

Total Dissolved Gas Monitoring 2010: Chief Joseph Dam, Albeni Falls Dam, and Libby Dam



TDG Monitoring 2010

- Introduction

- 5 monitoring sites
 - Libby tailwater
 - Chief Joseph forebay and tailwater
 - Albeni Falls forebay and tailwater
- Seasonal sites (April 1 – September 30)
- Sites calibrated every two weeks
 - COE data quality criteria
 - Laboratory calibrations
 - Field calibrations
 - Performance checks

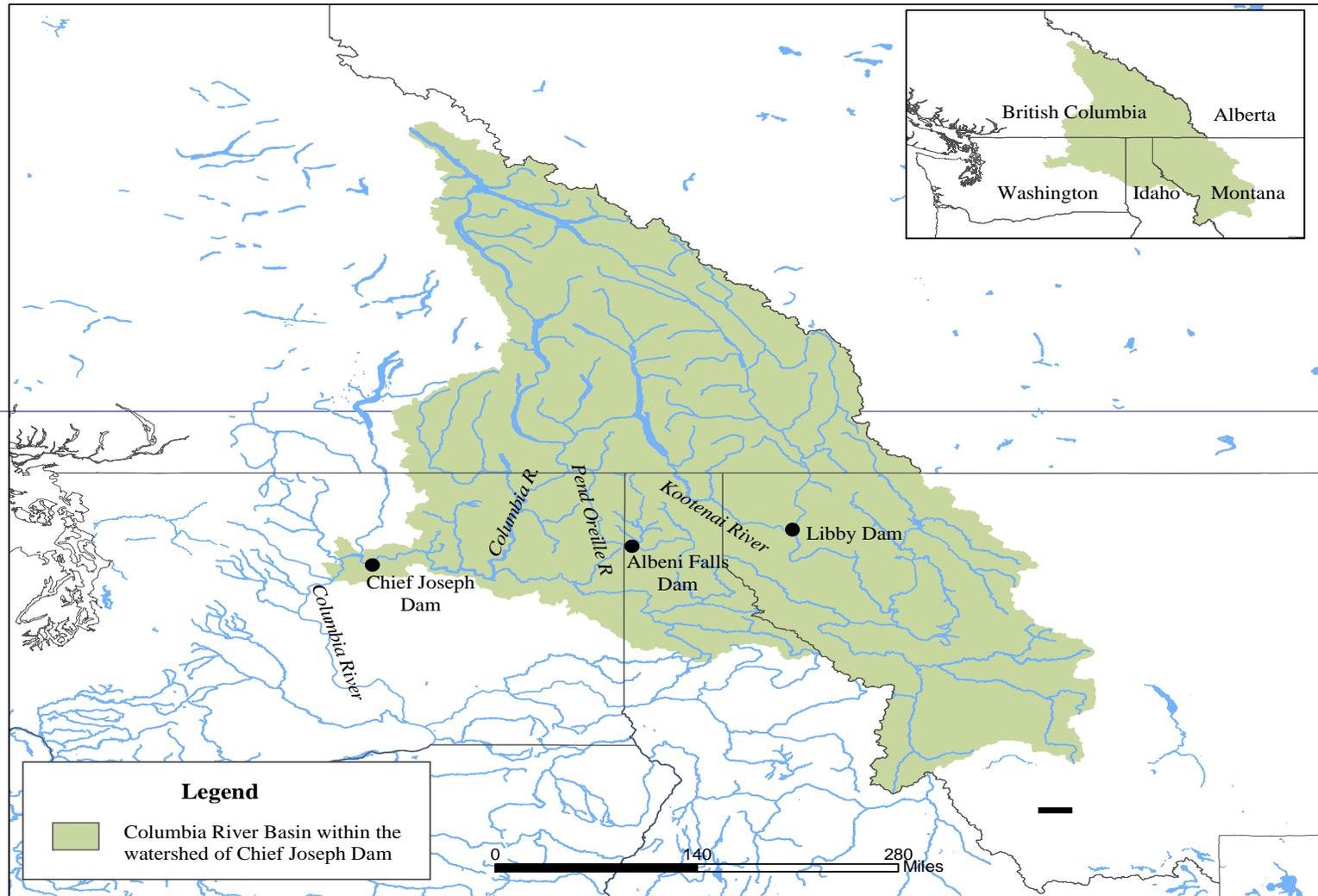


Figure 1. Location of the Seattle District's projects in the Upper Columbia River Basin.

