TECHNICAL MEMORANDUM 003

MCMILLEN, LLC

To:	Nathan Higa, PacifiCorp	Project:	Lewis River Acclimation Ponds
From:	Derek Nelson	Cc:	Frank Shrier, PacifiCorp Mort McMillen, McMillen LLC File
Date:	October 14, 2010	Job No:	1039.06
Subject:	Acclimation Ponds – Construction, Operations, and Potential Maintenance Issues		

1.0 INTRODUCTION

McMillen, LLC (McMillen) is submitting this technical memorandum to accompany the 60% Lewis River Acclimation Ponds design submittal which outlines the construction sequence, the operations of each acclimation pond facility, and the potential maintenance issues related to each facility. Operation of each of the acclimation pond facilities will occur from late April through the end of June depending on the snow level each year. The acclimation pond facilities will be operated for a total of six weeks with an additional one week of set up at the beginning and one week of dismantling at the end. The discussion in the subsequent paragraphs for Crab Creek, Clear Creek and the Muddy River correspond with the 60% design drawings and specifications.

2.0 CRAB CREEK

The Crab Creek Site is located on USFS Road 90 near the bridge located approximately one mile downstream from the Lower Falls Recreation Site. Crab Creek enters the Lewis River approximately 100 ft upstream of the bridge. An intake structure will be placed in Crab Creek approximately 250 ft upstream from the confluence with the Lewis River in a large pool at a high enough elevation to provide gravity flow to the portable acclimation tanks. A pipe will be connected to the intake structure and field routed on the ground, under the bridge, and then to the portable acclimation tanks. The acclimation tanks will be portable aluminum frame tanks and will be located near the gabion wall along the left bank downstream of the bridge. The tanks will drain into one discharge pipe that will be routed to the Lewis River. The drains will also serve as the fish release conduit at the end of the acclimation period.

2.1 Construction

The following is the sequence of construction activities that will occur to install the Crab Creek acclimation pond facility. Construction is estimated to take 4 to 8 weeks during the months of June through August.

1. Fabricate the aluminum intake structure, screens, and gate prior to any in-stream work off-site.

2. Mobilize equipment and materials to the site.
3. Install all sediment and erosion control BMPs.
4. Hand carry all materials to the intake structure location on Crab Creek.
5. Hand excavate in Crab Creek for the intake structure and 20 to 50 feet of buried HDPE pipe in the upland.
6. Hand bed and backfill the intake structure and buried water supply pipe.
7. Hand construction of permanent surface mounted pipe and secure in place with soil anchors.
8. Hand construction of removable pipe.
9. Clear vegetation and excavate area for acclimation tank pad.
10. Construct and compact base material for gabion retaining wall with excavator and 10-wheel dump truck.
11. Construct gabion retaining walls with geotextile filter fabric with excavator.
12. Construct acclimation tank pad with excavator and compactor.
13. Hand erect portable tanks.
14. Install water supply and drain pipes to the acclimation tanks.
15. Route drain pipe on the ground to the Lewis River.
16. Conduct tests to establish 1.2 cfs flow to the tanks.
17. Balance flows to each tank and maintain flows through the system for a minimum of 48 hours.
18. Grade and vegetate disturbed areas.
19. Remove and dispose any trapped sediment at the sediment and erosion control BMPs.
20. Remove sediment and erosion control BMPs and seed areas disturbed by BMPs.

Construction shall minimize disturbance to the existing vegetation from the bridge up to the intake structure on Crab Creek. Small shrubs and trees at the acclimation pond pad area shall be salvaged as possible for re-planting along disturbed slopes. All disturbed areas will be re-vegetated with a Gifford Pinchot National Forest approved seed mix, fertilizer, and mulch.

