

Columbia River Regional Forum
2013 Post-Spill Season Monitoring System Review
December 11, 2013

By Technical Writer Pat Vivian

1. Meeting Purpose and General Overview

The 2013 post-spill season review of the U.S. Army Corps of Engineers (USACE) regional water quality monitoring program was chaired by Scott English, USACE, with representatives of USGS, the USACE Districts, Oregon, Washington, Bureau of Reclamation (Reclamation), Douglas County PUD and others attending.

The purpose of the annual review was to exchange water quality data evaluations from monitoring sites throughout the region, note modifications or adjustments made to equipment in the past year, and review data quality for the year. It also fulfills the TDG Monitoring Plan requirement that an annual post-season TDG monitoring review meeting be held with USACE Districts, the Reclamation, the Public Utility Districts (PUDs), and related contractors where they give presentations to the region on how their FMS met the data quality criteria. Each presentation included a program overview, description of network sites and equipment, data quality review, and a summary of seasonal compliance with applicable water quality standards.

There was no live report from Grant County PUD or Chelan PUD today. The Grant County PUD slide show is posted online to the USACE RCC page, along with the other slide shows presented at today's meeting.

2. Portland District Spill Season Review

Heather Bragg, USGS gave a presentation on the USACE Portland District's water quality monitoring program. USGS monitors 8 sites on the lower Columbia River for the District. Three of these sites operate year round, the tailwater sites at John Day, The Dalles and Warrendale. The other five sites are seasonal from March-April.

2a. Equipment: Nothing has changed since last year. The District still uses the same Hydrolab minisondes and Sutron Satlink 2 DCP that transmits data hourly. Laboratory equipment includes a NovaLynx hand held digital barometer, a Digimano pressure gauge and club soda. Solar panels were added at all sites this year for backup power, which became an issue at The Dalles Dam. The solar panels will help ensure that power problems don't happen again.

2b. Data Completeness: This year a total of 99.2% of data were complete for all the sites. Most of the problems were caused by iced antennas at the year-round sites. Ruptured membranes led to a few days of missed data at John Day and Camas-Washougal gauges. When the AC power shut off in The Dalles forebay, transmission and data were lost. A bad membrane at The Dalles tailwater site caused 103 hours of data lost.

From August 29-31, Cascade Island gauge (Bonneville Dam tailwater) lost 94 hours of data due to a damaged pipe. But TDG readings were well under 120% when this occurred. A new pipe for the Cascade Island monitoring station is being designed.

At the John Day tailwater site, data from two Hydrolab sensors began drifting away from the reference sonde so the District switched to single sensor Hydrolabs. Nevertheless, there is still data drift. One possible remedy is to flush the pipe more frequently. Another possibility is to have personnel on call when disparities are seen between the reference sonde and the one being deployed.

2c. Season Summary: From April 1-August 31, based on an average of the 12 highest values per day, forebay stations with greater than 115% TDG saturation were:

- John Day, The Dalles and Bonneville in May-July
- Camas Washougal at times throughout the year.

Cascade Island was the only tailwater station with TDG values greater than 120% a few times in April-May.

Water temperatures exceeded 20°C at all stations from mid July to late September. Fisheries biologists don't look at data until the temperature is below 70°F, which is equivalent to 21°C. Bonneville station will continue to operate until the temperature is less than 20°C.

3. Seattle District Spill Season Review

Kent Easthouse gave a presentation. The USACE Seattle District operates 5 monitoring sites, including forebay and tailwater sites at Chief Joseph and Albeni Falls dams and a tailwater site at Libby Dam. With the exception of Albeni Falls, which is monitored year-round, these seasonal sites are calibrated every two weeks from April-September by John Lemons, Columbia Environmental. Albeni Falls is calibrated biweekly from April-September and monthly from October-March.

This year's presentation focused on sampling at 3 sites: Chief Joseph Dam on the Columbia River, Libby Dam on the Kootenai River, and Albeni Falls Dam on the Pend Oreille River. Because Libby is a headwater project, water quality is monitored in the tailrace only.

3a. Equipment: The equipment in use is the same as last year, Hydrolab minisondes, Sutron barometers and Sutron Satlink DCPs. Chief Joseph has AC backup power, Albeni Falls has AC and solar power, and Libby has solar power.

3b. Data Completeness: This was a good year for the Seattle District. There were 558 hours of missing data at Libby due to a contract delay for John Lemons, who couldn't begin monitoring on April 1 as usual. Vandalism to a probe at Albeni Falls

tailwater caused 39 hours of lost data. Other data losses at Chief Joseph and Albeni Falls were caused by DCP data transmission issues. There were no lightning strikes this year.

