



# United States Department of the Interior

U. S. GEOLOGICAL SURVEY

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May 2, 2018

## Memorandum

To: Sean Vincent  
Hydrology Section Manager, Idaho Department of Water Resources

From: David M. Evetts  
Assistant Director of Hydrologic Data, Idaho Water Science Center, USGS

Subject: Proposed discontinued ADVN operation and removal at USGS Gaging Station 13172500, Snake River nr Murphy, ID.

USGS Gaging Station 13172500, Snake River nr Murphy, ID has been in operation since 1912, providing invaluable hydrologic information about the Snake River between Swan Falls Dam and Brownlee Reservoir to multiple users. It is the reference gage used for the Swan Falls Agreement (1984) establishing minimum average daily flow requirements for key periods of the year, and is used to assist dam operators in flow regulation through the Swan Falls Dam. Due to the stream gage's importance and heavily relied on data, in 2015, the USGS, in cooperation with Idaho Department of Water Resources and Idaho Power Company, moved the gage from its historic location four miles downstream of the Swan Falls Dam to the current location 1 mile below the dam and an ADVN (Acoustic Doppler Velocity Meter), which calculates discharge based on velocity and area, was installed and operated along with the use of more conventional methods of calculating discharge (Stage/Q). The intent was that the upstream site would provide more accurate, reliable data without the need for the excessive shifting experienced at the historic gage site. After computing discharge using both methods for two years, the records would be evaluated and the more accurate method would continue to be used while the less accurate method dropped for primary discharge calculation.

Looking at the record and comparing the standard rated discharge with the computed discharge from the ADVN, the USGS feels confident that the ADVN is no longer needed and that we can rely solely on the rated discharge at this site. Backwater from macrophytes and algae growth do not seem to be an issue at the new site due to the configuration of the control. Specifically, the control at this site is narrow and deep which does not promote plant growth. The original site downstream had a wide shallow control which made it highly susceptible to plant growth.

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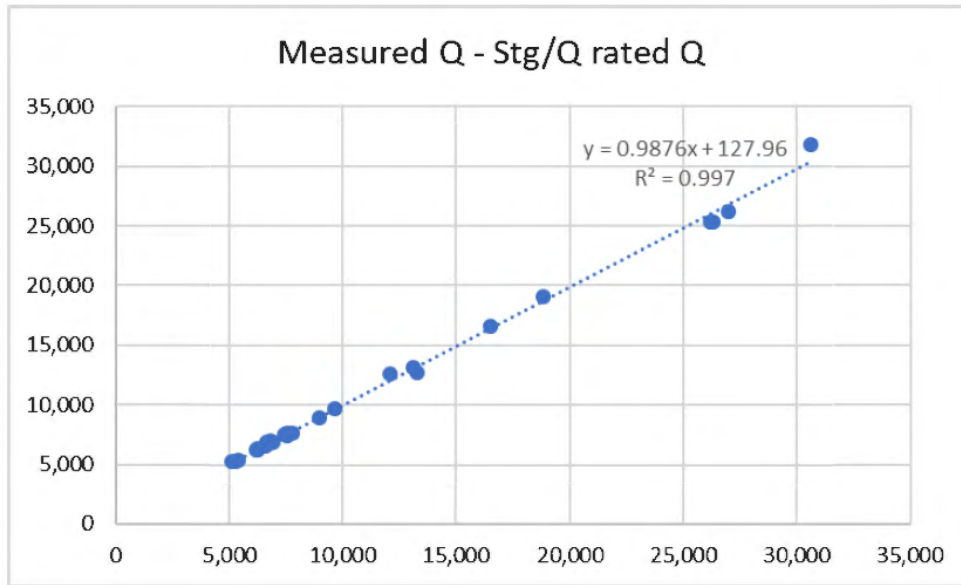


Figure 1 Flow (cfs) measured discharge vs rated discharge using a standard Stage/Q rating October 23, 2015 to April 3, 2018.

Figure 1 shows that no shifting to the rated discharge was necessary using the Stage//Q rating method. Maximum deviation of measurements from the rated discharge is 4.7% and the minimum is -4.0%.

By comparison, measured discharge vs the IV (Index Velocity) computed discharge from the ADVM showed less accuracy with a maximum difference of 26.4% and minimum of -10.4% between measured and computed discharge. Corrections to the record would need to be applied adding to the uncertainty of the published computed discharge at the site (fig. 2).

