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TACOMA PUBLIC UTILITIES

## ELECTRONIC FILING

July 18, 2006

Secretary  
Federal Energy Regulatory Commission  
888 First Street NE  
Washington, DC 20426

**Re: City of Tacoma, Cowlitz River Hydroelectric Project No. 2016  
Mayfield Dam Downstream Fish Passage Improvement Plan,  
License Article 401 and Settlement Agreement License Article 2 (b).**

Dear Secretary:

Attached is the Mayfield Downstream Fish Passage Improvements Plan submitted per the requirements of Cowlitz License Articles 401 and Settlement Agreement License Article 2 (b). This requires that *Within three (3) years of license issuance, the Licensee shall develop and file with the Commission, a plan for improvements to downstream fish passage at Mayfield Dam. The plan shall be developed in consultation with the FTC or agencies and shall be based upon, but not limited to, the 90% Fish Passage Report (filed as supplemental information by the Licensee in February 2000).*

The attached plan is submitted to fulfill the above requirement and it follows the study plan required by Section "a" of this license article that was submitted to FERC in July 2004 and subsequently approved in an order issued on July 12, 2005. Draft versions of this report were discussed at the May 10, 2006 Cowlitz Fisheries Technical Committee (FTC) meeting and a final draft report was distributed to the FTC for their comments on May 18, 2006. Comments on the final draft Mayfield Downstream Fish Passage Improvement Plan were received from the National Marine Fisheries Service (NMFS) and the Washington Department of Fish and Wildlife. Additional discussions with NMFS followed prior to the submittal of this final study report and they have approved the report. The e-mail from NMFS approving the report is included in the comment section of the plan. No written comments were received from U.S. Fish and Wildlife Service; some questions were addressed at the FTC meeting.

Please do not hesitate to contact Debbie Young, Natural Resources Manager, at (253) 502-8340 or Tom Martin, License Implementation Coordinator, at (253) 502-8298 if you have any questions regarding this submittal.

Sincerely,

Patrick D. McCarty  
Generation Manager

Attachment

Cc: Federal Energy Regulatory Commission, Portland Regional Office  
Fisheries Technical Committee  
Ed Meyer, NOAA Fisheries  
Debbie Young  
Tom Martin

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**City of Tacoma,  
Department of Public Utilities, Light Division  
Cowlitz Hydroelectric Project  
FERC No. 2016**

**License Article 401 and Settlement Agreement Article 2 (b).**

**Downstream Fish Passage Improvement Plan: Mayfield**

**1. INTRODUCTION**

This plan is prepared in compliance with the requirements of the amended license for the Cowlitz River Project (FERC No. 2016. Settlement Agreement Article 2(b) requires the City of Tacoma, Department of Public Utilities, Light Division (Tacoma) to file a plan for improvements to downstream fish passage at Mayfield Dam within three (3) years of license issuance.

**PROJECT DESCRIPTION**

The Cowlitz Project (FERC No. 2016) is located on the Cowlitz River, Lewis County, Washington between river mile (RM) 49.5 and RM 88.0. The project consists of Mossyrock Dam (RM 65.5), Mayfield Dam (RM 52.0), Riffe Lake reservoir, Mayfield Lake reservoir, two hydroelectric powerhouses, the transmission facilities associated with the dams, the Cowlitz Salmon Hatchery (RM 50.0), the Barrier Dam (RM 49.5), the Cowlitz Trout Hatchery (RM 42.0), recreational facilities at the reservoirs and lands within the Project boundary. Construction of the Project began with Mayfield Dam in 1956 and was completed with the construction of Mossyrock Dam ending in 1968. The Project has been operated and maintained continuously since original construction.

Tacoma Power built the Cowlitz Project between 1958 and 1968 and generation capacity was expanded in 1983. The original license for the project was issued November 28, 1951, and expired on December 31, 2001. A new thirty-five year license for the project was made effective on July 18, 2003.

**FERC License Article**

*Settlement Agreement License Article 2 b) Within three (3) years of license issuance, the Licensee shall develop and file with the Commission, a plan for improvements to downstream fish passage at Mayfield Dam. The plan shall be developed in consultation with the FTC or agencies and shall be based upon, but not limited to, the 90% Fish Passage Report (filed as supplemental information by the Licensee in February 2000). It shall include: 1) the results of studies of turbine mortality and effectiveness of the existing louvers; 2) plans for debris handling modifications; 3) plans for changes to the bypass system; 4) a comparison of the proposed improvements with those identified in the 90% Fish Passage Report along with a justification for any proposed improvements not included in the 90% Fish Passage Report; 5) a statement of how the proposed improvements will achieve increased Fish Guidance Efficiency ("FGE"), as defined in the August 2000 Settlement Agreement, and survival at Mayfield Dam*

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*to a level of downstream fish passage survival rate, also as defined in the August 2000 Settlement Agreement, of greater than or equal to 95% for anadromous stocks; 6) a construction and implementation schedule not to exceed one year from the date of plan approval, unless there is good cause for extending the period beyond one year; and 7) plans to evaluate the effectiveness of downstream fish passage, including FGE and the downstream passage survival rate at Mayfield Dam, upon completion of the proposed improvements. 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.*

## **2. PLAN DEVELOPMENT**

### **2.1 BACKGROUND**

The Cowlitz Fisheries Technical Committee (FTC) was organized and convened in November 2000. At the first meeting the FTC endorsed early implementation actions as encouraged in the Settlement Agreement (SA). At this meeting Tacoma proposed conducting turbine survival and louver evaluations studies at Mayfield Dam in 2001 and the FTC supported the proposal.

The FTC reviewed the proposals and work plans and suggested alternative actions and study protocols during the period the studies were conducted (2000 to 2002). The FTC reviewed the draft and final versions of all study results. The study results were filed with Commission in July 2004 and they were approved in July 2005.

Included in the study results filed in July 2004 were plans of possible improvements at the Mayfield Dam downstream collection facility including; investigating improvements to turbine unit 41, reducing noise levels from the attraction pumps, debris handling improvements at the louvers, improving the hydraulics in the north louver bay bypass pipe and upgrading the counting house operations.

In February 2006 Tacoma filed the Anadromous Fish Passage plan for the Cowlitz River Project with the Commission per the requirements of License Article 415. In the plan is a list of Mayfield Dam downstream fish facility improvements including; optimizing the secondary separator pump operations, investigating the pump noise, improvements to the secondary separator and the counting house, re-routing and upgrading the transport pipeline outfall and debris management options. The Commission approved the plan on May 10, 2006.

Progress towards completing the improvements to the downstream fish passage facilities at Mayfield Dam will be reported in any annual reports required by the Order for License Article 401 and Settlement Agreement Article 2 (a) Downstream Fish Passage Improvement Plan: Mayfield.

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At the May 10, 2006 Cowlitz Fisheries Technical Committee (FTC) meeting the concepts included in a preliminary discussion draft of this plan were discussed and some revisions agreed upon.

### **3. PLAN**

- A. Debris management**
- B. Hydraulic improvements**
- C. Noise investigations**
- D. Secondary separator improvements**
- E. Counting house improvements**
- F. Discharge chute upgrade**
- G. Operations and maintenance manual**
- H. Manual updates**
- I. Evaluation plan**

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## A. DEBRIS MANAGEMENT

Most woody debris clogging the trash rack or the louver vanes, and causing flow disruptions, at the Mayfield downstream fish collection facility floats down Mayfield Lake and makes its way past the north trash rack and into the louver bay.

*Cleaning:* The louver bay trash racks are cleaned as often as inspection reveals the need. This can be biweekly during heavy inflow periods. Currently cleaning is done using a mobile crane with crew support from a boat if needed.

Individual louver bay cleaning frequency will be every year as possible. High flows can preclude louver bay de-watering and cleaning. Cleaning one louver intake bay at a time does not shut down the downstream migrant collection system at Mayfield Dam.

Each intake is capable of being isolated, completely drained and entered by crew members and equipment. Cleaning activities in one louver bay can commence without interrupting the flows down the power tunnel, however, this activity can only occur when Mayfield discharge flows are less than 5,000 cfs (and usually only done when flows are below 4,000 cfs). Typically this occurs in the summer. A diver is used to clean the upstream stop log sill of the louver bay prior to placing the stop logs in order to drain the louver bay. A large volume pump is used for dewatering and to allow personnel and equipment to be placed directly in the empty louver bay for cleaning.

The bypass pipelines will be cleaned once the louver bay is de-watered. In addition back-flushing each individual louver outlet pipe will occur during the cleaning event. A remote operated vehicle (ROV) has been used for individual pipeline inspection during the louver bay draw down.

### **Improvements:**

The intent of the debris management improvements proposed are to reduce the size and the amount of the woody debris making it through the trash rack and clogging the louver apex, the intake to the bypass pipelines and the turning vanes. Tacoma will continue to investigate methods to keep the louver apex clear of the obstructions that may hinder or discourage downstream migrants from entering the intake structure and primary separator. It is believed that the thorough and frequent cleaning events proposed in this plan may be adequate to address this issue.

The first improvement will consist of installing a trash rake over the trash rack. The rake would be automated cleaning the trash rack at a specified interval. To install the trash rake may require other modifications to the existing debris boom. Below are three companies that can build and install a trash rake:

- Hydro Rake System by Atlas Polar
- The Dragrake by North Fork Electric ([www.nfei.com/dragrake.html](http://www.nfei.com/dragrake.html))
- The Catenary Trash Rake by E & I Corporation

Of the three systems considered the Dragrake may be the most feasible for the needs of Tacoma and the easiest to install. To install the Dragrake may require modification to the debris boom. The Dragrake operates by a system of motorized cable hoists which move a raking

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beam in a cyclical motion. This cycle begins with the raking beam at the trash dumping position located at the top of the trash rack. The raking beam is hoisted upstream and lowered into the water to the bottom of the intake several feet upstream from the toe of the trash rack. The raking beam now dredges the bottom of the intake until it reaches the bottom of the trash rack whereupon it rakes up the rack face bringing its trash load to the dumping position. This action allows the Dragrake to dredge debris which accumulates upstream, impeding flow and limiting production.