The following equipment is anticipated to be used during construction of the Crab Creek Acclimation Pond facility:

1. CAT 330 or 350 for acclimation pond pad construction.
2. 10-wheel dump truck for hauling materials to and away from site.
3. Small sheep foot compactor to compact backfill material.
4. Small steel drum roller to compact final grade surface. (alternative plate compactor for excavator)

2.2 Operations

<u>Seasonal Start-up</u>

When the snow level recedes sufficiently to access the acclimation pond site, operations personnel will begin mobilizing the water supply pipe, drain pipe, and portable tanks onto the site. The installation and flow testing is anticipated to take approximately one week and will follow these steps:

1. Cleaning the intake structure of debris and flushing the permanent pipe.
2. Installation of the intake screens and maintenance and exercising of the gate.
3. Installing the portable water supply pipe by connecting to the permanent pipe. Route the water supply under the bridge and to the acclimation tank site utilizing the pipe saddles to support the pipe. The saddles will be staked to secure the pipe.
4. Set up and level the portable tanks on the gabion pad.
5. Connect the water meter to the water supply pipe. Connect each individual tank water supply including valves and secure to the acclimation tank frame.
6. Install the overflow standpipe with screen to the outlet of each tank.
7. Connect the drain pipe to the tank outlet.
8. Route the drain pipe down slope to the Lewis River.
9. Turn on the water supply and fill the tanks.
10. Establish a 1.2 cfs flow through the flow meter.
11. Balance the flows through each tank by measuring the level of the water above the standpipes.
12. Verify that all piping is secure and there are no leaks.
13. Maintain flows and discharge for a test period of 3 days prior to introduction of juvenile Chinook.

The startup procedures will require manual hand labor. No motorized equipment will be required to service the tanks, intake or pipelines.

Daily Operations

Once the tanks are installed and tested, the fish transport vehicles will deliver the juvenile spring Chinook to the site and release them into the tanks via a flexible release pipe from the cleared gravel area adjacent to the paved road. The following procedures will be required once fish are in the tanks on a daily basis:

1. Travel to the site in a standard pickup with maintenance equipment.
2. Feed the fish.
3. Maintain the intake by removing any debris and ice.
4. Pull screens individually and clean with brush.
5. Inspect the water supply pipelines and drain lines for leaks and proper alignment.
6. Data collection of water temperatures, turbidity, flows, and mortality counts.
7. Maintain tank screens, inlets, and outlets. Inspect tanks for leaks and wear.
8. Remove debris from the tanks.

No motorized equipment will be required to service the tanks, intake or pipelines.

End of Season Shut Down

Upon completion of the six week fish acclimation period, the fish will be released into the Lewis River. Initially, the fish will be allowed to leave volitionally through the drain pipe over a one to two week period. At the end of this period the drain standpipes in the tanks are to be removed and the remaining juveniles flushed to the Lewis River. The portable equipment will then be

removed and taken off-site for cleaning and storage. The intake structure will be cleaned and the valve locked in the closed position. The intake structure lid will be closed and locked.

2.3 Maintenance and Operation Issues

The Crab Creek site major concern is maintaining the water supply to the acclimation tanks. The acclimation period from mid April to June is during times when high runoff may deposit large amounts of debris and sediment at the intake starving the acclimation tanks of water. Maintenance for major debris deposition at the intake will occur daily and include hand removal of the debris. Also during this period, freezing may occur that could constrict or diminish the water flow to the tanks. During the acclimation period, weather extremes may occur limiting access to the Crab Creek site for maintenance.

Predation of the fish by otters and birds is a concern at this site. Exclusion netting may not exclude otters from accessing the tanks.

The acclimation tanks will be located along the side of the Forest Service road in view of the general public. Vandalism is a concern at this site.

Any major event that diminishes flow to the acclimation tanks will require the immediate release of the juvenile Chinook to the Lewis River. Some of the potential major maintenance activities that may be required at the site include:

1. Hand excavating and repairing buried pipe.
2. Hand removal of major deposition or debris jam at the intake structure.
3. Re-grading of the acclimation tank pad.
4. Replacing sections of the surface mounted pipe.

