

Wells Hydroelectric Project Total Dissolved Gas Abatement Plan *2013 Annual Report*

Andrew Gingerich

Public Utility District No. 1 of Douglas County
1151 Valley Mall Parkway
East Wenatchee, WA 98802-4331

Prepared for:

USACE TDG
Performance Meeting

Portland, OR

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Wells Dam



- Nameplate rating of ~ 774 MW and peaking 840 MW.
- Generating units, spillways, switchyard, and fish passage facilities were combined → hydrocombine.
- **New license issued Nov 9th 2012**
- **Report data to USACE Year round (as of April 2013)**
- Bypass season: April 9th from 0000 to Aug 19th 1200
- JBS in spillways 2, 4, 6, 8, and 10
- ~96% juvenile bypass efficiency
- PH capacity is roughly 200 kcfs W/ 10 units











11/2011
1990 2013

Forebay TDC sensor
Wells Dam, WA 98853, USA

Zepko Acres Rd
97

Tailrace TDC sensor

Image USDA Farm Service Agency
Image NASA
Image © 2013 Province of British Columbia
Image © 2013 DigitalGlobe

Google earth

Imagery Date: 9/25/2011 47°55'38.61" N 119°53'07.78" W elev 876 ft eye alt 7099 ft



Methods:

- Minisonde MS5 in forebay (unit 6) and tailrace (2.5 km downstream).
- Calibrated monthly by John Lemons
- Data is sent using RF to Wells Dam
- Processed through SCADA system
- Data is uploaded to dcpud.org and USACE webpage for TDG data in real-time. (<http://www.dcpud.org/wells-project/total-dissolved-gas-and-temperature-monitoring>) and (<http://www.nwd-wc.usace.army.mil/tmt/wcd/tdg/months.html>)

2013 Results:

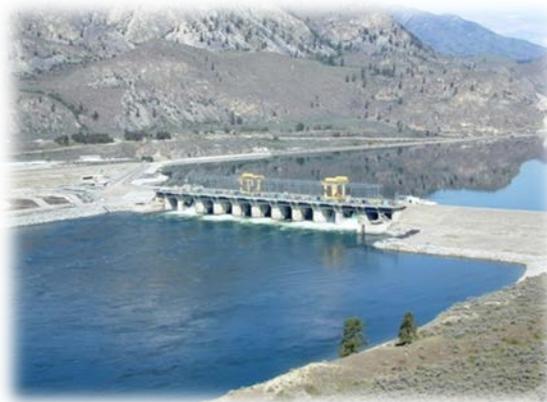
- **Forebay**
 - Missing 15 minute average 3.8% of the time
 - Missing hourly averages 1.2% of the time
- **Tailrace-**
 - Missing 15 minute average 4.2% of the time
 - Missing hourly averages 2.2% of the time
- Stretch between August 11-15th accounted for 75% of the missing data.

TDG Criteria



Ecology requirements once Fish Passage Waiver is obtained (110% otherwise):

- 1. No hourly value above 125% in tailrace**
 - 2. 12-C high (rolling 12 hour average) during any hour of the day in the Wells tailrace of 120%**
 - 3. 12-C high (rolling 12 hour average) during any hour of the day in the Rocky Reach forebay of 115%**
- *If 7Q-10 flows are occurring violations not considered.
 - *Also unwritten rule: If TDG is out of compliance incoming - as long as the project doesn't add any TDG, still in compliance (Not in the WQS however).*