TDG Monitoring 2010

- **Chief Joseph**

- Equipment

- Hydrolab MiniSonde 4a TDG sensor/Common Sensing barometer
 - Sutron 9210 XLite DCP, AC Power
 - Radio transmission and GOES station

- **Albeni Falls**

- Equipment

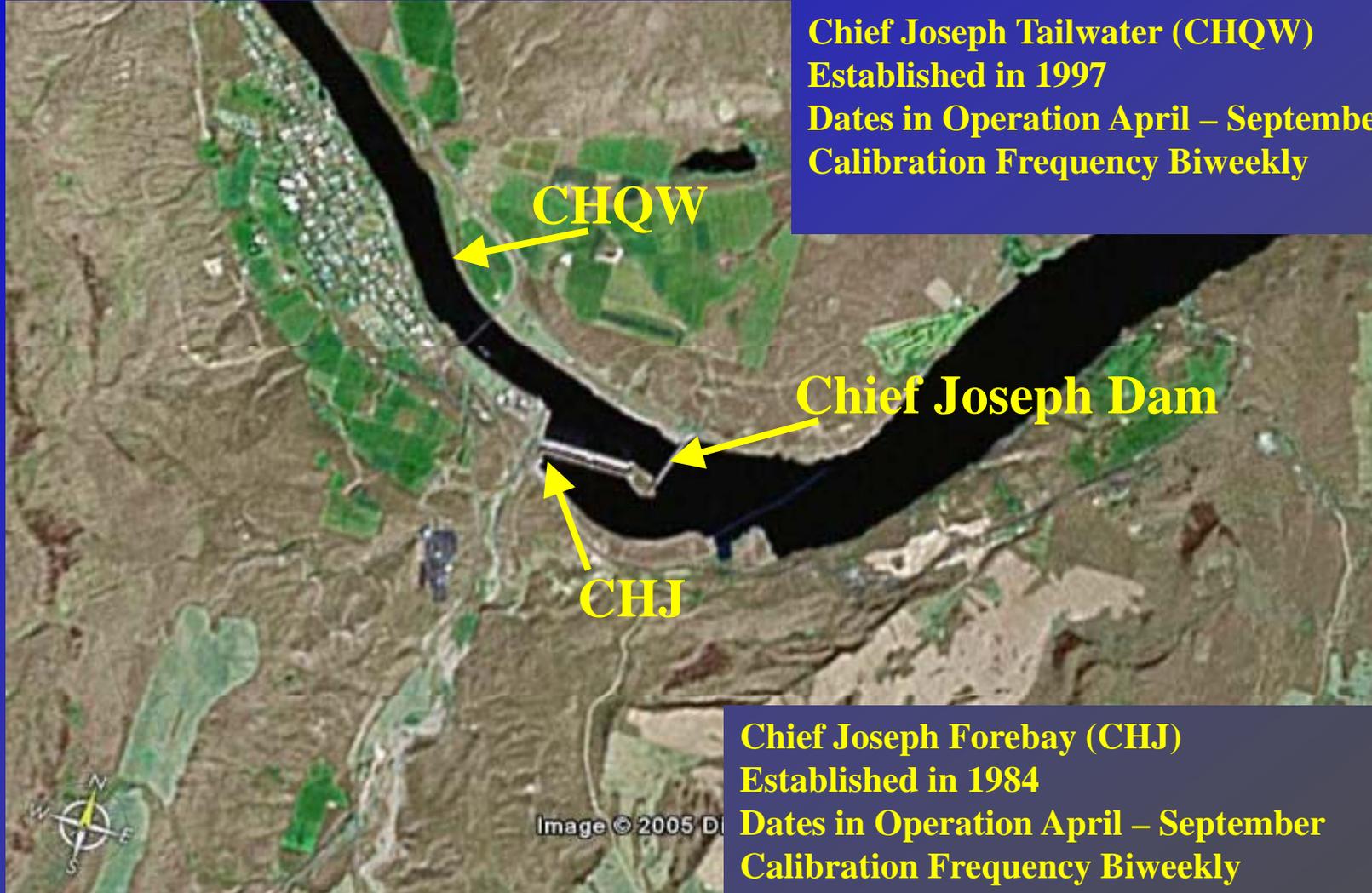
- Hydrolab MiniSonde 4a TDG sensor/Common Sensing barometer
 - Sutron 9210 XLite DCP, AC and Solar Power
 - Radio transmission station