The raking beam has a replaceable leading edge, flushing windows to allow silt and very small debris to pass through the trash rack and spring-loaded tines to remove impacted debris from in between the trash rack bars. Adjustable attachment chains allow for changes in the raking beam's angle to accentuate either its dredging or raking action. All components are accessible from above water level eliminating equipment failure which would require dewatering or diving for repair.

A second possible improvement is to place a vertical 2-inch by ½ -inch steel bar between the existing bars, thereby reducing the existing vertical trash rack slots from 8-inch to 3 ¾ -inch. This has the potential to obstruct the downstream migration of steelhead kelts and would only be undertaken if debris continues to be a problem in the louver apex and if approved by the FTC. Design of the rake will need to accommodate the possible change in bar spacing.

Work may be completed in the fall to minimize the effect on the downstream migrants.

*NOTES:* FERC requires the power tunnel to be fully drained and inspected for safety and integrity every 10 years. The entire louver system, transport pipes, secondary separator and counting house facilities are cleaned at the time of the power tunnel inspections. Power tunnel inspections interrupt the operation of the downstream migrant collection system at Mayfield Dam.

A good solution for cleaning the louver apex between louver dewatering events has not been found. If a suitable apex cleaning device or idea is proposed it will be brought to the FTC for discussion.

*SCHEDULE:* As this item is largely for the convenience of Tacoma personnel who can keep the intake clean by other means, the improvement tasks will follow the Cowlitz Complex design projects. Design is scheduled for the winter of 2007, with contracting to follow in the summer of 2008.

## **B. HYDRAULIC IMPROVEMENTS**

### **Addition of monitoring, alarm, and control measures for attraction water pumps and secondary separator.**

#### PLC/VFD Control of Pump Operation:

Tacoma proposes to control the pumps with the discharge weir or install variable frequency drives (VFDs) on 2 attraction water pumps (1 per side) to allow improved control of hydraulic conditions in louver bays and secondary separator for varying reservoir level and turbine operation. To increase flow available from pumps at lower reservoir levels, the attraction water pumps' discharge weir is proposed to be left completely open during pump operation with the potential need for automatic closure during a plant shutdown. A new programmable logic controller (PLC) would automatically operate the pumps to provide appropriate attraction flow to louver bays for the plant's current operating condition. This would eliminate the possibility of having inadequate flow to provide the appropriate ramping of velocity in the louver bays

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(maximum change in velocity/length of 0.2 fps per linear feet) and would also minimize the potential for excessive velocities (greater than 10 fps) in the 42" diameter pipes between louver bays and secondary separator.

The PLC/VFD combination or the discharge weir controls are also proposed to maintain screen approach velocities in secondary separator from exceeding 0.4 fps at the lower reservoir elevations. To provide adequate pump control, the new PLC will need to receive real-time reservoir level and total turbine flow data from the Mayfield Plant Control System (PCS) and be programmed for the appropriate response throughout the wide variety of operating conditions. The original design intent for velocities in louver bays is proposed to be the primary consideration for setting the amount of attraction flow at any given time. Initially the proposal is to install 2 VFDs on attraction water pumps where they may be manually controlled at a minimum followed by the automation of all four attraction water pumps via PLC.

Balancing of attraction flow between two louver bays:

The 42" diameter pipes that connect the secondary separator to the two louver bays are different lengths. The longer pipe goes to the North louver bay which gets the highest debris loading. For these reasons, it is likely that the South louver bay often gets a larger proportion of the attraction flow than the North louver bay. The proposal is to thoroughly clean louver bays including outlet guide vanes in the summer of 2006 and then collect hydraulic measurements in the 42" diameter pipes. If measurements confirm a hydraulic imbalance, a preliminary design to correct the flow will be brought to the FTC.

The most likely design for flow correction would be a smooth radius flow restriction added to one of the pipes. This device would decrease area and thus increase velocity and head loss at the discharge of the pipe to the secondary separator.

*SCHEDULE:* The VFD and PCS control of the pumps is planned for design in 2006, but may require several years to fully integrate with the planned Mayfield powerhouse control improvements. A manual control system should be under contract for construction in 2007.

## **C. NOISE INVESTIGATIONS**

### **Investigation of potential measures to reduce any noise that may cause avoidance behavior and, thus, decrease overall fish collection efficiency.**

Tacoma proposes that the baseline frequencies and decibel levels be measured at a depth of approx. 6 feet and documented for 2 and 4 pump operation at louver bay exit slots and near outlet of secondary separator to document existing sound environment. The proposal is to collect measurements and report on them to Fisheries Technical Committee.

Literature will be reviewed to determine if measurements indicate problem noise levels. If determined to be needed, potential measures that could reduce noise levels at migration facility may include the installation of variable frequency drive(s) on pumps, gearbox improvements, and/or new pump assemblies. If the VFDs are installed, additional noise measurements may be appropriate to determine if there are any new operation points that should be favored or avoided from a sound perspective.

*SCHEDULE:* A consultant will be hired to perform the measurements in the fall/winter of 2006, with a report to the Cowlitz FTC in 2007.

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## **D. SECONDARY SEPARATOR IMPROVEMENTS**

### **1. Screen changed to 3/32" stainless steel perforated plate**

Tacoma proposes to replace the 1/4" mesh – 14 gage "CALWICO" California wire cloth on 4 screen panels with a screen material that meets NOAA criteria for salmonid fry. One possibility could be 3/32" diameter. (maximum mesh opening) stainless steel perforated plate with minimum porosity of 27% open area.

Ferguson Perforating and Wire Co. have been recommended by WDFW screen shop due to their ability to construct the thickest gage screen of this type. As standard practice for WDFW screen shop in Yakima, the new screen panels are proposed to be mounted on a new, galvanized steel frame. Alternately, the new screen could be mounted on the existing steel frame after it was repainted or galvanized. The new screen panels will be installed without operational impact (no shutdown required) by either staging reconstruction using the spare frame or building all new panels for easy change out.

### **2. Addition of flow baffles to provide more uniform velocity distribution**

Tacoma proposes to install a flow baffle panel (louver system) behind each of the two downstream screen sections in the secondary separator as shown in the attached drawing. The two louver systems will provide the means to achieve a more uniform velocity distribution through secondary separator screens and, thus, avoid any potential hot spots. The louver system panels are proposed to be located in the extra, downstream guide slots with at least 10" of space between face of screen panels and the baffles in closed position. The porosity control will be provided by vertically arranged baffles so that fluctuations in water surface can be easily accommodated. The adjustment of each baffle will be independent of the other baffles in 20 degree increments. The eighteen 6" wide x 16' long baffles of each louver system will be constructed from 1/8" stainless steel plate with lateral support provided at approximately 6 foot spacing across 18 foot height of their galvanized steel support frame. Alternately, the louver systems may be constructed entirely out of aluminum.

### **3. Screen cleaning system**

Four vertical brush cleaners (vertical travel / horizontal brush arm) are proposed for the four screen panels of the secondary separator which have a maximum submergence of 16 feet. Based either on a timed cycle or a pressure differential at the screens, an approximately 10-foot long brush would travel along all submerged screen surfaces.

One potential issue with this proposal may be that there is an inadequate debris escape route due to having weir flow rather than full slot flow through to bypass pipe. However, historic debris loading on these screens has been minimal and algae growth has been the primary cause of screen plugging. The vertical brush cleaner should remove growth while it is small enough to flush through the screen.

The head differential across the entire screen and baffling structure on both sides of the secondary separator will be monitored. "Normal head loss for a clean screen designed for 0.4 fps approach velocity and 40% open area should be less than 0.1 foot through the mesh and less than 0.5 foot for the entire screen structure for a worst case scenario with extensive baffling requirements" (NMFS – Nordlund, 1996). Initially, the screen cleaning system described by #3 above will automatically be operated whenever the overall differential on either side of the



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separator exceeds approximately 2 inches. In addition, the screen cleaning system will be operated on a timed cycle to perform a cleaning operation at least once per day. In the event that the head differential exceeds approximately 0.3 feet across either side of separator, a warning signal would be sent to Plant Control System (PCS). If the head differential exceeds a design set point across either side of separator, an alarm will occur at PCS and it would automatically correct situation by reducing flow via shutdown of attraction water pump(s) or reducing their speed with variable frequency drives.

#### **4. Improve weir outlet into bypass pipe**

Tacoma proposes to either install a transition structure in downwell to bypass pipe to minimize the potential impact of fish against concrete wall after they exit secondary separator's weir or install a liner to protect fish from impacting the concrete wall. To develop concept(s) for this transition, the water surface profile from weir to its impact against downwell wall has been collected during normal operation. The appropriate shape of curved transition will be based both on this profile and the usual 5 foot operating range of reservoir (420 to 425 M.S.L.). Tacoma is considering either a transition that would move up and down with weir operation or a neoprene pad to reduce fish injury upon impact. The one drawback to the moving transition is that while it eliminates the wall impact, it would smoothly redirect the water into a more laminar plunge creating higher impact velocities and turbulence in the down well at the water surface.

WDFW has been collecting information on injury to fish at the counting house and Tacoma may move ahead with the relatively simple pad idea and then bring injury information to the FTC for review and discussion.