2013 Compliance

Wells Tailrace 125% hourly

Days out of compliance	1
Bypass season days	133
Compliance	99.2%

Wells Tailrace 120% 12C-High

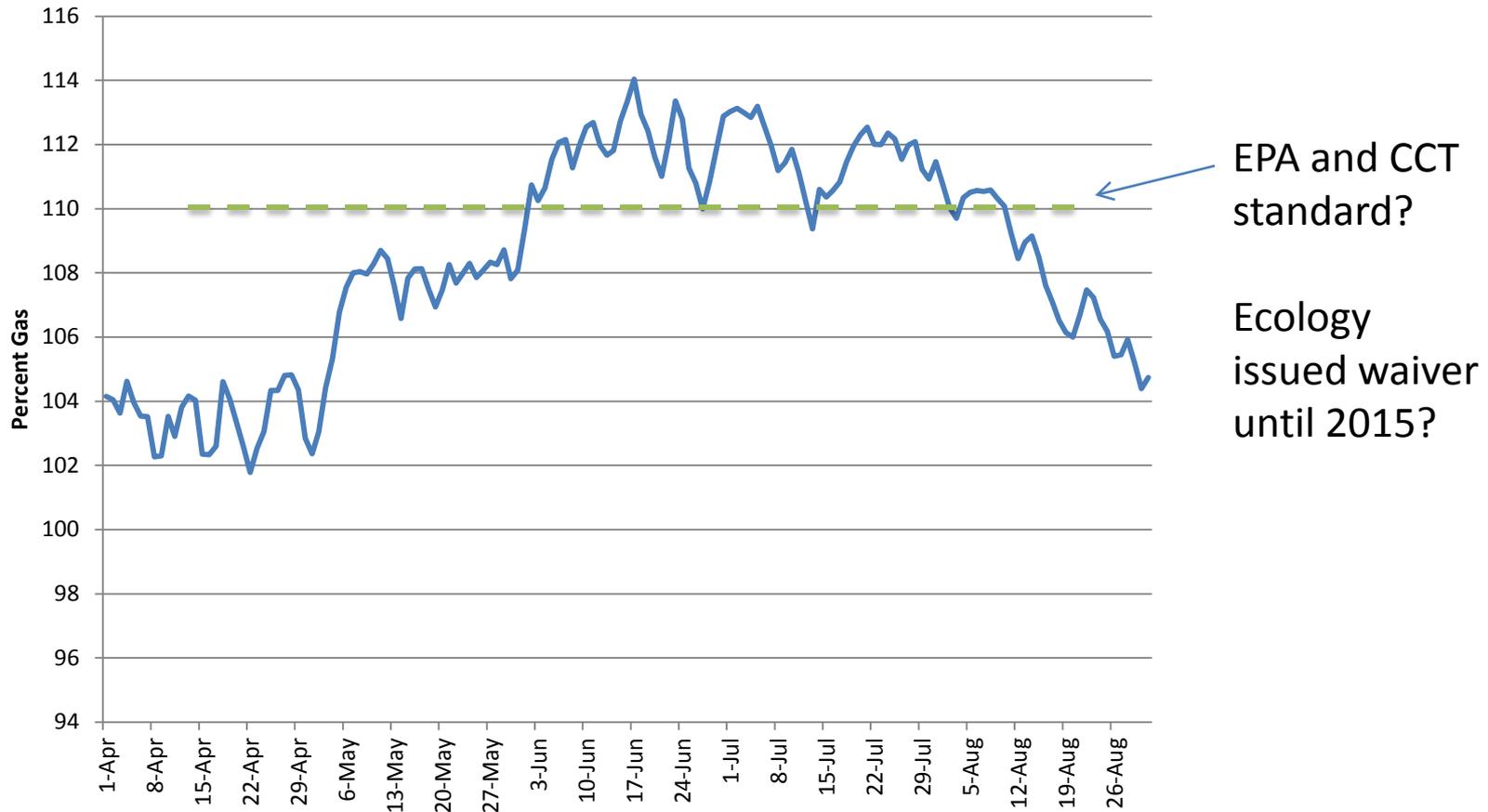
Days out of compliance	0
Bypass season days	133
Compliance	100%

Rocky Reach Forebay 115% 12C-High

Days out of compliance	14
Bypass season days	133
Compliance	89.4%

Upstream Achievements and Challenges?

- Great 115% standard compliance from FCRPS upstream of Wells Dam. However...
- Not so great at 110% standard. What is the incoming state, tribal or federal standard?