- **Libby**

- Equipment

- Hydrolab MiniSonde 4a TDG sensor/Common Sensing barometer
 - Sutron 9210 XLite DCP, Solar Power
 - Radio transmission station

TDG Monitoring 2010



Chief Joseph Tailwater (CHQW)
Established in 1997
Dates in Operation April – September
Calibration Frequency Biweekly

Chief Joseph Dam

Chief Joseph Forebay (CHJ)
Established in 1984
Dates in Operation April – September
Calibration Frequency Biweekly

Chief Joseph Total Dissolved Gas Monitoring System

TDG Monitoring 2010



Albeni Falls Total Dissolved Gas Monitoring System

TDG Monitoring 2010



Established 2003
Dates in Operation
April – September
Calibration Frequency Biweekly

Libby Dam Total Dissolved Gas Monitoring System

TDG Data Completeness 2010

Station Name	Station Abbreviation	Planned monitoring in hours	Number of missing hourly values	Percentage of real-time TDG monitoring data received	Percentage of real-time TDG data received and passing quality assurance
Chief Joseph Forebay	CHJ	4392	0	100.0	100.0
Chief Joseph Tailwater	CHQW	4392	0	100.0	100.0
Albeni Falls Forebay	ALFI	4392	153	96.5	88.0
Albeni Falls Tailwater	ALQI	4392	332	92.4	56.2
Libby Tailwater	LBQM	4392	5	99.9	99.1

Temperature Data Completeness 2010

Station Name	Station Abbreviation	Planned monitoring in hours	Number of missing hourly values	Percentage of real-time Temperature monitoring data received	Percentage of real-time Temperature data received and passing quality assurance
Chief Joseph Forebay	CHJ	4392	0	100.0	100.0
Chief Joseph Tailwater	CHQW	4392	0	100.0	100.0
Albeni Falls Forebay	ALFI	4392	150	96.6	96.6
Albeni Falls Tailwater	ALQI	4392	283	93.6	93.5
Libby Tailwater	LBQM	4392	5	99.9	99.9

