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United States Department of the Interior

BUREAU OF RECLAMATION

Snake River Area Office
214 Broadway Avenue
Boise, Idaho 83702-7298

December 13, 1995

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Department of Water Resources

Tim Luke
Idaho Department of Water Resources
1301 North Orchard Street
Boise ID 83720-9000

Subject: Measurement of Boise Cascade Payette River diversions at Emmett, Idaho

Dear Mr. Luke:

Thank you for coordinating our December 6 meeting with Jim Spencer at the Boise Cascade mill in Emmett. The opportunity to discuss water measurement alternatives for Boise Cascade's Payette River diversion with you and Jim, is very much in line with Reclamation's aim to work with the public and private entities toward improving water management.

After the site visit and conversations with Jim, I largely concur with the recommendations in your October 31, 1995, letter to Mr. Spencer. Because of the very flat slope of the delivery system and the need for downstream regulating structures, many conventional measuring devices such as weirs or flumes would not function properly. Your proposal to route the delivery channel flow through a pipe section and use a removable open flow meter at the end of the pipe should be quite adequate, particularly if only periodic measurements are required. If used for continuous measurements, this type of measuring device could be subject to fouling from floating moss and debris.

I would like to add the following comments to your initial recommendations:

- A 24-inch pipe should work for this installation. At maximum flow conditions (18 cfs), the head loss through the pipe is expected to be between 0.8 and 0.9 feet and at typical operating conditions (9 cfs), the head loss should be about 0.3 to 0.4 feet. A range of flows from 2 to 18 cfs would produce flow velocities in the pipe of 0.64 to 5.7 ft/sec, an acceptable operating range for most propeller meters. Some loss of accuracy might be experienced at the lowest flows.

- It should be possible to reduce the length of pipe required to 10 or 20 feet if the meter's propeller diameter is at least 75% of the pipe diameter. The larger propeller compensates for any flow anomalies which might occur in a shorter pipe reach. A propeller with a diameter 50% that of the pipe can read 3% to 4% too high in a shorter pipe.

- Steps may need to be taken when installing the pipe to assure complete submergence at both the inlet and outlet under all flow conditions. This may include placing the pipe at or below the invert of the channel or making provisions for stoplog installation at the outlet.
- Since the meter will be removed between measurements, it is important that permanent mounting brackets be placed so that the meter can be installed accurately and consistently each time.
- Since there would be some head loss through the new pipe and measurement structure and the channel is relatively flat with not much head to spare, it is important to keep the channel free of weeds and debris to maintain adequate flow capacities.

In addition to the items discussed above, some work might be done at the weir at the head of the Smith Ditch, depending on the measurement needs.

- The weir appeared to be operating well under the observed flow conditions. The water level downstream of the weir was not far below the weir crest, however. As with Boise Cascade's channel upstream, the Smith Ditch should be kept clean to prevent flow restrictions which would raise the water level downstream of the weir, particularly with higher flows.
- The abutments of the weir needed to be shored up. When this is done, care should be taken to assure the weir face remains plumb and the weir crest is level.
- Because of the proximity of the weir to the pipe outlet just upstream, the weir pool has substantial eddies and turbulence. This probably has only a small impact on the accuracy of the weir, but is definitely not an ideal upstream condition. One solution to this problem would be to construct a concrete box and a baffle assembly at the pipe outlet and discharge over the weir from the box.

Depending upon what type of installations are to be constructed, Reclamation may be able to supply drawings of typical structures that would be adaptable to these applications. Please call me at (208) 334-1750 if I or other Reclamation staff can provide assistance for this or any other water measurement or water management projects. Again, thank you for the opportunity to participate in this project.

Sincerely,



Brian Sauer, P.E.
Water Conservation Specialist