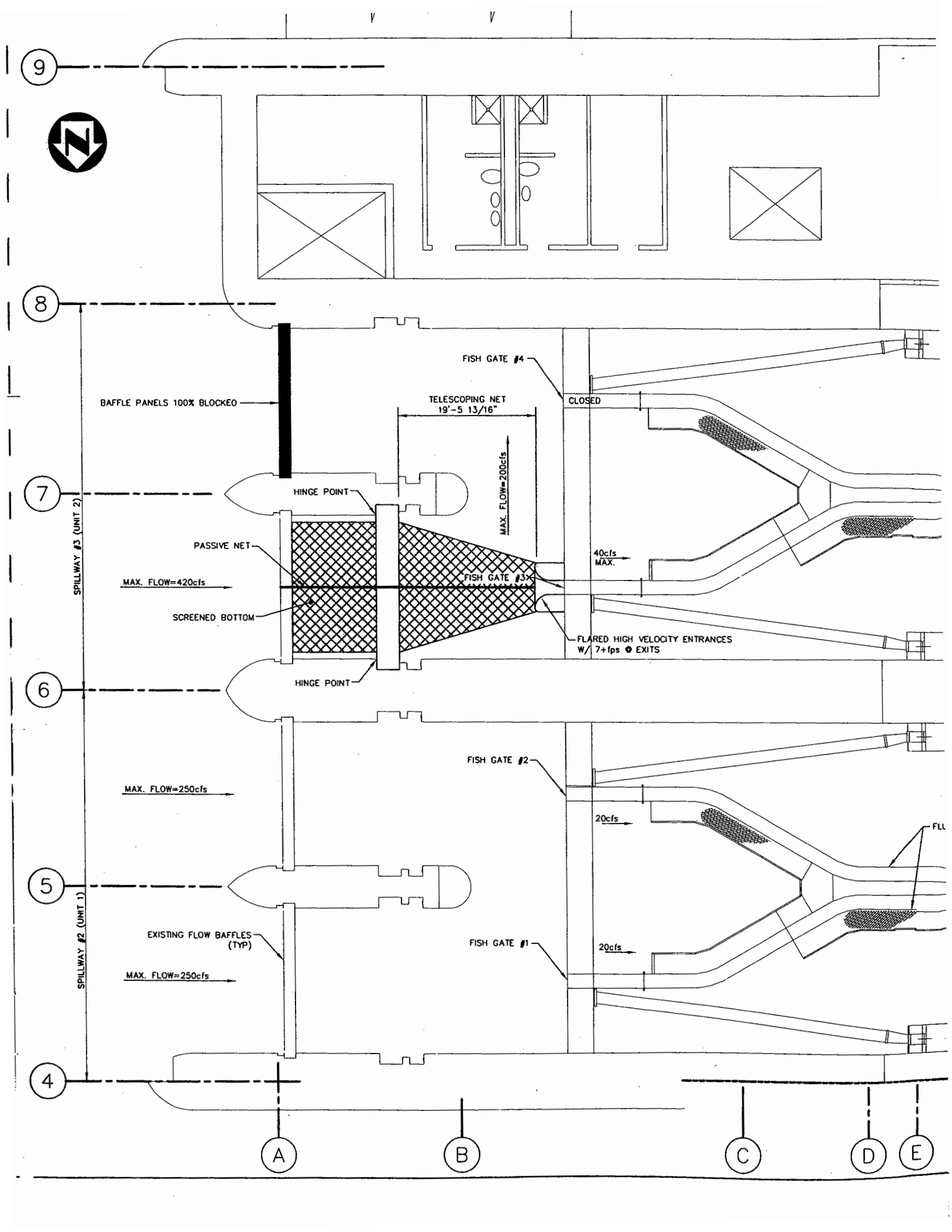
APPROVED
APPROVING ENGINEER

DESIGNED | FIELD BOOK

DATE: 10/23/03 | SCALE: AS SHOWN

DRAWING NO. B

SHEET OF


9
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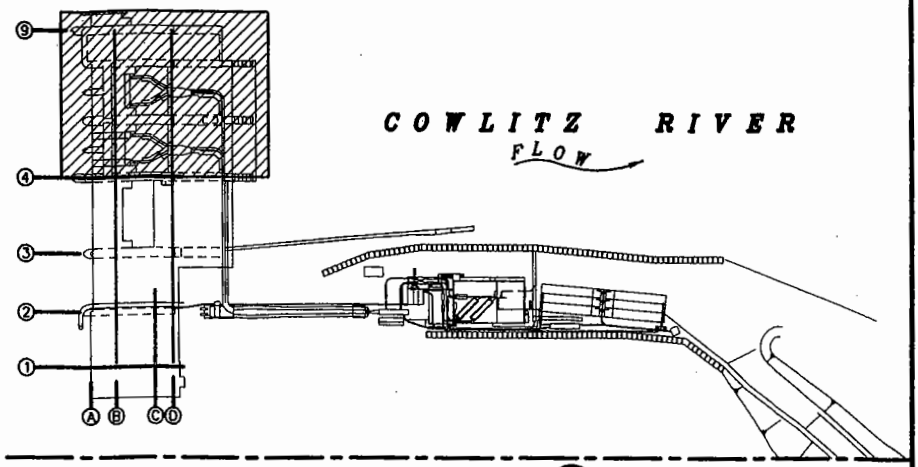
BAFFLE PANELS 100% BLOCKED
TELESCOPING NET
19'-5 13/16"
MAX. FLOW=200cfs
FISH GATE #4
CLOSED
HINGE POINT
PASSIVE NET
MAX. FLOW=420cfs
SCREENED BOTTOM
FISH GATE #3
40cfs
MAX.
FLARED HIGH VELOCITY ENTRANCES
W/ 7+fps @ EXITS
HINGE POINT
SPILLWAY #3 (UNIT 2)
FISH GATE #2
MAX. FLOW=250cfs
20cfs
EXISTING FLOW BAFFLES
(TYP)
FISH GATE #1
20cfs
MAX. FLOW=250cfs
SPILLWAY #2 (UNIT 1)



KEY PLAN

SAMPLING STATIONS

100cfs

MATCHLINE, SEE DWG. E-500

F

G

NO.	DATE	REVISION DESCRIPTION	DRAWN	CHECKED	STAMPED

CITY OF TACOMA
DEPARTMENT OF PUBLIC UTILITIES
LIGHT DIVISION

SCOPE OF APPROVAL

COWLITZ FALLS DAM
PRELIMINARY CONCEPT: PASSIVE NETTING IN CONJUNCTION WITH S.B.C.

DRAWN	CHECKED	REV. NO.
JCS		

REVIEWED

APPROVED
SUPERVISING ENGINEER

APPROVED
APPROVING ENGINEER

DESIGNED | FIELD BOOK

10/23/03 (DATE) | 1/8"=1'-0" (SCALE)

DRAWING NO. C

SHEET OF