*SCHEDULE:* Design will begin in the fall/winter of 2006, with fabrication in the winter and installation following in the spring of 2007 prior to the outmigration season.

### **E. COUNTING HOUSE IMPROVEMENTS**

The aim of the improvements to the counting facility is to minimize the amount of handling and human contact with the downstream migrants. Presently, the migrants are handled at multiple locations; once at the transfer from the holding ponds to the counting house and once in the counting house where they are anesthetized, counted and tagged. The proposed changes would reduce the amount of handling to one location, the point at which the migrants are counted and tagged. The facility upgrades and changes include a new trough and transport pipe from the holding ponds to the counting house, and redesigned processing area inside the counting house. The new processing method would resemble current methods used at the Cowlitz Falls Fish Facility.

The proposed physical improvements and the methods of counting and evaluating downstream migrants include the following (see Fish Handling Diagram):

- A. The existing holding ponds will be used to collect and hold downstream migrants.
- B. The migrants will be crowded by lowering the pond water level and transferred to the volumetric tank.
- C. The tank will be raised and the fish poured into a transfer pipe and transported into another holding tank located in the counting house.
- D. The migrants will be held here until they are ready to be counted and tagged.
- E. Once counting and tagging operations are started the migrants are batched into another tank where they anesthetized, counted and tagged.

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- F. Placed into another tank where they are allowed to recover
  - G. Once migrants have recovered from the effects of the anesthesia they are transferred back to the volumetric tank, in the lowered position, where they will be held until they are ready to be transferred to the 30-inch fish flume.

*SCHEDULE:* Design will occur in the winter of 2006/2007 with construction and changes to the fish transfer pipe and modifications to the counting house completed in the winter of 2007 when downstream migrant activity is minimized.

## **F. DISCHARGE CHUTE UPGRADE**

Tacoma is considering several improvements to the final leg of the downstream transport pipeline that descends to the powerhouse and drops the fish into the tailrace. First, Tacoma is reviewing the pipe condition to see if corrosion is creating a rough finish that may injure fish. Second, we are looking at alterations to the alignment so that the current dropping distance of approximately 20-feet can be reduced.

### **Retrofit of the fish chute**

If it can be shown that the pipe is structurally sound but unacceptably rough inside, then it may be preferred to line the pipe with polyester felt cure-in-place pipe (CIPP) lining. A lining could be placed inside the pipe, have a smoother surface and placed for about half the price of replacement. Liner Products Incorporated ([www.linerproducts.com](http://www.linerproducts.com)) manufactures a quality CIPP lining for pipe from 8-inch to 96-inch diameter. All CIPP lining tubes comply with applicable ASTM standards, including ASTM D-5813, ASTM F-1216, and ASTM F-1743. These linings are generally used for repairs of potable water systems and should be fish friendly. For this option the chute would need to be inspected and shown that there is adequate pipe to warrant a lining.

### **Replace Fish Chute with New pipe**

A second option if the inside is deteriorated would be to remove the existing pipeline and replace it with new 24-inch diameter HDPE pipe.

### **Lower the Discharge**

Tacoma is looking at multiple options to reduce the drop at the exit. In the current alignment it appears possible to drop the pipeline about 5-feet by removing some unused equipment. It would be difficult and require structural concrete modifications to drop the pipeline any lower in this alignment. If the fish chute is turned on a deflection angle of approximately 60-degrees it could be extended into an old adult fish channel that parallels the powerhouse. The extended pipe would maintain a gentler slope taking energy out of the water after coming down the hill at a 24° slope and getting the migrants very close to the tailrace level for a less severe exit from the pipe. Concerns were expressed at the May 10, 2006 FTC meeting about the fish exiting the fish channel into the tailrace. Tacoma agreed to perform test releases to see if delays would be created. Tacoma will bring its final recommendations to the FTC for comment.

*SCHEDULE:* Tacoma will bring its recommendations to the Cowlitz FTC in the fall of 2006. Providing an agreement to improvements is finalized, Tacoma will design the improvements for installation in the winter of 2007 when downstream migrant activity is minimized..

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## OPERATIONS AND MAINTENANCE MANUAL

### OPERATIONS

#### Migrant Trap

The downstream fish guidance and collection system is an integrated function of the water intake system for power generation at Mayfield Dam. The system operates 24 hours per day, seven days per week. Mayfield Lake is a re-regulating reservoir with a ten (10) foot change in elevation. The normal range for reservoir operation is from EL 421' to EL 425' above sea level. Full pool is EL 425'.

Two of the four attraction water pumps supplying the secondary separator and drawing water through the vertical slots at the apex of the louver bays are operational during the outmigration season. During the spring, summer and fall out migration seasons these pumps are used to increase the attraction flow into the louver apex and to the secondary separator. This is known as the active mode. At times when the pumps are turned off and the system operates by the design head it is known as the passive mode. Water not out-flowed into the transport pipe through the dam is returned to the power tunnel.

The migrant fish holding raceways can be bypassed such that the fish and transport water continues directly to the Mayfield powerhouse tailrace. The Mayfield collection system is not currently operated in the bypass mode so that all downstream migrants collected at Mayfield Dam can be given a unique mark.

To collect the downstream migrants operators reduce the flow to the holding raceways and direct the fish to a sump area at the end of the raceways for sorting and capture. Fish are manually netted and placed into a 4" transport pipe that delivers them into a fiberglass trough in the counting house. The fish are dip netted into an anesthetic container, counted and tagged with wire tags. After handling the fish are placed into a trough with running water and transported into a lift tank to be released into the transport pipe.

The minimum operation schedule for the Mayfield downstream migrant facility has been weekly year-round. During the spring, summer and fall the operation frequency has been increased to 4 – 5 days per week. During the winter the juvenile fish accumulating in the raceways were checked weekly, enumerated, tagged and released.

The Commission issued an Order Approving Anadromous Fish Passage Plan on May 10, 2006 which included an expanded schedule for operating the Mayfield counting house. Based on NMFS comments, and further discussions, Tacoma proposes the following changes to further increase the number of operating days.

The Mayfield counting house operation will consist of a three (3) days per week minimum operation from April to December (*Monday, Wednesday and Friday*). Facility operation (e.g., processing and releasing all the fish) should occur first thing Monday morning and last thing Friday or Saturday, depending on which ever is the last day of the week's operation, to minimize the fish holding time.

During the months January to March, the louver system will operate in a bypass mode such that no fish enter the counting house raceways and all fish guided are bypassed directly into the downstream transport pipeline. An occasional 24-hour test will be conducted during the bypass mode period to ensure that low numbers of downstream migrants are continuing.

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During April to December, when the daily average counts (*the holding raceways emptied, the fish tallied and the fish released alive downstream*), as determined by the previous five day running average, are greater than 250 fish per day, the operating schedule shall be increased to five days per week (*Monday, Tuesday, Wednesday, Thursday & Friday*). When the daily average counts are greater than 750 fish per day, the operating schedule shall be increased to six days per week (*Monday, Tuesday, Wednesday, Thursday, Friday & Saturday*). Decreases in schedule are the reverse of increases.

Evaluation of facility operations should occur on an annual basis and operations modified per adaptive management if warranted.

The louver bypass system is operated year-round at Mayfield Dam. The secondary separator pumps are turned off during the winter to save electrical costs, however, the bypass system continues to operate in a passive mode. Beginning in April the secondary separator pumps are turned on.

### **Juvenile Fish Holding, Examination and Tagging**

The holding capacity of the Mayfield downstream migrant facility was based upon the production potential of the entire upper Cowlitz River basin above the Mayfield Dam site, as there were no dams upstream until the construction of Mossyrock Dam in 1968.

Table 1. Downstream migrant fish holding capacity of Mayfield counting house raceways.

	Number of smolts	Density
Spring Chinook	11,000	0.11 lb./cf
Fall Chinook	20,000	0.20 lb./cf
Coho	30,000	0.30 lb./cf
Steelhead/Trout	25,000	0.25 lb./cf

These capacities are based upon rearing densities used at the Cowlitz Salmon Hatchery and are contemporary limitations. These density limitations are calculated for salmonid smolts that average 180 mm fork length and equate to 8 fish per pound (fpp).

All juvenile salmonids handled at the Mayfield counting house are examined for visual marks and clips. Adult salmonids and non-salmonid fish are not examined for marks or clips. Individual species tagging protocol is listed below. All salmonids (except rainbow trout) are released downstream with or without tagging as indicated below. Warm water and cool water species are returned to Mayfield Lake after recording any identification marks.

Tagging or marking procedure: Fish with a fork length less than 50 mm are not tagged. All tags are placed in snout. No fins are clipped on wire tagged fish. All tagged fish are released into downstream flume and discharged into Cowlitz River at the Mayfield powerhouse.

**Cutthroat**- All unmarked (no fin clips or visual implant elastomer marks) cutthroat are blank wire tagged in the snout.

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**Chinook** - All Chinook juveniles collected at the Mayfield downstream migrant collection facility are wire tagged in the snout. The trap operator makes the judgment call whether the individual fish are fall Chinook or spring Chinook juveniles

**Coho** - All coho juveniles are blank wire tagged in the snout.

**Steelhead** - All unmarked steelhead juveniles are blank wire tagged in the snout. Adipose clipped steelhead juveniles are released back into the Cowlitz River. Unclipped, anal fin elastomer-marked steelhead juveniles will be blank wire tagged.

**Rainbow trout** – Rainbow trout are not examined for marks or differentiated by hatchery or wild origin. All rainbows are recycled back upstream into Mayfield Lake. No rainbow trout collected at the counting house are released into the Cowlitz River downstream of Mayfield Dam.

