

Home of the **Acoustic Scintillation Flow Meter**

AQFlow at T.W. Sullivan Plant

AQFlow was retained by Portland General Electric (PGE) to conduct relative flow measurements at units 10 and 11 of the TW Sullivan Hydroelectric plant, located in West Linn, Oregon, January 31 to February 4, 2005. The plant's 13 units (1.4 MW each) last underwent a complete overhaul in 1954. In the past 6 months, Units 10 and 11 have undergone a runner and wicket gate upgrade. The modifications to the forebay have led to strong currents along the trash rack just upstream of the penstock inlet.



The units do not have a conventional scroll case inlet to the propeller runner. A 6 ft long, 10 ft diameter penstock leads to a 27 ft diameter room. Piezometer taps can usually be installed in the turning flow in a scroll case, but this was not possible at TW Sullivan.

Relative flow measurements with the ASFM were conducted to identify the optimum wicket gate opening for maximum efficiency. AQFlow estimates that the absolute uncertainty of the measurements was approximately three times the target in the ASME code – a reasonable achievement, considering the difficult hydraulic conditions.

Additional ASFM flow measurements may be conducted on some of the remaining units as units are overhauled.

AQFlow at Lower Granite Dam, Walla Walla District, USACE, WA

As part of an ongoing program of turbine testing, the USACE's Hydroelectric Design Center performed an index test to update the operating curve for Unit 4's Kaplan turbine in December 2004. AQFlow operated USACE's own 20-path/bay ASFM to provide flow values and HDC collected Winter-Kennedy data for comparison at the same time.

While the test was going on, several other flow measurement systems which had been specially set up in Unit 4 were used for comparative tests of two different flow measurement methods using a variety of installation configurations for each.

- 1) An acoustic time-of-flight system was installed in all three bays with horizontally and vertically oriented paths.
- 2) A second ASFM system was installed with paths vertically oriented in all 3 bays.
- 3) A third test was done using a 5-path ASFM system mounted on the walls at the downstream end of the bay A intake. This was to test the performance of a limited number of acoustic paths for tracking discharge. During this time we were also able to do a month long operational test of our ASFM Monitor surface unit – which performed flawlessly, successfully logging data through a variety of operating conditions.

The results from these comparative tests are under analysis by an independent, impartial evaluator.

AQFlow at Wells Dam, Douglas County PUD

Wells Dam, owned and operated by Douglas County PUD (Public Utility District) in Washington State on the Columbia River, has ten large Kaplan turbines with three very short intake bays each (total 840 MW). The unique geometry of the structure makes Wells a difficult plant for traditional flow measurement methods.

As part of Douglas County PUD's ongoing program of performance testing of the units, off-cam measurements were completed at units 3 and 4 during September 2004. AQFlow was contracted to take the flow measurements using Well's own ASFM Advantage, and analyse the flow data. The project plan calls for measurements at two more units this year and two more each year until all 10 are done (2008).

This work is the subject of a technical paper being presented by AQFlow, Devine, Tarbell & Associates and Douglas Co. at WaterPower XIV July 2005, in Austin, Texas. The paper will describe the work conducted since 2002, the process that has led to measurements being planned at all units in the future, and the benefits for Douglas County PUD.



ASFM Frame being lowered into intake



Water Power XIV July 18-22, 2005 Austin, Texas

ASL AQFlow will be presenting a technical paper titled "Flow measurement at Douglas County PUD's Wells Dam with the ASFM". We will also be exhibiting in booth # 414. Please stop by for a visit.

Other Hydro Solutions

Our parent company, [ASL Environmental Sciences](#), offers a range of related services and products for other hydro applications, such as flow surveys and numerical simulations in forebays and tailraces.

Client Reviews

Reviews given by AQFlow clients may be found on our website at:

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