TDG Monitoring 2010

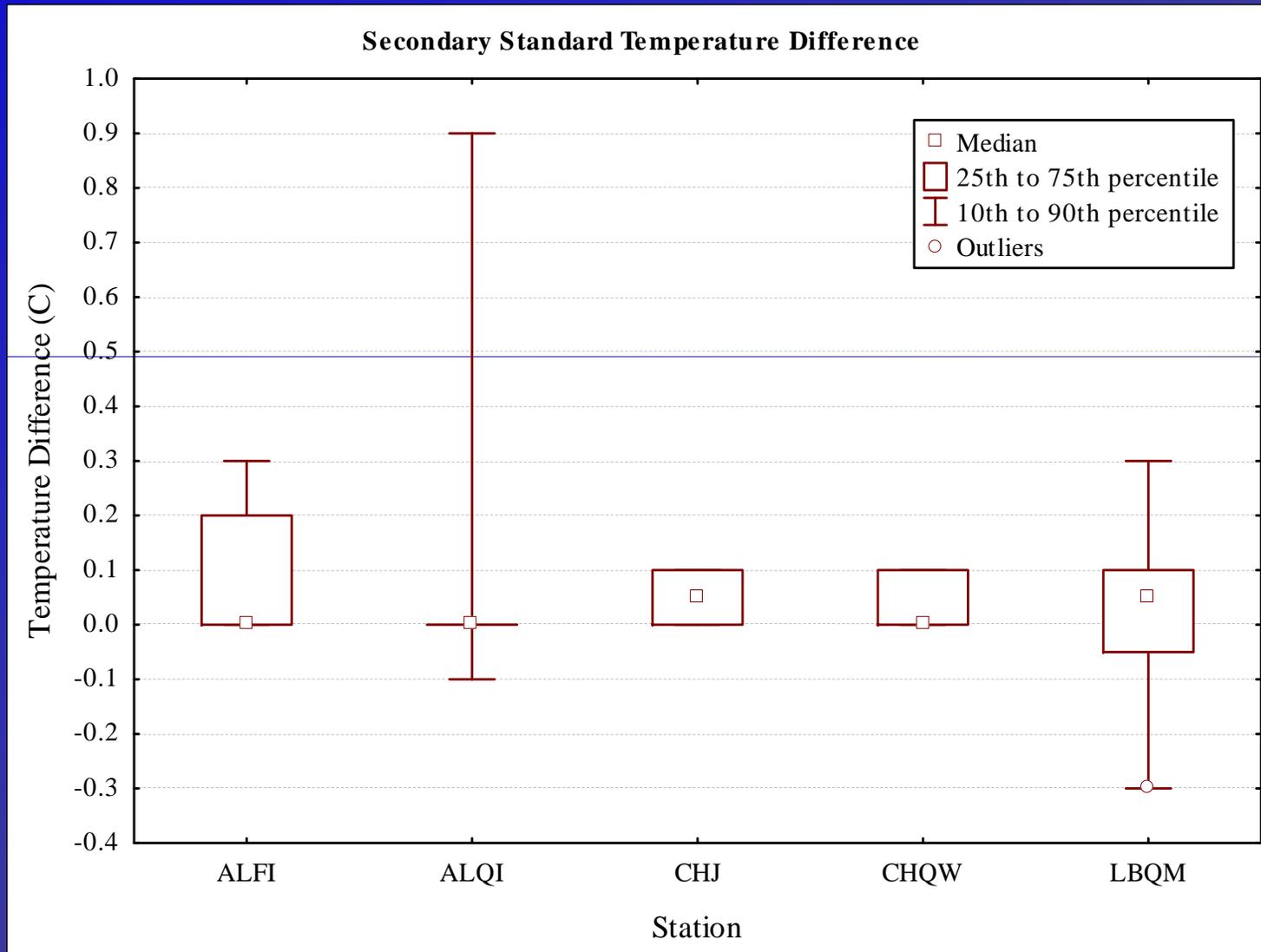
- Overview of 2010 TDG and Temperature Data
 - Data completeness
 - Chief Joseph Forebay (CHJ) and Tailwater (CHQW)
 - Few problems
 - Albeni Falls Forebay (ALFI) and Tailwater (ALQI)
 - DCP malfunctions and programming problems
 - Barometer problems
 - Hydrolab problems
 - Libby Tailwater (LBQM)
 - Few problems

TDG and Temperature QA/QC 2010

	Temperature	Total Dissolved Gas Pressure (% Saturation)			
	°C	100%	113%	126%	139%
Num	42	42	42	42	42
min	-0.10	-0.21	-0.21	-0.21	-0.21
max	0.17	0.27	0.34	0.34	0.27
median	0.03	0.04	0.08	0.08	0.02
avg	0.04	0.03	0.06	0.06	0.01
sd	0.06	0.11	0.12	0.12	0.12