**Tiger muskies** – Tiger muskies are examined for a VIA (visible implant alpha numeric) tag and recycled back upstream into Mayfield Lake. No tiger muskies that are collected at the counting house are released into the Cowlitz River downstream of Mayfield Dam.

## MAINTENANCE

### Attraction and guidance

*Cleaning:* The louver bay trash racks are cleaned as often as inspection reveals the need. This can be biweekly during heavy inflow periods. Currently cleaning is done using a mobile crane with crew support from a boat if needed.

Individual louver bay cleaning frequency will be every year as possible. High flows can preclude louver bay de-watering and cleaning. Cleaning one louver intake bay at a time does not shut down the downstream migrant collection system at Mayfield Dam.

Each intake is capable of being isolated, completely drained and entered by crew members and equipment. Cleaning activities in one louver bay can commence without interrupting the flows down the power tunnel, however, this activity can only occur when Mayfield discharge flows are less than 5,000 cfs (and usually only done when flows are below 4,000 cfs). Typically this occurs in the summer. A diver is used to clean the upstream stop log sill of the louver bay prior to placing the stop logs in order to drain the louver bay. A large volume pump is used for dewatering and to allow personnel and equipment to be placed directly in the empty louver bay for cleaning.

The bypass pipelines will be cleaned by specialized equipment once the louver bay is de-watered. In addition back-flushing each individual louver outlet pipe will occur during the cleaning event. A remote operated vehicle (ROV) has been used for individual pipeline inspection during the louver bay draw down.

FERC requires that the power tunnel to be fully drained and inspected for safety and integrity every 10 years. The entire louver system, transport pipes, secondary separator and counting house facilities are cleaned at the time of the power tunnel inspections. Power tunnel inspections interrupt the operation of the downstream migrant collection system at Mayfield Dam.

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The four (4) secondary separator pumps gear box oil is changed yearly. The pumps themselves have a water lubrication system for the bearings to reduce the potential for oil spill.

**Capture and enumeration**

Counting house and raceway maintenance occurs on an as-needed basis. The operators report problems at the facility and repairs are made by Cowlitz Project personnel. Operators clean the raceways, the screens and the racks every time that they operate the facility.

The hoist mechanism for the transport tank for discharging the fish into the transport pipe has a yearly maintenance protocol.

**Transportation and release**

The fish transport pipe and the discharge flume is visually inspected weekly and repaired as needed.

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## **G. EMERGENCY PROCEDURES**

### **Attraction and guidance**

The emergency procedures program is limited for attraction and guidance system at the Mayfield downstream migrant facility due to its gravity operation. When the secondary separator pumps are off (passive mode) the system still operates as designed due to the head of the system that continues to drive water through the louver bypass transport pipes, through the secondary separator and down the transport pipe through the dam.

When operated in the active mode (secondary separator pumps on) a minimum of two of the pumps run at all times. The Mayfield downstream migrant collector system has been operated in the passive mode during the winter and non-peak collection months at times in the past.

The leaf gate that regulates the flow to the transport pipeline is controlled by a PLC that automatically adjusts the gate to changes in lake level. Should this adjustment fail and move out of pre-set limits, an audible alarm and warning light are activated.

### **Capture and enumeration**

Fisheries biologists and fish technicians operate the Mayfield downstream migrant facilities up to several times per week. A visual inspection is conducted each time the facility is operated.

The raceway holding capability is 86,000 smolts, and is not exceeded on a daily or weekly basis due to the frequency of operations. The water supply for the raceways, counting house and the fish transport pipe are via gravity feed. The water originates from the outflow of the secondary separator and outflows into the transport pipe through the dam and to the raceways.

If water flow were interrupted to the raceways, the gate to the concrete trough that spills through the bar racks and into raceways would be closed. All transport water and fish would continue uninterrupted down the transport pipeline.

Interruption of the electrical service to the secondary separator pumps would have no effect on water supply as the system is designed for gravity flow operation and would continue to provide water flow downstream to the transport pipeline.

Gate failure at the secondary separator outflow could lead to too much water flow through the pipe to the holding ponds. The water flow can also be controlled via a valve located on the downstream side of the dam at the mouth of the transport pipeline. The gate has failed once since it was put into service in 1965. Stainless steel cable was used to replace the secondary separator weir gate chains that failed in that incident.

### **Transportation and release**

The failure of the transport pipeline or discharge flume would result in increasing the frequency of the counting house operation to a daily occurrence. All fish, including the anadromous downstream migrants would be flumed to an existing holding tank after enumeration and tagging, and lifted to the deck of Mayfield Dam. There the fish would be loaded into Tacoma fish hauling trucks and driven to their respective destinations.

### **Emergency Procedures Notification**

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Tacoma will include the reporting of emergency events occurring to the Cowlitz Project fish transportation program in the annual Upstream Passage Study Report (License Article 3).

### **Schedules for Inspections of Facilities**

A daily inspection of the louver apex areas, the secondary separator outlet and the counting house raceways will occur by a personnel visit.

A drive-by inspection will be performed every day at the remaining areas of the Mayfield Dam and downstream migrant facilities. Security guards will perform these inspections during non-work times and hours. Weekly a more comprehensive inspection is conducted and includes an inspection of the secondary separator attraction pumps, an inspection of all screens, louver faces and entrance slots.

### **Reporting Procedures of Inspection Results**

In the event monitoring or inspection activity yields a finding outside of established operational standards Tacoma's employee or Tacoma's agent shall:

- Immediately notify the on duty Cowlitz Project Manager, Generation Section, Tacoma Power, 418 Gershick Road, Salkum, WA 98585 via Tacoma radio or by phone at (360) 985-2222.
- In lieu of contacting the Project manager, immediately notify the security guard at the Mayfield powerhouse at (360) 985-2222.

Tacoma or Tacoma's agent will make an immediate effort to determine if any fish health risk or state water quality standards violation risks have or are occurring. The cause of this risk will be the priority action rather than determining if the risk is the result of Tacoma's actions or discharges into the Cowlitz River. If a direct cause and effect is found Tacoma will implement the following corrective actions:

- Either immediately cease the activity, or correct the cause of the risk to the fish or to pollution into the Cowlitz River as much as possible within operational constraints of the Cowlitz River Project.
- Assess the possible cause(s) of the risks and take appropriate measures to correct the problem and/or prevent further environmental damage.
- In the event of finding distressed or dying fish, Tacoma or Tacoma's agent shall collect fish specimens and, within the first hour of such conditions, collect water samples for analysis of dissolved oxygen and temperature.
- In the event of a fish kill, Tacoma or its agent will immediately notify the Washington Department of Ecology, Southwest Region Spill Response Office at (360) 407-6300, the SWRO Federal Permit Coordinator, and the Washington Department of Fish and Wildlife Enforcement Office, and NOAA Fisheries Law Enforcement Office at 800-853-1964. Notification shall include a description of the nature and extent of the problem, any actions taken to correct the problem, and any proposed change in operations to prevent further problems.
- Also notify Michelle Day of NOAA Fisheries at 503-736-4734. If Ms. Day cannot be reached at that number, call her cell phone at 503-351-4393. If Ms. Day cannot be reached, leave a message for her, and then call Keith Kirkendall at 503-230-5431.



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Notification shall include a description of the nature and extent of the problem, any actions taken to correct the problem and any proposed changes in operations to prevent further problems.

### **Anticipated Special Operations of Facilities for Research**

The Mayfield downstream migrant facility will be integral to future studies to establish and verify the 95% fish passage survival (FPS) criterion established for Mayfield Dam in the license. Each calendar year the Cowlitz Evaluations Work Plan submitted by the WDFW details the projects anticipated at the Mayfield facility. In addition, the Cowlitz FTC will be the review team to evaluate fish passage projects utilizing the Mayfield Dam facilities. Projects are submitted to the Cowlitz FTC on a routine basis during the course of a year.

## **H. MANUAL UPDATES**

This manual will be updated as necessary. Upon completion of the improvements planned and scheduled for the Mayfield downstream migrant facility (see License Article 415 – Anadromous Fish Passage Plan, May 2006) this manual will be updated.

## **I. EVALUATION PLAN**

By letter dated July 15, 2004, NOAA-Fisheries provided the following comments and study recommendations on Tacoma Power's Downstream Fish Passage Study Report for Mayfield Dam:

1. *Additional Fish Guidance Efficiency (FGE) testing must be conducted with modern PIT or radio-tag techniques over a range of flows from low to full powerhouse loading. The testing must include a variety of species and sizes of fish as each would likely have a different FGE.*
2. *An additional turbine survival study must be conducted using radio tags instead of balloon-tags since such studies only account for the direct mortality component of the project.*
3. *A spill survival test should be conducted since a significant number of juveniles could use this route of passage.*
4. *A bypass survival evaluation must be conducted due to concerns with the secondary dewatering system, the trap/evaluation system, bypass conduits, and the outfall.*

The studies and methodologies suggested by NOAA-Fisheries in their comments can certainly be applicable to the testing of the improvements to the Mayfield Dam downstream migrant facility as they are implemented and immediately afterward. However, Tacoma Power proposes to the Cowlitz FTC and to NOAA-Fisheries to complete the improvements proposed in this document prior to conducting relevant evaluation studies. Thus the evaluations would be scheduled after the improvements and upgrades to the facilities are completed.

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**Tacoma proposes the studies necessary to calculate the FGE and FPS at Mayfield Dam be postponed until the improvements to the louver facilities, bypass and collection facilities at the Mayfield Downstream Migrant Fish Collection Facility are completed Mayfield Dam.**

1. Fish Guidance Efficiency (FGE)

Estimates of the FGE will enable the assessment of the improved louver guidance and collection systems. These estimates will be used in annual updates of the fish passage survival (FPS) model.