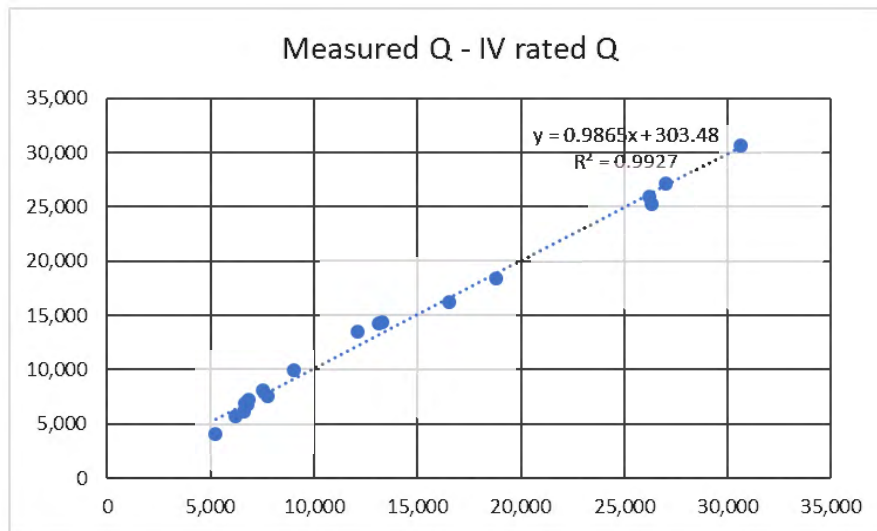


Figure 2 Flow (cfs) measured discharge vs computed discharge using IV method October 23, 2015 to April 3, 2018.

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There was also concern regarding a possible lag in response to flow changes using the Stage/discharge rating as opposed to the computation of discharge using the IV method. The graph below (fig. 3) shows this lag does not have a noticeable effect on the daily discharge computations due to the configuration of the control and the narrow gage pool at the site, stage appears to respond well to discharge changes.

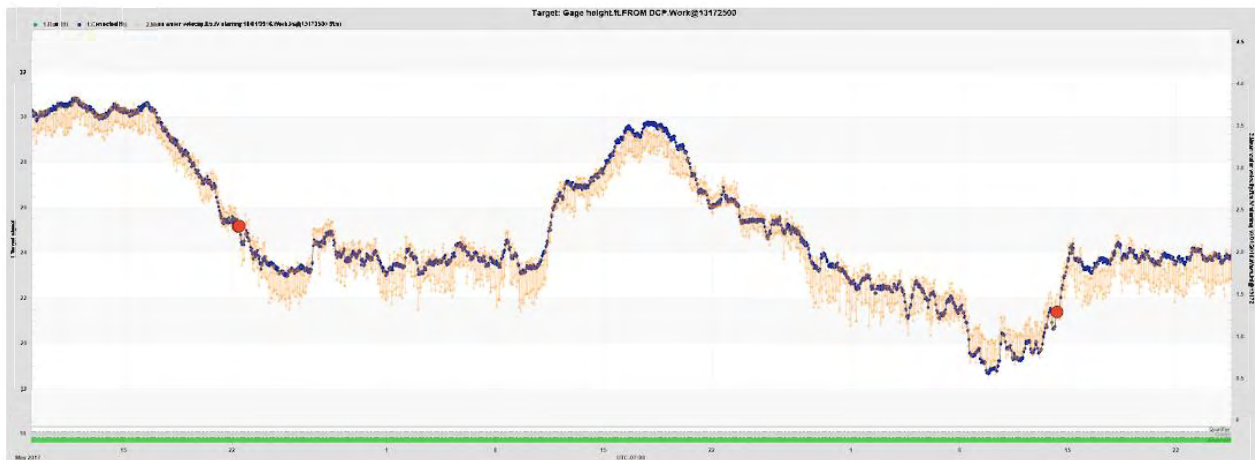


Figure 3 plot of stage (black) and mean velocity from the ADVM (brown) over time, physical measurements are red. Note the variability in velocity compared to stage.

In conclusion, the USGS recommends the discontinuation of the computation of discharge using the IV method and remove the ADVM from the site at the end of the current agreement period, June 30, 2018. Future discharge would be done sole using the Stage/Q rating method.

If you have any questions or concerns place contact me at [devetts@usgs.gov](mailto:devetts@usgs.gov) or 208-387-1316.

Cc Kyle Blasch  
Douglas Ott