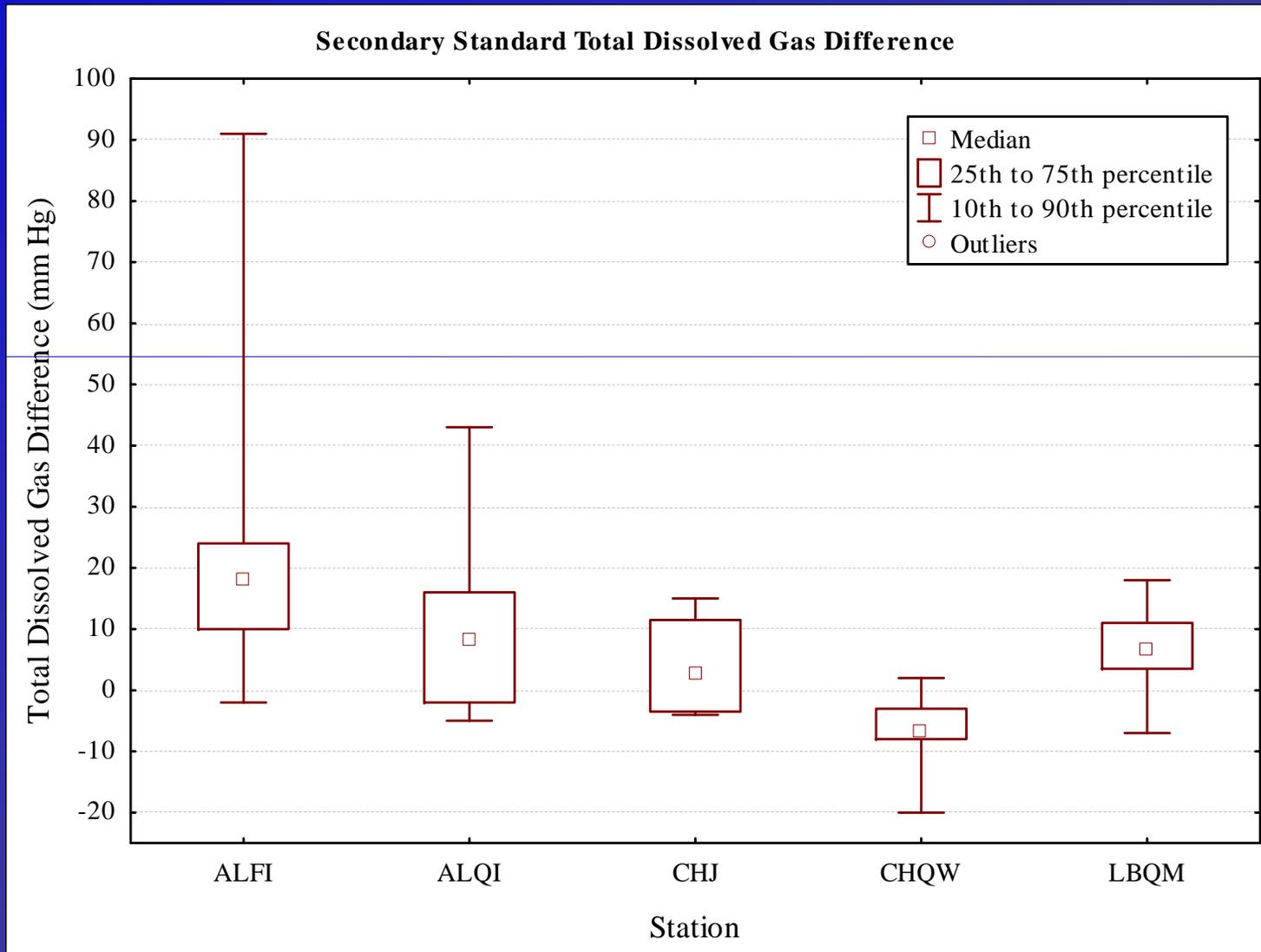
Difference between the primary standard and total dissolved gas instrument.