Path Forward: Began 10 year TDG Attainment Plan in 2013

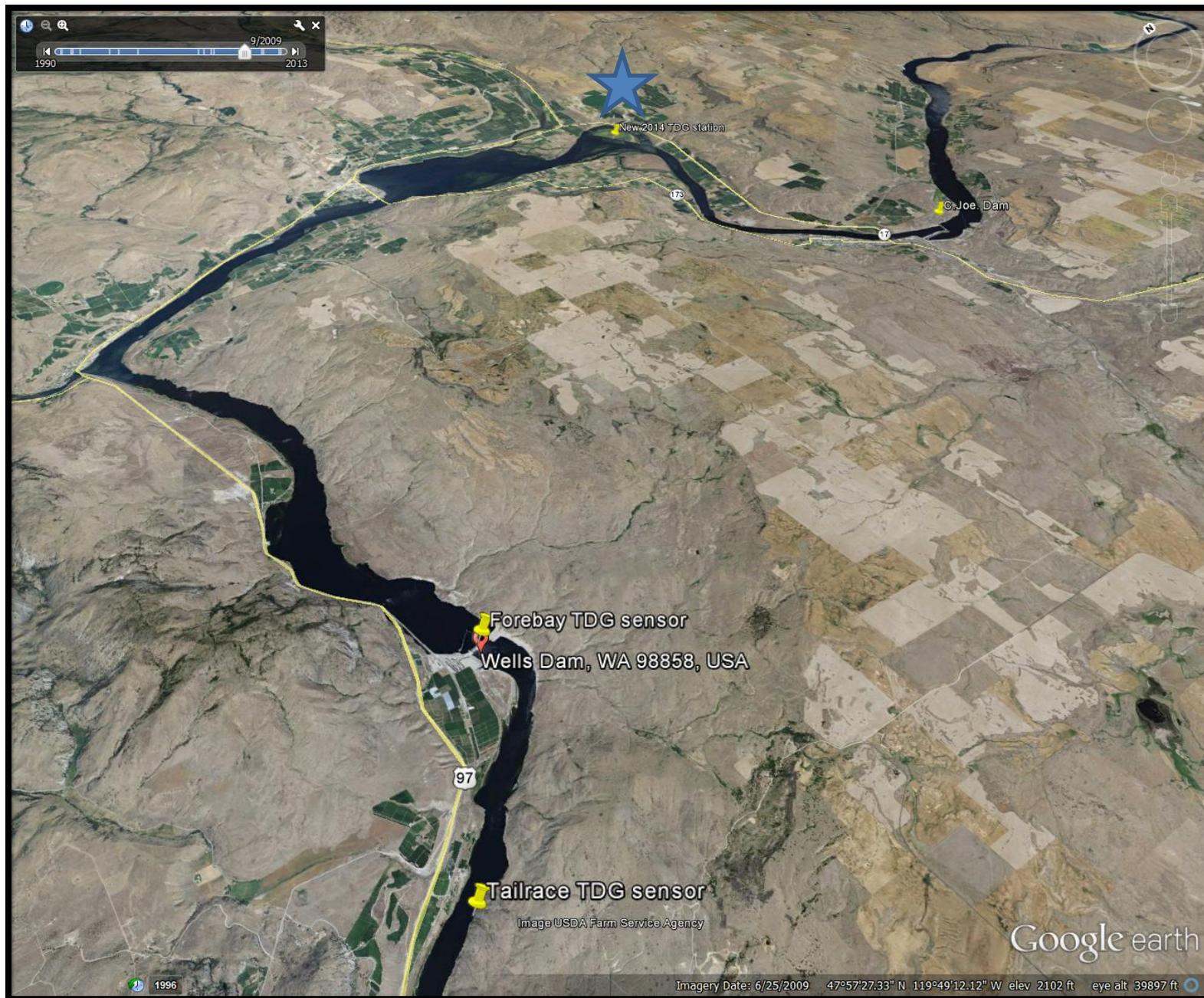
Fun and Games- TDG removal through reservoirs above and below Wells.

	TDG removal from CJ tail to Wells	TDG removal from Wells tail to Rocky Reach
Average	-0.53	-0.72
Min	+3.68*	+1.7
Max	-6.22~	-2.72
Standard Deviation	1.47	0.88

Table assumes 1 day lag. (6 hour lag would be better). 2013 data April-August.

- *Indicates that the Wells Reservoir added 3.68 % to water arriving at the face of Wells Dam
- ~Indicates that the Wells Reservoir removed 6.22% from water arriving at the face of Wells Dam
- Sensor placement? Bulk flow?
- Reasonable to suspect that 7/10 of 1% of TDG is removed from Wells to Rocky Reach on average.

