MEMO

3-4232

February 21, 2005

To: Ken Hall

From: Bruce Walsh

Xausmdas Sockeye Channel
Site Inspection - February 11, 2005

Ken,

This memo is intended to provide you with a brief description of what was observed during the site inspection, and provides some preliminary ideas on possible options. A more formal letter report will be provided after further discussions with you, Dave Algers and Karl Wilson.

SITE DESCRIPTION

Machmell River

Steve Smith mentioned that the flow in the Machmell River appeared to be slightly higher than normal.

Extensive debris accumulation, sedimentation and channel shifting has occurred over much of the river downstream of the bridge crossing. A series of photos is provided that documents these changes by comparing photographs taken in November 2003 and February 2005. Since 2003, much more wood is present in the system and the logs are accumulating on the bars which is causing aggradations and subsequent channel shifting (Photo series 1 and 2). These channel changes appear to be fairly recent and are probably a result of large storms in November 2004 and January 2005.

In November 2003, a 20 m section of bar was excavated along the bank about 500 m upstream of the intake to allow flowing water to reach the intake (Photo series 3 and 4). The log jam adjacent to where the channel was excavated has doubled in size. This has caused the bar to extended upstream towards the end of the spur (Photo 5) and has blocked flow along the right bank towards the intake (Photo 6) during low flow conditions. The water level in the channel is only a few centimeters below the crest of the bar.

Downstream along the right bank, the constriction between the bank and the log jam has lowered the bed along the side channel, however this material has been moved downstream forming a bar across the side channel near the road (Photo series 4).

The remaining length of the side channel to the intake remains much the same as in November 2003 with isolated stretches of water along the bank and a scour pool at the intake (Photo 7). Some minor debris has accumulated on the trashrack at the intake (Photo 8).

Spawning Channel

One of the intake gates is open about a 22 cm opening and the other is closed. The estimated flow from the pipe is in the order of 20 L/s.

A fair amount of fine sediment has entered the channel and has filled the outlet pond and Ponds #1 and #2 (Photo 9). However, for the most part, the steeper channel section upstream of the mainline culvert is reasonably free of sediment, with deposition occurring behind logs and boulders (Photo 10). The flatter section of channel for 400 m downstream of the mainline culvert has significant sediment deposition (up to 0.5 m) caused mostly by the addition of the rock riffles between Riffles #9 and #10 (Photo 11). Further downstream, the channel is steeper and gravel substrate is exposed at many locations (Photo 12)

The flow at the end of the side channel is estimated to be in the order of 40 L/s, which suggests that 20 L/s groundwater is entering the channel below the intake.

While there were some locations along the channel were orange (iron) flocculate was observed, overall its occurrence was relatively minor.

PRELIMINARY COMMENTS

Machmell River

If increased flow to the intake is desired for the channel to better meet its biological performance during winter low flow condition, the following options are available:

1. For the short term, excavate material from along the bank, as was done in November 2003. The excavations should extend upstream to the end of the existing rock spur.

2. In the long term, the Machmell channel will continue to undergo extensive channel shifting as logs accumulate at the heads of bars and gravel is redistributed among the bars. The existing log jam at the head of the bar will likely continue to grow upstream, however, there is a benefit to this since this will constrict flow along the bank which would tend to keep the bed level lower along the bank and more likely to be open during low flow conditions. In addition, scour along the

end of the rock spur will also tend to keep the bed level low. To further encourage these conditions to develop, placement of logs spurs and rocks over a distance of 50 m or so along the bank downstream of the rock spur would help to further scour the channel along the bank. Logs and rock are readily available - the work would take 3 or 4 days to complete.

3. The debris at the trashrack should be removed, preferably by hand. It would be easiest to cut the larger debris using a chainsaw and let the debris float away during higher flows in late spring.

Spawning Channel

Sediment is affecting the performance of the channel and the channel should be operated as per the recommendations presented in the Operation and Maintenance Manual. Flows should be limited during the spring and peak runoff periods when sediment loads are high. In fact, during this period it may be possible to close the intake and relying groundwater - about 20 L/s of flow was entering the channel during the inspection at winter low flow conditions and much more would be expected during summer high flow conditions when flow would be along the bank adjacent to the channel.

Towards the end of the summer, the intake should be opened and the channel operated under high flow conditions to move sediment thorough the system and to resort gravel along the bed.

The additional riffles downstream off the mainline culvert should be removed or altered to prevent sediment deposition along this section of the channel.

Logs that have been added to the outlet of Pond #2 should be removed (about 24 or so; and could be used to construct the bank works on the Machmell River).

Additional slight modifications to log and rock placement along the channel is also desirable.

Biology

There seems to be questions regarding what target species the channel is intended for and how successful the channel has been since it was built. While the name of the channel implies that sockeye spawning is the main goal, sedimentation along the channel is limiting the available gravels. Input by the biologist is required, and engineering and operation can follow to meet these requirements.