3.0 CLEAR CREEK

The Clear Creek Site is located on USFS Road 9300 near the bridge approximately 1.5 miles upstream of the confluence with Muddy River. The Clear Creek site provides an opportunity for an acclimation channel located on the right bank looking downstream from the bridge and will not adversely affect the bridge abutment. The acclimation channel will be constructed in an existing side channel and provide a constant grade to an outfall into Clear Creek. A screened surface intake structure will be placed at the head of the acclimation channel. An outlet structure will be placed near the downstream end of the channel to provide water level control and prevent juvenile escapement. At the end of the acclimation period, the control in the outlet structure will be removed and the fish released into Clear Creek.

3.1 Construction

The following is the sequence of construction activities that will occur to install the Clear Creek acclimation pond facility. Construction is estimated to take 8 to 12 weeks during the months of June through September.

1. Precast the concrete intake and outlet structures prior to any in-stream work off-site.
2. Mobilize equipment and materials to the site.
3. Install all sediment and erosion control BMPs.
4. Excavate the acclimation channel using an excavator salvaging 3” to 6” cobbles for the acclimation channel substrate. Place all remaining excavated materials into the dike area to divert water to the newly constructed acclimation channel. Remove all excess material.
5. Install acclimation channel substrate, large woody debris, and boulders.
6. Excavate for the outlet structure.
7. Install the outlet structures complete with screens and stop logs.
8. Install coffer dam for intake excavation and installation.
9. Excavate for the inlet structure and install the inlet structure.
10. Install diversion boulders.
11. Remove the cofferdam.
12. Initiate flow through the acclimation channel.
13. Conduct tests to verify proper flow delivered through the channel.
14. Grade and vegetate disturbed areas.
15. Remove and dispose any trapped sediment at sediment and erosion control BMPs.
16. Remove sediment and erosion control BMPs and seed areas disturbed by BMPs.

Construction shall minimize disturbance to the existing vegetation along the acclimation channel. Small shrubs and trees in the acclimation channel area shall be salvaged, as possible, for re-planting along disturbed slopes. All disturbed areas will be re-vegetated with a Gifford Pinchot National Forest approved seed mix, fertilizer, and mulch.

The following equipment is anticipated to be used during construction of the Clear Creek acclimation pond facility:

1. John Deere 120D excavator for acclimation channel construction.
2. Skid steer for acclimation channel construction.
3. Small backhoe CAT 416 for loading/unloading truck near roadway.
4. 10-wheel dump truck for hauling materials to and away from site.

3.2 Operations

<u>Seasonal Start-up</u>
When the snow level recedes sufficiently to access the site, operations personnel will begin mobilizing the screens and stop logs to the acclimation channel. The installation and flow testing is anticipated to take approximately one week and includes:

1. Cleaning the intake and outlet structures of debris.
2. Installing the intake screen and trash rack.
3. Installing the outlet stop logs and screen.
4. Inspection of the side channel.
5. Turn on the water supply to provide flow through the channel.

6. Once the channel is filled, pull the stop logs and screens in the outlet structure to provide a flushing flow to remove as much floating debris as possible.
7. Replace the outlet screens and stop logs.
8. Establish the flow through the acclimation channel by measuring the flow over the outlet structure stop logs.
9. Maintain the flow through the channel for a minimum of 48 hours.

No motorized equipment will be required to service the channel, intake, or outlet.

Daily Operations

Once the site is prepared, the fish transport vehicles will deliver the juvenile spring Chinook to the site and release them into the channel via a flexible release pipe from the paved road. The following procedures will be required on a daily basis:

1. Feed the fish.
2. Maintain the intake structure by removing debris and ice.
3. Maintain the outlet structure by removing debris and ice.
4. Pull the screens and clean with a brush.
5. Data collection of water temperatures, turbidity, flows, and mortality counts.
6. Inspect the channel for debris or obstructions that may preclude fish from using any part of the channel.

No motorized equipment will be required for daily operations of the channel, intake, or outlet.

End of Season Shut Down

At the end of the acclimation period, the fish will be released into Clear Creek. Initially the fish will be allowed to leave volitionally over the stop logs over a one to two week period. At the end of this period the stop logs are to be removed flushing the remaining juveniles to Clear Creek. Optional release procedure would be to connect a short section of HDPE pipe to the outlet structure stop log with the pipe thimble. The pipe then could be routed to the creek to ensure the fish do not get stranded from the outlet to Clear Creek. The screens and stop logs will then be removed and taken off-site for cleaning and storage.