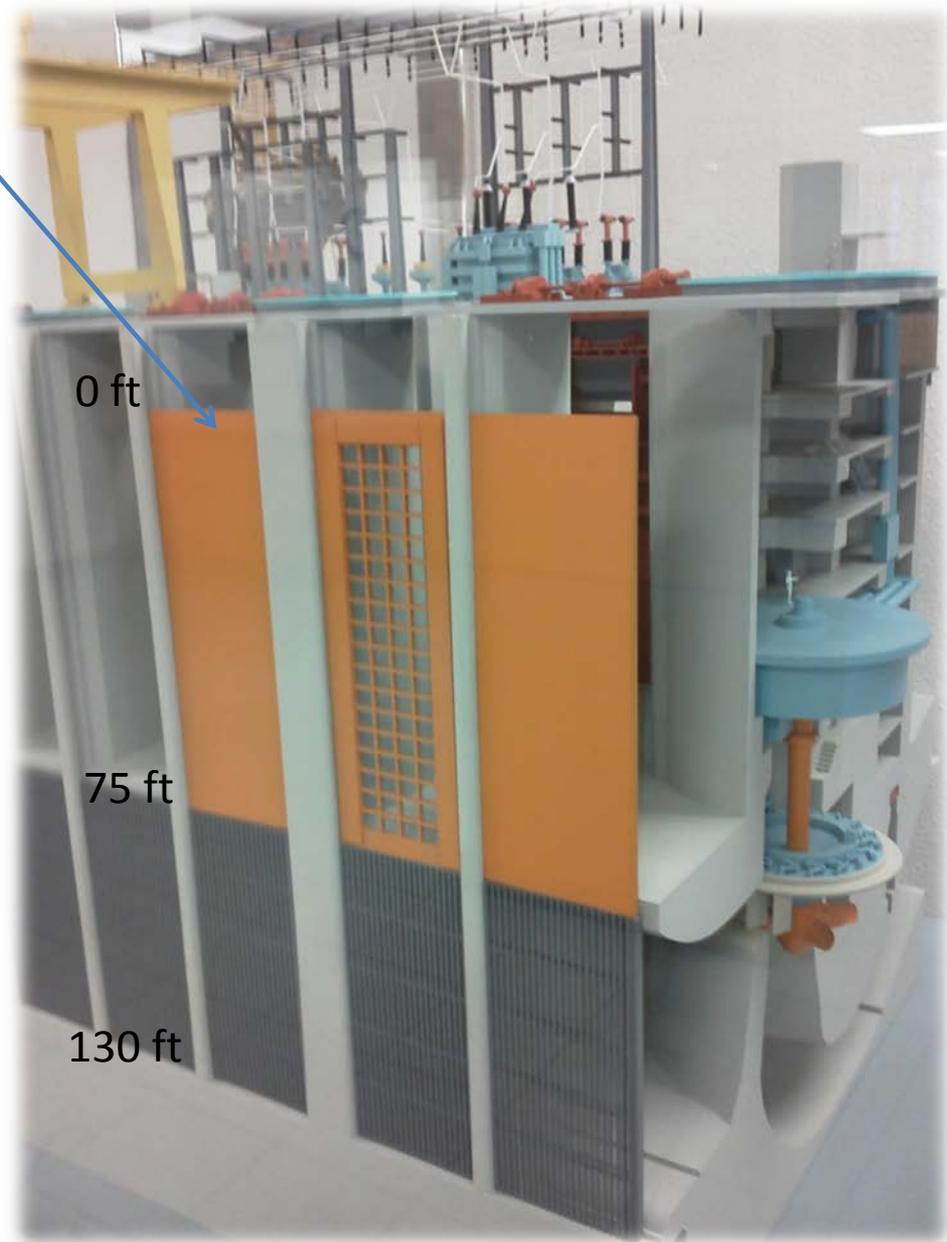
Need to Understand TDG production above and Below Wells Dam



- The bypass: flow barriers placed in 5 of 11 spillbays (2, 4, 6, 8, and 10)
- 92% - 96% smolt bypassed
- Survival studies: 1997 – 1999, 2010 with PIT-tagged fish. Two species (Chinook and steelhead yearlings) survival of >96%.

Features that allow for high guidance and survival of juveniles:

1. 10 turbine intakes very deep in the profile of the river.
2. Situated immediately above the turbine intake are the 11 spillways.
3. Fish hesitate to follow the water flowing into the deep turbine intakes.
4. Instead follow modest spill flow.
5. Vertical opening 16 ft wide and 70 ft deep.
6. The five bypass gates operate in conjunction to the operation of paired turbines immediately below.
7. i.e, 6 turbines operating, those 3 gates located above are opened.



Questions?

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Andrew Gingerich
andrewg@dcpud.org
509-881-2323