The FGE at Mayfield Dam is defined as:

“Fish Guidance Efficiency” (“FGE”) means the percentage of smolts entering the Mayfield louver system that are guided through the juvenile fish guidance and bypass facilities and do not enter the turbines.

The FPS at Mayfield Dam is defined as:

“Downstream fish passage survival rate” means the percentage of smolts entering the Mayfield louver system that are guided through the juvenile fish guidance and bypass facilities and do not enter the turbines, plus those juveniles that also pass through the project turbines or over the spillway and also survive.

A possible study methodology would be to capture smolts immediately above trash racks with passive capture device (such as baited traps or cages) and use these fish for tagging.

These naive fish could be tagged with radio tags or PIT tags, held for 24 – 48 hours, and released at or just above louver trash racks. The radio or PIT tag data signals could be collected with an array of detectors in the louvers, at the power tunnel, on the trash racks and in the secondary separator.

This study could include coho, steelhead and Chinook smolts captured tagged and released during historic peak out migration times. Range of flow testing would then be naturally accomplished by conducting the work annually during the out migration periods regardless of flows.

Acoustic tag antennas in the power tunnel or forebay would collect signals from juvenile fish that would be analyzed to determine the number of fish passing to the turbines. These numbers would be added to the total count in the counting house to determine the FGE.

2. Turbine survival study.

Following the improvements to the Mayfield louver guidance and downstream migrant facility, the need for additional turbine survival studies will be evaluated with the FTC. If collection efficiencies increase sufficiently, additional studies may not be needed. If additional turbine

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survival studies are deemed necessary, they could be conducted with Chinook smolts, similar to the 2002 tests conducted on steelhead and coho smolts. In addition, the migration of the Chinook smolts could be tracked to the Barrier Dam to calculate their survival from Mayfield tailrace to the Barrier Dam tailrace for an in-river survival rate. Turbine survival studies of fall and winter migrating Chinook would be conducted at higher turbine flows than previous studies at Mayfield Dam.

3. Spill survival test.

Tacoma proposes the juvenile salmonid spill test be forgone as there is little spill at Mayfield Dam, and the spill that does occur is not during a time of the year that heavy juvenile salmonid out migration occurs on the Cowlitz River. For the 10-year period, 1996 to 2005, only 2.93% of the total flow past Mayfield Dam was via spill. The majority of those spill flows occurred from November to February, and most of that volume occurred during the "flood-of-record" in 1996.

For the considerable expense and potential harm to ESA listed fish, the value of conducting a spill study is questionable and Tacoma proposes to use surrogate values for spill survival rates in the fish passage survival (FPS) model as calculated for the Northfork dam on the Clackamas River in Oregon. Average survival value was 75%<sup>01</sup> (personal communication, Michelle Day, NMFS 2006).

4. Bypass improvement evaluations.

Tacoma recommends this evaluation be deferred until the improvements to the Mayfield downstream migrant facilities are completed. Then an overall survival study could be conducted upon the smolt species during the peak out migration periods. These evaluation studies could be conducted following the completion of the hydraulic improvements.

5. Steelhead kelts and fallbacks.

Steelhead kelts and fallbacks will be monitored for fresh injury and enumerated at the Mayfield separator before and after the planned improvements are implemented to determine if they are being negatively impacted. The results will be discussed with the FTC. The FTC will discuss the potential for further monitoring of kelts and fallbacks as they encounter the facility. If the trash racks at Mayfield Dam are modified, kelts will be considered in the design.

#### 4. CONSULTATION AND COMMENTS

Date	Agencies/ Committees	Participants	Type of Communication	Topics
April 12, 2006	Cowlitz Fisheries Technical Committee	Tacoma Power, WDFW, Yakama Nation, AR/TU, WDOE, USFWS	Preliminary draft upgrade plans distributed. Preliminary comments recorded.	<ul style="list-style-type: none"> <li>Distribution of draft for discussion only of Mayfield Downstream migrant Fish Collection Facility improvements for review.</li> </ul>
May 10, 2006	Cowlitz Fisheries Technical Committee	Tacoma Power, WDFW, AR/TU, WDOE & NMFS	Preliminary draft upgrade plans discussed. Comments received and recorded.	<ul style="list-style-type: none"> <li>Discussion of comments on the Mayfield Downstream migrant Fish Collection Facility improvements plan</li> </ul>
May 18, 2006	Cowlitz Fisheries Technical Committee	Tacoma Power, WDFW, NMFS, Yakama Nation, AR/TU, WDOE, USFWS	Final draft plan distributed.	<ul style="list-style-type: none"> <li>Distribution of final draft Mayfield Downstream Fish Passage Improvement Plan for review.</li> </ul>
June 19, 2006	Cowlitz Fisheries Technical Committee	WDFW & NMFS	Comments received.	<ul style="list-style-type: none"> <li>Receipt of comments on the final draft plan.</li> </ul>
June 30, 2006	NMFS & Tacoma Power	NMFS	Conference call	<ul style="list-style-type: none"> <li>Discussion and receipt of additional comments on final draft plan.</li> </ul>
July 17, 2006	NMFS & Tacoma Power	NMFS	Conference call and emails	<ul style="list-style-type: none"> <li>Final edits to plan and NMFS approval</li> </ul>

#### 5. REFERENCES

Nordlund, Bryan . 1996. Designing Fish Screens for Fish Protection at Water Diversions. National Marine Fisheries Service, Portland, OR. 40 pp.

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**Appendix 1**

***Mayfield Dam downstream fish passage facility, Fish Handling Diagram***

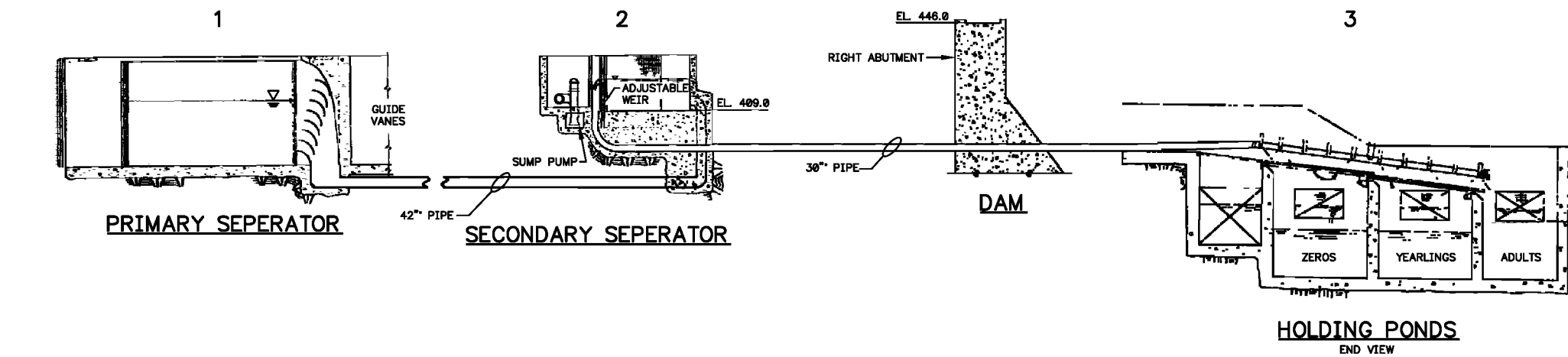


FIGURE 1  
SCALE: N.T.S.

