From: Osborn, Jeff
To: Bitterman, Deborah
Subject: FW: Chelan River flow measurement
Date: Wednesday, May 27, 2015 10:04:50 AM

Debby: Will you please add the email below to the handouts for the May 21 CRFF meeting?

Thank you very much.

Jeff

From: Yow, Gene
Sent: Monday, March 30, 2015 2:12 PM
To: Osborn, Jeff
Cc: Hays, Steve
Subject: Chelan River flow measurement

Here's my draft of information about flow measurements as part of the Chelan River Project. It's more of an outline than a narrative. Let me know what else is needed in the way of information or elaboration.

LLO:

- GE Model AT868 AquaTrans Ultrasonic Flow Transmitter.
- Specifications page 8-1.
- For pipes of diameter >6 inches and flow velocity >1 fps, accuracy is ±1% or better with calibration.
- The LLO installation is in an 84 inch pipe with flow velocity of 2 fps or higher, and it was calibrated.
- Therefore, the accuracy should be ±1% or better.
- Conclusion: A reported flow of 80 cfs should reflect an actual flow between 79.2 cfs and 80.8 cfs.

Pump Station & Canal:

- H-ADFM Velocity Profiler, Teledyne ISCO
http://www.isco.com/products/products3.asp?PL=2022030
- The channel section is relatively regular and the canal flow is not turbulent.
- Accuracy within 2% to 5%

- Conclusion: A reported flow in the canal of 240 cfs should reflect an actual flow between 228 cfs and 252 cfs, using the accuracy of ±5%.

Flow measurements in open channels with more conventional instruments are substantially less accurate than this. Measurements of smooth, regular (non-turbulent) flow in a channel of well-known cross-section, can be accurate within about ±20%, if they are very carefully done. In the case of the Chelan River, the irregular channel shape introduces some additional uncertainty, and the flow is less regular than is desirable. As a result, a level of accuracy of ±20% is probably optimistic.

Conclusion: A reported flow in the river of 320 cfs would be expected to reflect an actual flow between 256 cfs and 384 cfs.