

MEMORANDUM

Date: March 22, 2011
To: Shelley Keen
From: medl
Re: diversion rate alternative

Statement of Purpose

The licensing field exam for Permit 1-10542 has been completed and the water rights agent assigned to the file has completed a licensing review. The agent concurs with the field examiner's recommendation and would issue a license based on the full rate authorized by the permit.

During a supplemental field visit to the site, the field examiner from Brockway Engineering PLLC measured a rate in excess of the total authorized for use through this system. The measurements show that the quantity of water diverted may have been as much as 59.5 cfs during part of the development period of the permit. He recommended 25.8 cfs for 1-10542 and requested guidance from the Department relative to an application for a subsequent, third permit. I was asked to evaluate the capacity of the diversion culvert and write a technical memo reporting my findings. That memo has been made a part of the file for 1-10542.

Although I found that the culvert is capable of delivering at least the combined rate (26.8 cfs), authorized by water rights 1-7103 and 1-10542, I do not agree that the examiner found the beneficial use required for that recommendation. He found additional flow in the system, but additional flow does not necessarily equate to additional beneficial use.

This memo proposes an alternative diversion rate for 1-10542 and rationale for not issuing an additional permit.

Scope and Report of Findings

1-10542 is the second water right authorizing live flow through Gem Lake Harbor. The first right is 1-7103. Both rights are for non-consumptive, recreation use. The place-of-use is a flooded quarry which is now the water feature for Gem Lake Harbor subdivision. The diversion culvert is on the south bank of the Snake River at river-mile 793, between two power plants operated by the City of Idaho Falls. The return flow from Gem Lake Harbor back to the Snake River is indistinguishable from the headwater pool for the Gem State power plant, which is known locally as Gem Lake.

On May 7, 2010, I requested operation data from Idaho Falls Power personnel. The Generation and Operation Superintendent, Mark Reed, responded to my request that same day. He gave me the nominal elevations for the two power plants which bookend this reach of the Snake River. The nominal tailwater elevation for the Lower plant is 4655.9 ft and the nominal headwater for the Gem State plant is 4655.1 ft. He also stated that "we maintain head level at Gem State at 4655.1 ft (+/- 0.2 ft) year round." Based on that information the differential head across the diversion culvert for Gem Lake Harbor could be 0.8 ft ($4655.9 - 4655.1 = 0.8$) and still be within expected operations of the power plants.

Proposed Alternative

During his supplemental field exam the examiner appears to have witnessed a slug flow that exceeded normal operation of the two power plants. However, he does not explain how the additional water available from that flow provided additional recreation use. No additional recreational use has been documented by the field examination report for 1-10542.

I believe that a diversion rate above the 1.0 cfs rate licensed by 01-7103, could be justified, but it would not be based on additional recreation use. As a rule of thumb, a scouring water velocity greater than 2 fps would be required to keep the diversion culvert clear of sediment. Based on the type 4 culvert calculations, that velocity occurs when there is a differential head across the culvert of 0.11 ft and a flowrate of approximately 14.18 cfs.

According to the data I received, typical operation of the two power plants can create river elevation changes +/- 0.2 ft. The field examiner witnessed a lag in response of the upper subdivision pond elevation to changes in the river elevation. As a consequence of that lag he found a head difference as high as 0.945 ft across the diversion culvert. I believe that a lag occurs throughout the range of elevation changes presented to that diversion culvert. Theoretically a head difference of only 0.11 ft would be needed to provide the flow which should keep the culvert free-flowing. This head difference is within the usual and expected operation range for the power plants.

1-10542 would not typically be subordinated to the power use and yet the City of Idaho Falls did not protest the permit. I am uncomfortable requiring that the power plants shape their operations so as to supply a certain flow to a subdivision amenity. However, it would be reasonable to authorize a flow comparable to the head differential that the culvert has routinely seen and to subordinate that scour flow use to the hydropower use.

Conclusions/Recommendations

Although the examiner found additional flow, he did not confirm any additional recreational, beneficial use for 1-10542. I would discourage the applicant from filing for a third permit unless they can demonstrate beneficial use.

I recommend that this permit be licensed for a rate sufficient to supply a velocity which would keep the culvert sediment free and still be within the typical operation range for the two Idaho Falls Power hydropower plants. I recommend a volume based on a constant scouring flow and I recommend that this license be subordinated to hydropower.

The beneficial use sought by permit 1-10542 is recreation. Recreation is not the best characterization for the use and flow that I am recommending. Channel maintenance would be a more applicable description and is the use I recommend for a license.