TDG and Temperature QA/QC 2010



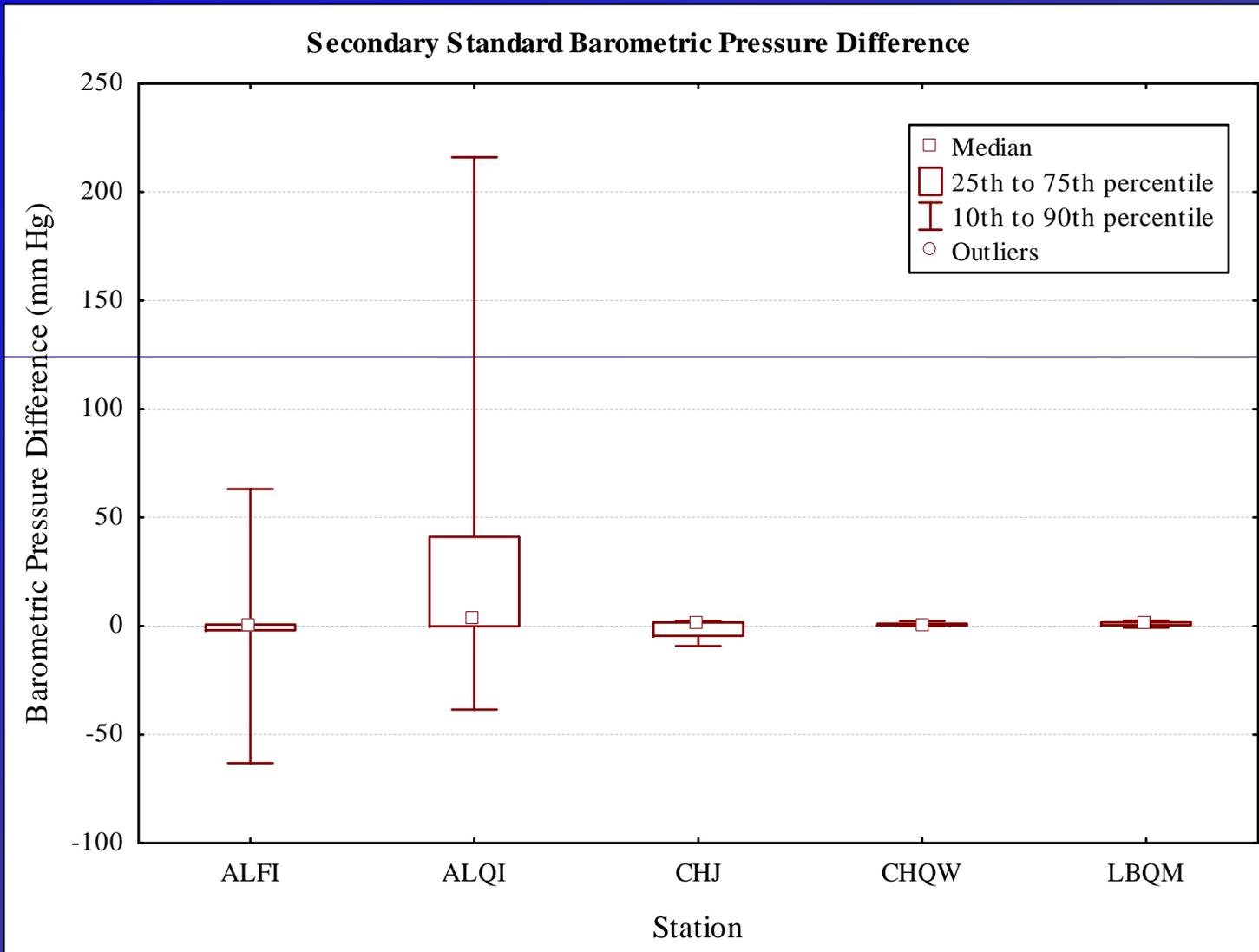
Difference between the secondary standard and the field thermometer

TDG and Temperature QA/QC 2010



Difference between the secondary standard and the TDG instrument

TDG and Temperature QA/QC 2010



Difference between the secondary standard and the Barometer

TDG Monitoring 2010

- Overview of 2010 Data QA/QC
 - Laboratory calibration data were good and within 0.1 ° C for temperature and 1% saturation for TDG
 - Field calibration data for temperature were good and generally within 0.2°C of the secondary standard thermometer
 - Field calibration data for TDG were generally within 10 mm Hg of the secondary standard TDG instrument except at Stations ALFI and ALQI
 - Field calibration data for barometric pressure were generally within 5 mm Hg of the secondary standard except at Stations ALFI and ALQI
 - Barometer problems and TDG probe problems at stations ALFI and ALQI

TDG Monitoring 2010

- 2010 Spill Season Results for Chief Joseph Dam

- TDG-Forebay (CHJ)

- Forebay TDG levels were a function of Grand Coulee tailwater TDG levels
- Maximum TDG of about 118%

- TDG-Tailwater (CHQW)