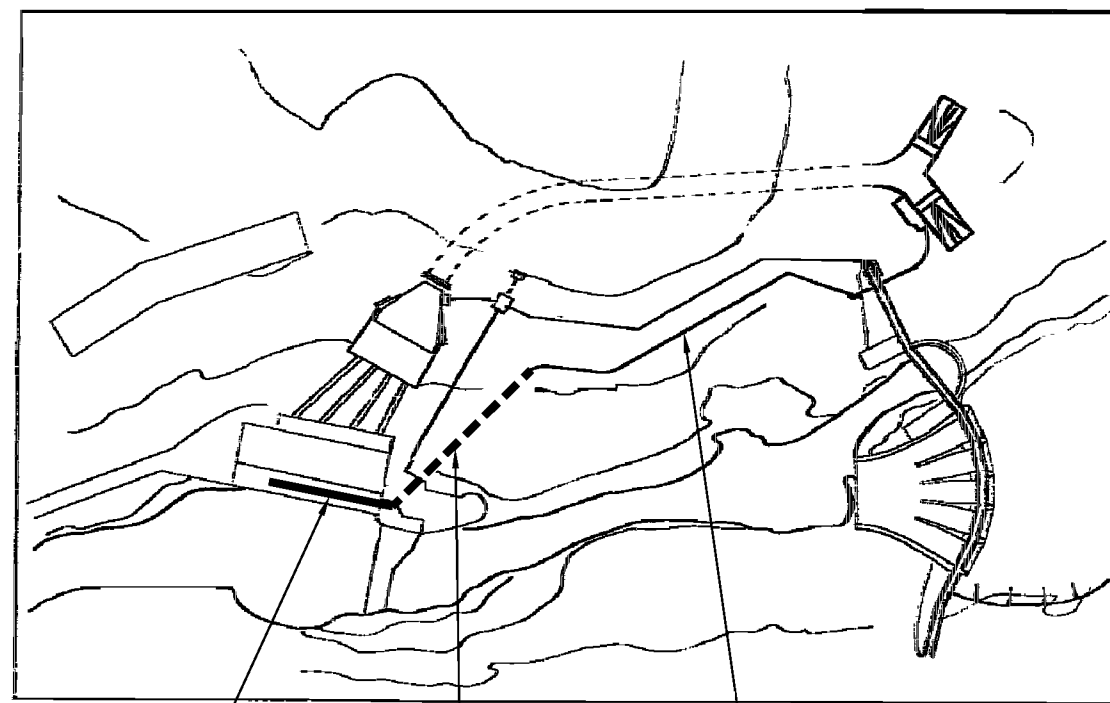
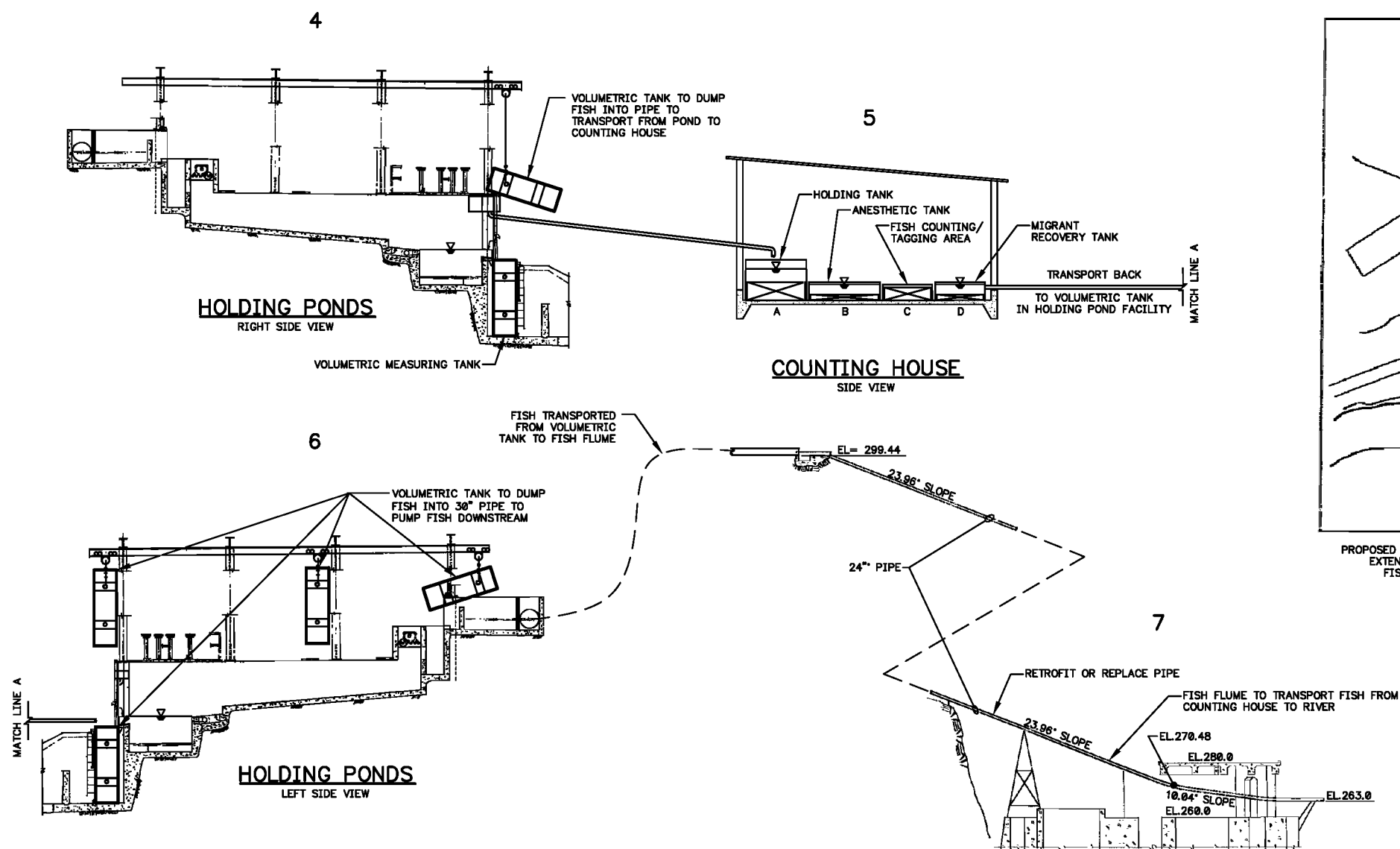


FIGURE 2  
SCALE: N.T.S.

NO.	DATE	REVISION DESCRIPTION	DRWN	CHECKED	STAMPED
0	4/7/06	ORIGINAL DRAWING	JAL		

**CITY OF TACOMA**  
**DEPARTMENT OF PUBLIC UTILITIES**  
**LIGHT DIVISION**

**MAYFIELD FISH FACILITY**  
**FISH HANDLING DIAGRAM**

DESIGNED	FIELD BOOK
SDF	
APPROVED	DATE
	4/7/06
APPROVED	SCALE
	N.T.S.
APPROVED	DRAWING NO.
	SKETCH
APPROVED	SHEET OF

SCOPE OF APPROVAL  
ORIGINAL DRAWING

**STEPHEN D. FAIRFIELD**  
CITY OF TACOMA  
PROFESSIONAL ENGINEER  
EXPIRES 6/30/11

DRWN: JAL, CHECKED: JAL, REV. NO.

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**Appendix 2**

*Response to Comments on and Approval of License Article 401 and Settlement Agreement  
Article 2 (a),  
Draft Mayfield Downstream Fish Passage Improvement Plan*

**Martin, Thomas (Nat. Res.)**

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**From:** Michelle Day [Michelle.Day@noaa.gov]  
**Sent:** Monday, July 17, 2006 5:21 PM  
**To:** Martin, Thomas (Nat. Res.)  
**Subject:** Re: RE: Downstream Fish Passage Improvement Plans for Mayfield- Revised

Tom,

I have reviewed the attached plan and approve it. I appreciate Tacoma's efforts in working with us on this plan.

-Michelle

----- Original Message -----

**From:** "Martin, Thomas \ (Nat. Res.)" <TEMartin@ci.tacoma.wa.us>  
**Date:** Monday, July 17, 2006 4:42 pm  
**Subject:** RE: Downstream Fish Passage Improvement Plans for Mayfield- Revised

> Michelle,

>

> The changes shown in redline that you made are incorporated in the  
> attached. Hopefully this does the trick.

>

> Thanks for working with me on this.

>

> Tom

>

>

> Thomas E. Martin

> License Implementation Coordinator

> Tacoma Power

> Ofc. 253.502.8298

> Fax 253.502.8396

> temartin@cityoftacoma.org

>

>

> -----Original Message-----

> **From:** Michelle Day [mailto:Michelle.Day@noaa.gov]

> **Sent:** Monday, July 17, 2006 4:30 PM

> **To:** Martin, Thomas (Nat. Res.)

> **Subject:** Re: Downstream Fish Passage Improvement Plans for  
> Mayfield-

> Revised

>

> Tom,

> There are a couple of changes in the kelt section that were not



> incorporated. I attached a word document with that paragraph in  
track  
> changes so that the changes are clearly identified. If you accept  
> these(which includes a title change for 5.), then just send the final  
> plan again so I can respond.  
>  
> Thanks,  
> -Michelle  
>

June 16, 2006

Ms. Debbie C. Young  
Natural Resources Manager  
Tacoma Power  
3628 South 35th Street  
Tacoma, Washington 98409-3192

RE: Comments on Tacoma's License Article 401 (Settlement Agreement Article 3) draft report and License Article 401 (Settlement Agreement Article 2(a)) draft plan, Cowlitz River Hydroelectric Project (FERC No. 2016)

Dear Ms. Young:

Following are our comments on the subject draft report and plan.

License Article 401 and Settlement Agreement Article 3.  
Upstream Fish Passage Study Report  
Draft 2006 Annual Report (redlined version)

1. Although improved from the previous draft, the report is still difficult to follow and understand. Overall, the document should be able to stand alone with a clear explanation of what is in the report and the reasons those items are there. We recommend that the report be reviewed and edited by a technical writer (not familiar with the project).
2. page 6, A. Definitions: The definition for Spawner is confusing. As defined in the report, there is no difference between a Spawner and a Pre-spawner.
3. page 14, Table 6. Tilton River coho salmon Recruit per Spawner (R/S) ratio calculations: The 2005 total for No. of adult coho released into Tilton River and Mayfield Lake (8,591) does not match the number given on page 18 (appendix Table 2 Coho salmon transported and released in the Tilton River basin in 2005 (9,607)). Please either fix the error or explain the difference between the two numbers in the report (explain why it is not an error, if that is so).
4. page 16, discussion on transit and survival study: The draft report could be read to imply that coho will not be used in the study since they "are not one of the "trigger" species for determining the development of self-sustaining runs of natural fish into the upper Cowlitz River basin." Fish originating from the Tilton as well as the upper Cowlitz are supposed to be used in the study. The concern is not only to ensure that Upper Cowlitz fish go to the trap at Mossyrock, but also that Tilton fish are not straying to the trap and transported above with no viable route back. It still makes sense to wait for sufficient natural adults to conduct the study, but please change the text to acknowledge that that includes both Tilton and Upper Cowlitz fish.