Temperature data were generally complete in 2013 with the exception of Libby tailwater which had 558 hours of missing data. Laboratory calibration data were within 0.1°C for temperature and 1% saturation for TDG. Field calibration data were within 0.2°C for temperature, 2mm Hg for barometric pressure, and 2% saturation for TDG at all stations.

3c. Season Summary: This was a low spill year for Chief Joseph Dam with a maximum forebay TDG saturation level of 115%. Water quality in the Chief Joseph forebay is a direct reflection of TDG levels in Grand Coulee tailwater. At Chief Joseph, there's little difference between forebay and tailwater temperatures.

Likewise, Albeni Falls forebay TDG levels are a function of the next project, Cabinet Gorge, 50 miles upstream. The highest TDG value in the Albeni Falls forebay was 115% saturation and 118%, in the tailwater with spill of 46 kcfs. Albeni Falls is anomalous in that higher spill levels don't necessarily produce higher TDG. When the project is on free-flow, there's little difference between forebay and tailwater TDG. However, lower volume spill through only a few bays can produce high TDG.

The maximum TDG level at Albeni Falls tailwater this year was 125% saturation with 11 kcfs spill. At Libby, TDG levels tend to rise rapidly with small increases of spill, and there's a tendency for wind events to change water temperatures quickly.

4. Walla Walla District Spill Season Review

Dewey Copeland gave a presentation. The Walla Walla District operates 15 water quality monitoring sites, 6 of which operate year round and 9 of which are seasonal. Five of these are forebay sites, 6 are tailwater sites and 4 are riverine sites. All 15 sites are monitored every 3 weeks during spill season, and the 6 tailwater sites are monitored every 4 weeks outside of spill season.

4a. Equipment: Field equipment includes 41 Hydrolab minisondes, including mini-4a and mini 5s. The MS 4a minisondes are preferred because they respond more quickly than MS 5 minisondes. Equipment also includes Sutron digital barometers and Novalynx 230 hand-held digital barometers. This year the district purchased 25 new In-Situ TDG membranes as it does every year. There was discussion of these membranes, which tend to pass initial tests and then fail.

Lab equipment includes a Heise digital pressure gauge, an Ashcroft digital gauge, two digital thermometers, and a ParoScientific barometric pressure gauge.

4b. Data Completeness: Data quality was fairly good in 2013. This year 99.94% of barometric pressure data, 99.98% of water temperature data, and 97.5% of TDG data were received in real time and passed QA/QC review.

In 2013, there were 1,841 hours or 2.15% of missing or anomalous barometric pressure and TDG data. For the whole reporting period, 99.6% of barometric pressure data, 98.3% of TDG data and 99.8% of water quality data were complete.

The best sites were Little Goose, Lower Monumental and McNary, with 100% usable data. The worst sites were Peck (418 hours of bad data), Lewiston (198 hours), Little Goose tailwater (247 hours) and Pasco (364 hours). Data from these sites accounted for 90.5% of all bad TDG data. Data from Peck, Lewiston and Little Goose tailwater sites were determined to be unreliable because sediment caused TDG readings to be artificially low. Problems at the Pasco site this summer apparently were caused by aquatic growth in the tube housing the equipment. Removal of aquatic growth works temporarily.

4c. Season Summary: The 15 Walla Walla District sites had an average of 2.9% missing or anomalous data this year. There were problems with sedimentation, which accumulates gradually and makes TDG readings too low. Daily site checks typically can identify this data drift over the course of 5-6 days.

In QA/AC checks, the median differences between TDG sensors and field measurements were 0.0 mm Hg for barometric pressure, -0.02°C for water temperature and -0.1% for TDG saturation.

Dworshak's highest instantaneous TDG value was 112%. The Peck site on the Clearwater downstream of Dworshak is a riverine site used to track Dworshak conditions year-round. This year sedimentation caused problems at Peck during low flows. Lewiston, the last site before the confluence of the Snake and Clearwater rivers, also had sedimentation problems this year.

On the Snake River, the spike in TDG values in Lower Granite tailrace at the end of September was the result of double testing of the turbines and repair of the powerhouse roof. Little Goose tailwater also had sedimentation problems this year, which is unusual. The Lower Monumental tailwater site is problematic because it's inside a river bend, which creates backwater conditions. This year the Lower Monumental tailwater hovered around 120% TDG saturation, while the forebay exceeded 115% TDG saturation in May.

Pasco had low TDG readings this year, probably caused by aquatic growth (millefoil). As long as the site remains in its current location, the only solution is to clear the pipe frequently.