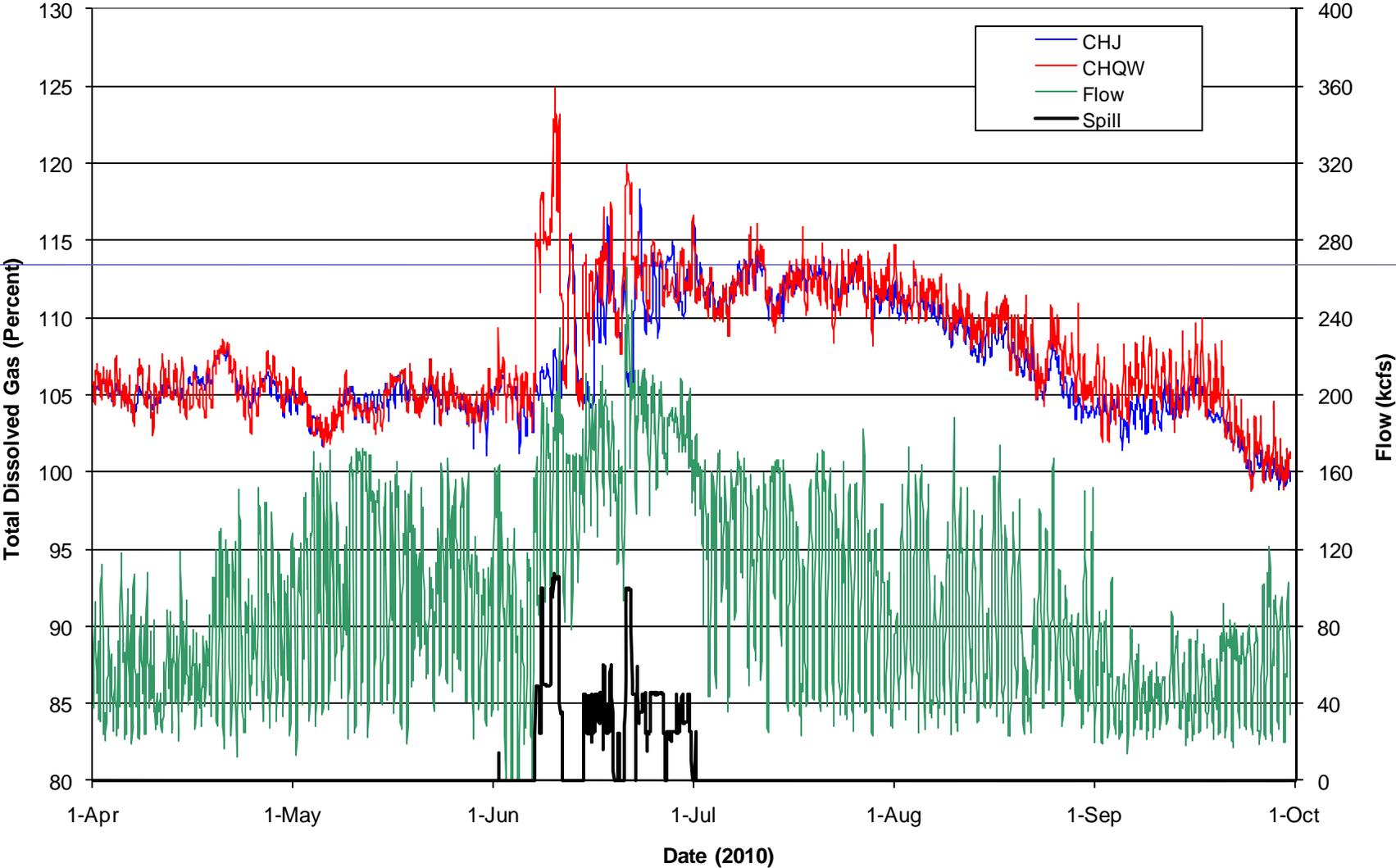
- Maximum TDG of about 124% during a 105 kcfs spill
- Deflectors reduced TDG to system
- TDG dependent on tailwater elevation with higher tailwater resulting in higher TDG