- 
5. page 21, Note, first paragraph: The first sentence is missing a word. It should be (the added word is underlined): "These tables will not be updated for this report." Please modify the third sentence to (the requested additional word is underlined): "The FTC recommended at their May 10, 2006 meeting that the tables be updated in a couple of years as there is currently no annual utility for the data and they are not related to any trigger for a fish mitigation action or decision."
  6. The Tacoma Power Fish Truck Worksheets:
    - What is the holding capacity of the trucks (in cubic feet of water, pounds of fish, or number of fish?)
    - Does "# of fish" mean pounds or number (seems to be used both ways in the worksheet)?
    - There should be an identification of the species of fish (e.g. coho, Chinook, steelhead, etc.) and lifestage (e.g. adult or juvenile).
    - The temperature readings seem to always be recorded in Celsius. The note about tempering at the bottom is in Fahrenheit. For simplicity, the note should be given in both Celsius and Fahrenheit for ease of use out in the field.
    - The sheets do not have the receiving water temperature filled in. This must be filled in. How is the note on temperature tempering being followed if there is no evaluation of the receiving temperature?
    - On worksheet for truck #11751, date 4/21/06, there is a line with "no release." What does this mean? Please explain.
    - On worksheet for truck #12566, date 4/14, under the Morts heading there is "15-20 loaded dead." Please explain. There should be notes on the worksheet explaining this.
    - There is a worksheet without a truck number, date 11/19 through 11/26. At the bottom of this worksheet it has: "Fish had heads out of water on arrival." Again there is no explanation. What is the explanation?

License Article 401 and Settlement Agreement Article 2(a).  
Downstream Fish Passage Improvement Plan: Mayfield  
Draft (redlined version)

1. We appreciate the overall plan and recognize that Tacoma has put a great deal of work into developing the modifications presented in the document. We look forward to working with Tacoma during the development of the design details for the proposed changes. Approval of this plan does not constitute approval of the designs; we need to have the detailed designs before we can approve them.
2. Why are schedules removed from this document? Timeframes for implementation of the various parts of this plan should be included in this plan.
3. Page 11, Operations and Maintenance Manual section, under Migrant trap: As requested at the May 10, 2006, FTC meeting, we request an explanation from Tacoma on how the operation schedule triggers were derived and why Tacoma believes the "operation schedule supports re-establishing the runs and minimizes delay" (see our comments on the Fish Passage Plan - January 9, 2006, letter). We are hoping to understand the reasoning and justification for this operation. We know that this was in the Fish Passage Plan, but that Plan is an annual plan with NMFS approval required each year. We are not in agreement with Tacoma on this issue and would like further

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discussion in hopes that we can develop a mutually agreeable plan for operating the collection facility.

We recommend that the Mayfield downstream migrant facility be operated year round. The trap should be operated (the holding raceways emptied and the fish released downstream) twice a week (Monday and Thursday) when daily average number of fish collected in the trap is less than 50 fish per day. When the daily average fish number of collected in the trap is between 50 and 250 fish per day, the trap should be operated 3 days a week (early Monday, Wednesday, and late Friday). When the daily average number of fish collected in the trap exceeds 250 fish per day, the trap should be operated every day.

This operation is similar to the operation of other juvenile trap and haul operations at other hydroelectric projects in the Northwest. For example at, the Baker River Hydroelectric, the project traps and hauls juvenile fish every 24 hours beginning around the 1<sup>st</sup> of March through the 1<sup>st</sup> of August. At Cowlitz Falls Hydroelectric, WDFW hauls juvenile fish every 48 hrs (except for the weekends) when the numbers are low (less than 200 fish per day), then when numbers reach 200 fish per day, hauls every day through the season until the numbers drop off. On the Columbia and Snake Rivers, for juvenile transportation, the maximum holding time is 48 hours early and late in the season. During the bulk of the out-migration, maximum holding time is 24 hours or less. Depending on river conditions, management objectives, and project location, transportation can start as early as the screens go in, usually around 1 April and usually extends until Oct 31.

4. page 15, Schedules for Inspections of Facilities: To avoid confusion of which areas get inspected by a personnel visit and which get inspected by a drive-by, please modify the first sentence of the second paragraph in this section. Change the sentence from “A drive-by inspection will be performed every day at the Mayfield Dam downstream migrant facility” to “A drive-by inspection will be performed every day at the remaining areas of the Mayfield Dam and downstream migrant facility.” (Note: the additional words are underlined.)
5. Please add kelt evaluation to future Mayfield evaluations regardless of whether or not there are changes to the trashrack.
6. page 18, Spill survival test: A quick literature review indicates that there is a wide range of spillway survival estimates that vary depending on the site. These estimates range from 50% (Capilano River with a Ski jump spill type) to 98% survival (Big Cliff Dam). However, the spillway configuration at Mayfield dam appears to more closely resembles the spillway at Northfork dam on the Clackamas River (survival estimated at approximately 75%) or the spillway at the Elwah dam on the Elwah river (survival estimated at approximately 63%). Northfork dam would appear more representative of the conditions at Mayfield Dam spillway than the mid-Columbia spillways. Without site specific information, it is more appropriate to use 75% as a survival estimate for juveniles passing through the spillway at Mayfield.

We appreciate the opportunity to review the draft report and plan. We envision a conference call with Tacoma to discuss these comments and their possible resolution before the finals are submitted to FERC. Please contact Michelle Day of my staff at 503-736-4734 for this call as well as any questions you may have.

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Sincerely,

Keith Kirkendall, Chief  
FERC & Water Diversions Branch  
Hydropower Division

cc: Craig Burley, WDFW  
Brad Caldwell, WDOE  
Mark LaRiviere, Tacoma Power  
George Lee, Yakama Nation  
Tammy Mackey, Washington Council, Trout Unlimited  
Brian Peck, USFWS

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June 13, 2006

Mark LaRiviere  
Tacoma Power  
Natural Resources  
P.O. Box 11007  
Tacoma, WA 98411

SUBJECT: Comments on License Article 401- Settlement Agreement Article 2 (a), Mayfield Dam Downstream Fish Passage Improvement Plan and comments on License Article 401-Settlement Agreement Article 3, Upstream Fish Passage Study Report (Draft 2006 Annual Report).

Dear Mr. LaRiviere,

Washington Department Fish and Wildlife (WDFW) thanks Tacoma Power for the opportunity to review and comment on the Mayfield Dam Downstream Fish Passage Improvement Plan and the Upstream Fish Passage Study Report.

#### **4. Mayfield Dam Downstream Fish Passage Improvement Plan**

- 1). The design shows a volumetric tank to transport fish from the holding ponds to the counting house and then using the same tank to transport fish to the fish flume. In months where there are high numbers of migrants, only having one volumetric tank is a concern. We would propose adding a second volumetric tank. This would allow for the processing of fish continuously without having to run the trap two or three times when there are large numbers of fish. An additional idea would be to increase the size of the recovery tank and hold fish there until they are ready to be transported to the fish flume.
- 2). There needs to be added a way to batch fish in the holding ponds similar to the current design, as well as within a holding pond before fish enter the volumetric tank.
- 3). We have concerns with how the adults will be handled with the new design. Adults need to be handled to identify, sex, and determine if they are of natural or hatchery origin. Currently, the adults do not go into the counting house and they don't need to be anesthetized. They could be directly transported from the holding ponds to the volumetric tank and into the fish flumes if there is the ability to handle fish before being transported downstream.
- 4). Is the grading system (to grade out juveniles from adults) that is currently in place going to be upgraded and improved? Currently, WDFW staff segregates adults from juveniles in the holding ponds during the fall and winter months. During this time get some juveniles that are in the adult holding ponds and don't grade out. If adults are going to be put straight into the volumetric tank and hoisted up and released in the fish flume, there needs to be a way to have all the juveniles out of the adult holding area.

Page 2

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Mark LaRiviere  
June 13, 2006

5). The draft plan proposes to complete construction work in the fall. We would suggest completing work when the least number of fish are migrating which occurs in February and March.

6). Inside the counting house is there a there a way to batch the fish from the holding tank to the anesthetic tank? Also, the fish-tagging tank should be split in half so fish can be sorted. Juvenile fish need to be sorted before tagging. Two workers could be on each side of the tank to tag different species.

7). In the counting house ergonomics should be considered in the design of the height of the tanks in relation to the tagger. Also, worker height related to the Mark IV tagging machine is important for the correct placement of the coded wire tag in the fish.

## **5. Upstream Fish Passage Study Report-2006 Annual Report**

1). Add lower Cowlitz River spring and fall Chinook spawning ground abundance, age and stock information to this report. Could add to Table 4. (Data source-Kelly Jenkins-WDFW Vancouver).

2). Table 5. Spring Chinook-Cowlitz Salmon Hatchery-add "Ad+CWT".

3). Tables 6, 7 and 8 put into appendix. Don't need to update every year-maybe every 3 years.

4). Table 9-Add R/S values.

5). Table 10-Needs to be reviewed to verify the last year that unmarked spring Chinook juveniles were released in upper basin the 2006 spring Chinook juveniles were marked. This will effect timetable calculations.

6). Add references as to data source for appendix Tables 1-4. Add a "total" (right side) column to Table 3.

Again, thanks for the opportunity to review and comment on the draft plans. We hope you find our comments helpful. Should you have any questions or comments please contact Wolf Dammers, District Fish Biologist, at (360) 906-6709.

Sincerely,

Craig Burley  
Region 5 Fish Program Manager

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TACOMA'S RESPONSES TO COMMENTS RECEIVED ON

*License Article 401 and Settlement Agreement Article 3, DRAFT 2006 Upstream Fish Passage Study Report Annual Report, Cowlitz River Hydroelectric Project (FERC No. 2016)*

**Comments from NMFS, June 16, 2006:**

Comment 1:

*We appreciate the overall plan and recognize that Tacoma has put a great deal of work into developing the modifications presented in the document. We look forward to working with Tacoma during the development of the design details for the proposed changes. Approval of this plan does not constitute approval of the designs; we need to have the detailed designs before we can approve them.*

Response to Comment 1

Comment noted. Tacoma Power will continue to work closely with NMFS during the development, analysis and implementation of the designs for downstream fish passage improvements at Mayfield Dam through meetings, conference calls and site visits.