No motorized equipment will be required for shut down of the channel, intake, or outlet.

3.3 Maintenance and Operation Issues

The Clear Creek site major concern is maintaining the water supply to the acclimation channel. The acclimation period from mid April to mid June is during times when high runoff may deposit large amounts of debris and sediment at the intake. Also during this period, freezing may also occur that could constrict or diminish the water flow to the channel. During the acclimation period, weather extremes may occur limiting access to the Clear Creek site for maintenance of the water supply and feeding.

Predation is a concern for the acclimation channel due to the large number of fish in a confined area. Large woody debris and boulders will be placed in the channel to provide the juvenile Chinook escapement opportunities.

Any major event that diminishes flow to the acclimation channel will require the immediate release of the juvenile Chinook to Clear Creek. Some of the potential major maintenance activities that may be required at the site include:

1. Excavating and repairing intake utilizing John Deere 120 size excavator.
2. Excavation of major deposition from flooding of Clear Creek with John Deere 120 size excavator.
3. Re-grading of the acclimation channel.

4.0 MUDDY RIVER

The Muddy River Site is located on USFS Road 25 near the bridge located approximately 5 miles upstream from the confluence with the Lewis River. The site is located next to a day use recreation area just north of the bridge providing paved access to the site. The site will consist of an infiltration gallery approximately 1,700 ft upstream from the bridge. A pipeline will extend into the left bank along the Muddy River to a water control structure located in the upland. The water control structure will provide flow control through a valve for the pipeline and discharging into a screened outlet before entering the acclimation channel. The acclimation channel will be constructed in an existing channel. The channel will be graded to provide a continuous flow to the outlet. The outlet structure will be used for level control and juvenile escapement control.

4.1 Construction

The following is the sequence of construction activities that will occur to install the Muddy River acclimation pond facility.

1. Precast the concrete water supply control structure, water supply discharge structure and the outlet structure prior to any in-stream work off-site.
2. Mobilize equipment and materials to the site
3. Install all sediment and erosion control BMPs.
4. Clear vegetation and excavate the acclimation channel and place substrate, woody debris and boulders within the channel.
5. Excavate for the outlet structure and water supply pipe discharge structure.
6. Install the outlet and pipe discharge structure.
7. Excavate and install water supply pipeline and water supply control structure.
8. Install cofferdam in Muddy River for infiltration gallery installation.
9. Excavate the infiltration gallery area and pipeline to the water supply control structure.
10. Install the infiltration gallery and pipeline to water supply control structure and backfill.
11. Remove the cofferdam.
12. Provide back flush of the infiltration gallery with the portable pump.
13. Conduct tests to verify proper flow delivered through the channel for 48 hours.

14. Grade and vegetate disturbed areas.
15. Remove and dispose any trapped sediment at sediment and erosion control BMPs.
16. Remove sediment and erosion control BMPs and seed areas disturbed by BMPs.

Construction shall minimize disturbance to the existing vegetation along the acclimation channel and pipeline alignment. Small shrubs and trees at the acclimation channel area shall be salvaged as possible for re-planting along disturbed slopes. All disturbed areas shall be re-vegetated with a Gifford Pinchot National Forest approved seed mix, fertilizer, and mulch.

The following equipment is anticipated to be used during construction of the Muddy River acclimation pond facility:

1. CAT 330 or 350 excavator for acclimation channel construction, pipeline excavation and infiltration gallery excavation.
2. Skid steer for acclimation channel construction.
3. Small backhoe CAT 416 for loading unloading truck near site access.
4. 10-wheel dump truck for hauling materials to and away from site.