5. Bureau of Reclamation Spill Season Review

Norbert Cannon, Reclamation, gave a presentation. Reclamation maintains 4 sites, 3 year-round at Grand Coulee Dam and 1 at Hungry Horse Dam on the south fork of the Columbia in Montana. Grand Coulee has a forebay site 2 miles downstream of the international boundary and a tailwater site 6 miles downstream. The international

boundary TDG gauge is about 2-3 miles below the international boundary. Hungry Horse tailwater site is 4 miles downstream of the dam. With the exception of Hungry Horse, these sites are maintained bi-weekly from March through October and once a month in the winter months. Hungry Horse is not monitored in winter.

5a. Equipment: The Reclamation uses Sutron Satlink 2 DCPs and Sutron Accubar gauges for barometric pressure. The Alpha Design TDG/temperature probes are reaching the end of their useful life. They are being replaced by Hydrotech probes which seem to work well.

5b. Data Completeness: Field comparisons were within the desired parameters. Calibrations had a standard deviation of 0.08 for temperature and around 1.0 on all % TDG and pressure readings. These results are considered very good. QA/QC checks this year were calibrated to:

- ± 0.9 mm Hg for mercury barometers
- 0.5 mm Hg for Netech Digimano pressure meters
- 0.06°C to Thermoprobe digital thermometers

5c. Season Summary: From July 22-23 a torn membrane at Hungry Horse caused almost a day of lost data. The international boundary site had a DCP lockup due to a thunderstorm on June 2-3. Grand Coulee forebay site also had a DCP lockup on September 8-9. Grand Coulee tailwater site went out of service on September 15-16. All these data losses were for about a day.

6. Douglas County PUD Spill Season Review

Andrew Gingerich gave a presentation. Wells Dam has a hydrocombine design, which means the powerhouse, spill bays and juvenile bypass system are integrated rather than separate. Wells has 10 units and a peaking capacity of 840 MW with about 20 kcfs through each unit. The juvenile bypass system operates from April 9-August 19 via a series of openings in spill bays 2, 4, 6, 8 and 10. This was the first full year that Wells Dam operated under its 2012 FERC license, which carries increased requirements for water quality monitoring among other fisheries obligations.

6a. Equipment: Douglas PUD uses MS-5 minisondes in the forebay and tailrace of Wells. The forebay TDG sensor is on the pier nose of Unit 6 and the tailrace TDG sensor is about 1.5 miles downstream of the project. Data are calibrated monthly by John Lemons and uploaded in real time using SCADA.

6b. Data Completeness: Data from September 23, 2013, found that:

- In the forebay: 3.8% of the time, 15-minute averages were missing, and 1.2% of the time, hourly averages were missing.

- In the tailrace: 4.2% of the time, 14-minute averages were missing, and 2.2% of the time, hourly averages were missing.
- Most (75%) of the missing data was caused by DCP transmission failure from August 11-15.

6c. Season Summary: Wells Dam is managed during spill season to a standard of 120% TDG saturation in the tailrace, calculated as a rolling 12-hour average. No instantaneous value is to exceed 125%. Rocky Reach Dam, the next project downstream, is managed to 115% TDG saturation in the forebay at any hour, also calculated as a rolling 12-hour average. However, if water arriving at Wells already is out of compliance and Wells passes it without adding any gas, that is not considered a violation.

In 2013, Wells had 99.2% compliance with the 125% hourly TDG standard and 100% compliance with the 120% rolling 12-hour average. However, Rocky Reach forebay was out of compliance for 14 days, or 89.4% of the time, with the 115% rolling 12-hour average. This finding will receive further scrutiny. One proposal is to add a sensor in Wells pool to gather information on degassing and use it to improve compliance with state water quality standards. Survival studies indicate that Wells Dam bypasses 92% of spring migrants and 96% of summer migrants.

This meeting summary prepared by technical writer Pat Vivian.

Attendees:

<i>Name</i>	<i>Affiliation</i>
Dewey Copeland	USGS Kennewick
Steve Juul	Walla Walla District
Ben Holman	USGS
Kevin Wright	USGS Kennewick
Joe Carroll	citizen
Kent Easthouse	Seattle District
Mike Schneider	citizen
Dan Polette	USGS
Heather Bragg	USGS
Kathryn Tackley	Portland District
Pat Vivian	notetaker
Laura Hamilton	USACE RCC
Paula Calvert	ODEQ
Scott English	USACE RCC
Pat Irle	WDOE

Participation by Phone:

Norbert Cannon	Reclamation
Andrew Gingerich	Douglas PUD