Comment 2:

*Why are schedules removed from this document? Timeframes for implementation of the various parts of this plan should be included in this plan.*

Response to Comment 2:

Due to the ongoing consultation on solutions and designs with the agencies, and the necessary approvals by the agencies for the project components, Tacoma removed the timelines for project implementation from the draft report. Tacoma is committed to completing the Mayfield downstream fish passage improvements in a timely manner, and has added project timelines for the project components to the final report. These timelines are as best as can be estimated at this time.

It is anticipated that the Order approving the Mayfield Downstream Fish Passage Improvements Plan will include an annual reporting requirement, similar to the Annual Upstream Fish Passage Plan (License Article 3). That annual report, as well as the ongoing Cowlitz Fisheries Technical Committee (FTC) review, can be a vehicle for communicating the status of the improvements.

Comment 3:

*Page 11, Operations and Maintenance Manual section, under Migrant trap: As requested at the May 10, 2006, FTC meeting, we request an explanation from Tacoma on how the operation schedule triggers were derived and why Tacoma believes the "operation schedule supports re-establishing the runs and minimizes delay" (see our comments on the Fish Passage Plan - January 9, 2006, letter). We are hoping to understand the reasoning and justification for this operation. We know that this was in the Fish Passage Plan, but that Plan is an annual plan with NMFS approval required each year. We are not in agreement with Tacoma on this issue and*



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would like further discussion in hopes that we can develop a mutually agreeable plan for operating the collection facility.

*We recommend that the Mayfield downstream migrant facility be operated year round. The trap should be operated (the holding raceways emptied and the fish released downstream) twice a week (Monday and Thursday) when daily average number of fish collected in the trap is less than 50 fish per day. When the daily average fish number of collected in the trap is between 50 and 250 fish per day, the trap should be operated 3 days a week (early Monday, Wednesday, and late Friday). When the daily average number of fish collected in the trap exceeds 250 fish per day, the trap should be operated every day.*

*This operation is similar to the operation of other juvenile trap and haul operations at other hydroelectric projects in the Northwest. For example at, the Baker River Hydroelectric, the project traps and hauls juvenile fish every 24 hours beginning around the 1<sup>st</sup> of March through the 1<sup>st</sup> of August. At Cowlitz Falls Hydroelectric, WDFW hauls juvenile fish every 48 hrs (except for the weekends) when the numbers are low (less than 200 fish per day), then when numbers reach 200 fish per day, hauls every day through the season until the numbers drop off. On the Columbia and Snake Rivers, for juvenile transportation, the maximum holding time is 48 hours early and late in the season. During the bulk of the out-migration, maximum holding time is 24 hours or less. Depending on river conditions, management objectives, and project location, transportation can start as early as the screens go in, usually around 1 April and usually extends until Oct 31).*

Response to Comment 3:

At the June 14, 2006 Cowlitz FTC meeting an extensive discussion of the proposed Mayfield downstream migrant trap schedules was held. Tacoma utilized a computer model to forecast the number of days the facility would be operational based on past years' smolt numbers. Following that meeting, and additional discussions with NMFS, Tacoma revised the final plan as follows:

The minimum operation schedule for the Mayfield downstream migrant facility has been weekly year-round. During the spring, summer and fall the operation frequency has been increased to 4 – 5 days per week. During the winter the juvenile fish accumulating in the raceways were checked weekly, enumerated, tagged and released.

The Commission issued an Order Approving Anadromous Fish Passage Plan on May 10, 2006 which included an expanded schedule for operating the Mayfield counting house. Based on NMFS comments, and further discussions, Tacoma proposes the following changes to further increase the number of operating days.

The Mayfield counting house operation will consist of a three (3) days per week minimum operation from April to December (*Monday, Wednesday and Friday*). Facility operation (e.g., processing and releasing all the fish) should occur first thing Monday morning and last thing Friday or Saturday, depending on which ever is the last day of the week's operation, to minimize the fish holding time.

During the months January to March, the louver system will operate in a bypass mode such that no fish enter the counting house raceways and all fish guided are bypassed directly into the downstream transport pipeline. An occasional 24-hour test will be conducted during the bypass mode period to ensure that low numbers of downstream migrants are continuing.

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During April to December, when the daily average counts (*the holding raceways emptied, the fish tallied and the fish released alive downstream*), as determined by the previous five day running average, are greater than 250 fish per day, the operating schedule shall be increased to five days per week (*Monday, Tuesday, Wednesday, Thursday & Friday*). When the daily average counts are greater than 750 fish per day, the operating schedule shall be increased to six days per week (*Monday, Tuesday, Wednesday, Thursday, Friday & Saturday*). Decreases in schedule are the reverse of increases.

Evaluation of facility operations should occur on an annual basis and operations modified per adaptive management if warranted.

Comment 4:

*page 15, Schedules for Inspections of Facilities: To avoid confusion of which areas get inspected by a personnel visit and which get inspected by a drive-by, please modify the first sentence of the second paragraph in this section. Change the sentence from “A drive-by inspection will be performed every day at the Mayfield Dam downstream migrant facility” to “A drive-by inspection will be performed every day at the remaining areas of the Mayfield Dam and downstream migrant facility.” (Note: the additional words are underlined.).*

Response to Comment 4:

Changes made to text as noted.

Comment 5:

*Please add kelt evaluation to future Mayfield evaluations regardless of whether or not there are changes to the trashrack.*

Response to Comment 5:

Changes made to text as noted.

Comment 6:

*page 18, Spill survival test: A quick literature review indicates that there is a wide range of spillway survival estimates that vary depending on the site. These estimates range from 50% (Capilano River with a Ski jump spill type) to 98% survival (Big Cliff Dam). However, the spillway configuration at Mayfield dam appears to more closely resembles the spillway at Northfork dam on the Clackamas River (survival estimated at approximately 75%) or the spillway at the Elwah dam on the Elwah river (survival estimated at approximately 63%). Northfork dam would appear more representative of the conditions at Mayfield Dam spillway than the mid-Columbia spillways. Without site specific information, it is more appropriate to use 75% as a survival estimate for juveniles passing through the spillway at Mayfield.*

Response to Comment 6:

Comment noted. The 75% survival estimate for juveniles passing via the spillway route at Mayfield Dam will be used in the Mayfield Dam fish passage survival model.

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## Comments from WDFW, June 13, 2006:

### Comment 1:

*The design shows a volumetric tank to transport fish from the holding ponds to the counting house and then using the same tank to transport fish to the fish flume. In months where there are high numbers of migrants, only having one volumetric tank is a concern. We would propose adding a second volumetric tank. This would allow for the processing of fish continuously without having to run the trap two or three times when there are large numbers of fish. An additional idea would be to increase the size of the recovery tank and hold fish there until they are ready to be transported to the fish flume.*

### Response to Comment 1

A second volumetric tank would not be possible without extensive (possibly unnecessary) expansion of the holding raceways and counting house. The final design of the interior of the counting house has not been established, however, the idea of increasing the size (or number) of the recovery tank and/or additional holding capacity within the counting house has merit.

Tacoma will continue to work with NMFS and WDFW in the final design of the counting house improvements.

### Comment 2:

*There needs to be added a way to batch fish in the holding ponds similar to the current design, as well as within a holding pond before fish enter the volumetric tank.*

### Response to Comment 2

Tacoma believes this “batching” process can be handled by operational changes. The ability to do the batch processing will be enhanced by the changes within the Mayfield counting house.

### Comment 3:

*We have concerns with how the adults will be handled with the new design. Adults need to be handled to identify, sex, and determine if they are of natural or hatchery origin. Currently, the adults do not go into the counting house and they don't need to be anesthetized. They could be directly transported from the holding ponds to the volumetric tank and into the fish flumes if there is the ability to handle fish before being transported downstream.*

### Response to Comment 3

Improvements to the head of the raceways will include a means for adult fish to be sorted and held separately from the juvenile fish. Adults will then be directed to a separate adult handling area for processing such that they do not enter the counting house.

Tacoma will continue to work with NMFS and WDFW in the final design of the counting house, including the operational criteria, the fish handling protocols and the physical improvements.

### Comment 4:

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*Is the grading system (to grade out juveniles from adults) that is currently in place going to be upgraded and improved? Currently, WDFW staff segregates adults from juveniles in the holding ponds during the fall and winter months. During this time get some juveniles that are in the adult holding ponds and don't grade out. If adults are going to be put straight into the volumetric tank and hoisted up and released in the fish flume, there needs to be a way to have all the juveniles out of the adult holding area.*

Response to Comment 4

Yes. Improvements to the facility will include the head of the raceways and the adult/juvenile separation area. Means to keep the juveniles and adult separate will be provided similar to the flume sorting operation in place at the Cowlitz Falls Fish Facility.

Comment 5:

*The draft plan proposes to complete construction work in the fall. We would suggest completing work when the least number of fish are migrating which occurs in February and March.*

Response to Comment 5

Comment noted. Tacoma will revise the schedule to conduct the work which effects fish during the minimum fish migration period in the winter – February to March.

Comment 6:

*Inside the counting house is there a there a way to batch the fish from the holding tank to the anesthetic tank? Also, the fish-tagging tank should be split in half so fish can be sorted. Juvenile fish need to be sorted before tagging. Two workers could be on each side of the tank to tag different species.*

Response to Comment 6

The final design of the interior of the counting house has not been established. Tacoma will continue to work with NMFS and WDFW in the final design of the counting house improvements.

Comment 7:

In the counting house ergonomics should be considered in the design of the height of the tanks in relation to the tagger. Also, worker height related to the Mark IV tagging machine is important for the correct placement of the coded wire tag in the fish.

Response to Comment 7

Comment noted. The final design of the interior of the counting house has not been established. Tacoma will continue to work with NMFS and WDFW in the final design of the counting house improvements.