4.2 Operations

Seasonal Start-up

When the snow level recedes sufficiently to access the site, operations personnel will begin mobilizing the screens and stop logs to the acclimation channel. The installation and flow testing is anticipated to take approximately one week and includes:

1. Cleaning the outlet structure and the water supply pipe outlet structure of debris.
2. Cleaning of the water control structure.
3. Maintenance and exercising the gate and butterfly valves.
4. Back flush the infiltration gallery area using a portable motorized pump. Back flush each of the 8 back flush pipes for 10 minutes.
5. Installing the outlet stop logs and screen. Installing the water supply pipe discharge structure screens and trash rack.
6. Inspection of the side channel.
7. Turn on the water supply to provide flow through the channel.
8. Once the channel is filled, pull the stop logs and screens in the outlet structure to provide a flushing flow to remove as much floating debris as possible.
9. Replace the outlet screens and stop logs.
10. Establish the flow through the acclimation channel by measuring the flow over the outlet structure stop logs.
11. Maintain the flow through the channel for a minimum of 48 hours.

A four wheeler and a trailer will be required to transport the gas powered portable pump to the water supply control structure along the pipeline alignment.

Daily Operations

Once the site is prepared, the fish transport vehicles will deliver the juvenile spring Chinook to the site and release them into the channel via a flexible release pipe from the paved parking area. The following procedures will be required on a daily basis:

1. Feed the fish.
2. Maintain the intake structure by removing debris and ice.
3. Maintain the outlet structure by removing debris and ice.
4. Maintain the pipe outlet structure including screens and trash rack by removing debris and ice.
5. Pull the screens and clean with a brush.
6. Data collection of water temperatures, turbidity, flows, and mortality counts.
7. Inspect the channel for debris or obstructions that may preclude fish from using any part of the channel.

On a weekly basis, the infiltration gallery should be back flushed to ensure proper flows are maintained through the water supply pipe. A four wheeler and a trailer will be required to transport the gas powered portable pump to the water supply control structure. The frequency of back flush activities may be reduced if the water supply flows are maintained.

<u>End of Season Shut Down</u>
Upon completion of the acclimation period, the fish will be released to the Muddy River. A 50 foot to 150 foot section of HDPE pipe will be connected to the pipe outlet stop log within the outlet structure. The pipe will be extended to discharge directly into the Muddy River. The slide gate will be pulled at the pipe outlet stop log and the fish will be released. The screens and stop logs will then be removed and taken off site for cleaning and storage. The lids for each structure will be closed and locked.

4.3 Maintenance and Operation Issues

The Muddy River has changed course in recent years that could cause issues with the acclimation site. This movement and high bed load will cause problems for an infiltration gallery and the outlet location. If the channel converts back to the channel location from 2006, then the proposed infiltration gallery site will not function. The current proposed intake location is adjacent to a highly unstable bank potentially leaving the pipeline and water control structure exposed to damage.

The outlet location for the acclimation channel is located on the left bank looking downstream and just upstream of the bridge. The possibility of a runoff event depositing gravel and sediment that will block off the outfall is high. Fish release would need to be timed to insure connectivity between the acclimation channel and the Muddy River.

An additional concern is maintaining the water supply to the acclimation channel. Potentially the infiltration gallery may become blocked during high runoff and sediment events. **Due to the high bed load movement, the likelihood of the infiltration gallery becoming plugged is high**.

Major maintenance will be required if the infiltration gallery becomes blocked and could become a yearly activity.

Also during this period, freezing may also occur that could constrict or diminish the water flow to the channel. During the acclimation period, weather extremes may occur limiting access to the Muddy River site for maintenance of the water supply and feeding.

Predation is a concern for the acclimation channel due to the large number of fish in a confined area. Large woody debris and boulders will be placed in the channel to provide the juvenile Chinook escapement opportunities. Beaver activity has occurred in the proposed acclimation channel area that could become a major maintenance activity to support proper flows through the channel if dams are constructed in the channel.

Vandalism is a concern at this site due to the proximity of the day use site. Maintenance activities to camouflage or obscure the concrete structures will aid in deterring vandalism.

Any major event that diminishes flow to the acclimation channel will require the immediate release of the juvenile Chinook to the Muddy River. Some of the potential major maintenance activities that may be required at the site include:

1. Excavating and repairing infiltration gallery, pipeline, or structures utilizing CAT 330 size excavator.
2. Re-grading of the acclimation channel using a skid steer.