- Temperature-Forebay/Tailwater

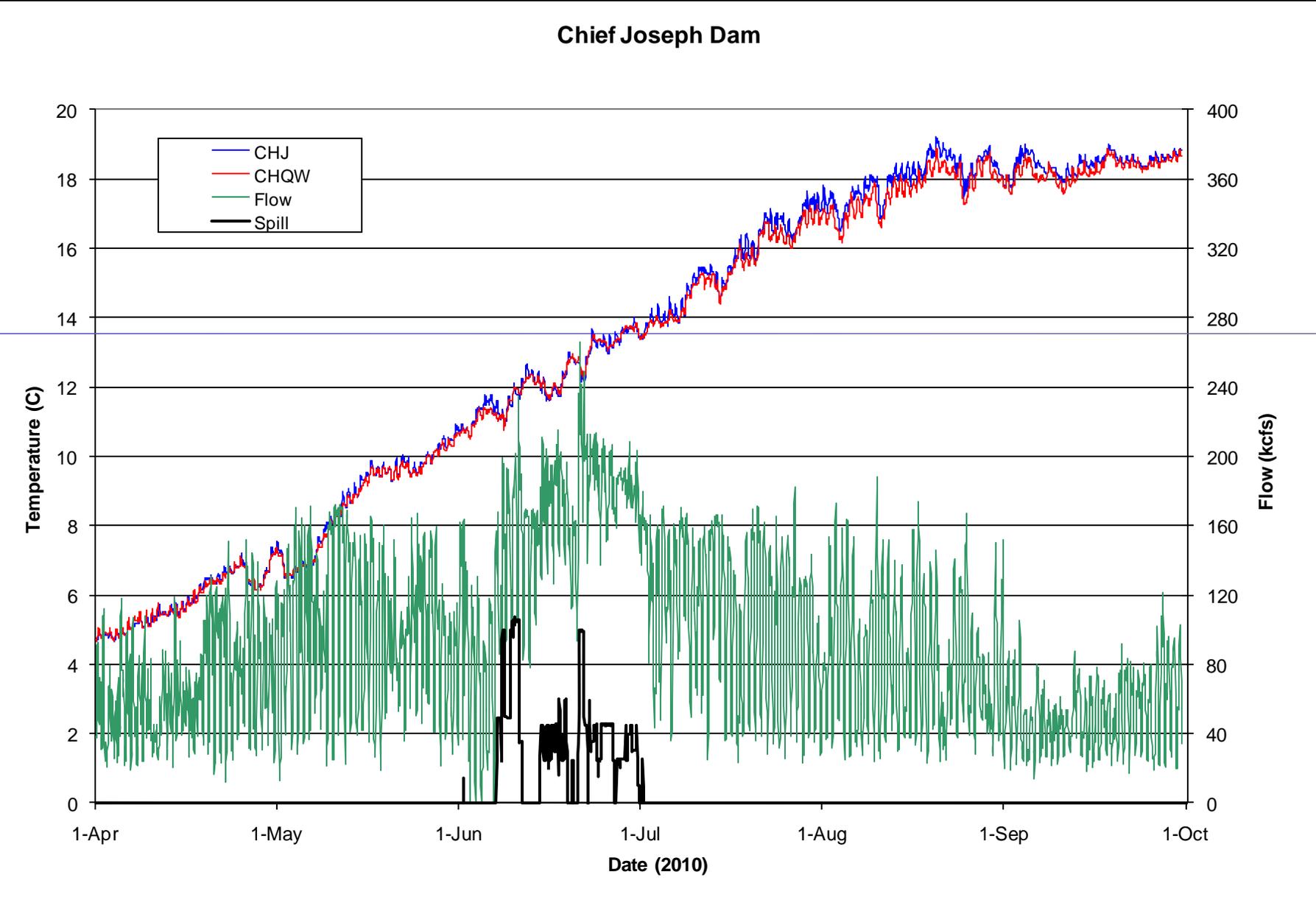
- Forebay temperatures exceeded the CCT standard (16°C) from about Mid July through the end of sampling on Sept 30, and the WDOE standard (18 °C) from about Mid August through the end of sampling on Sept 30
- Tailwater temperatures exceeded the WDOE and CCT standard (18°C) from about Mid August through the end of sampling on Sept 30

TDG Monitoring 2010

Chief Joseph Dam



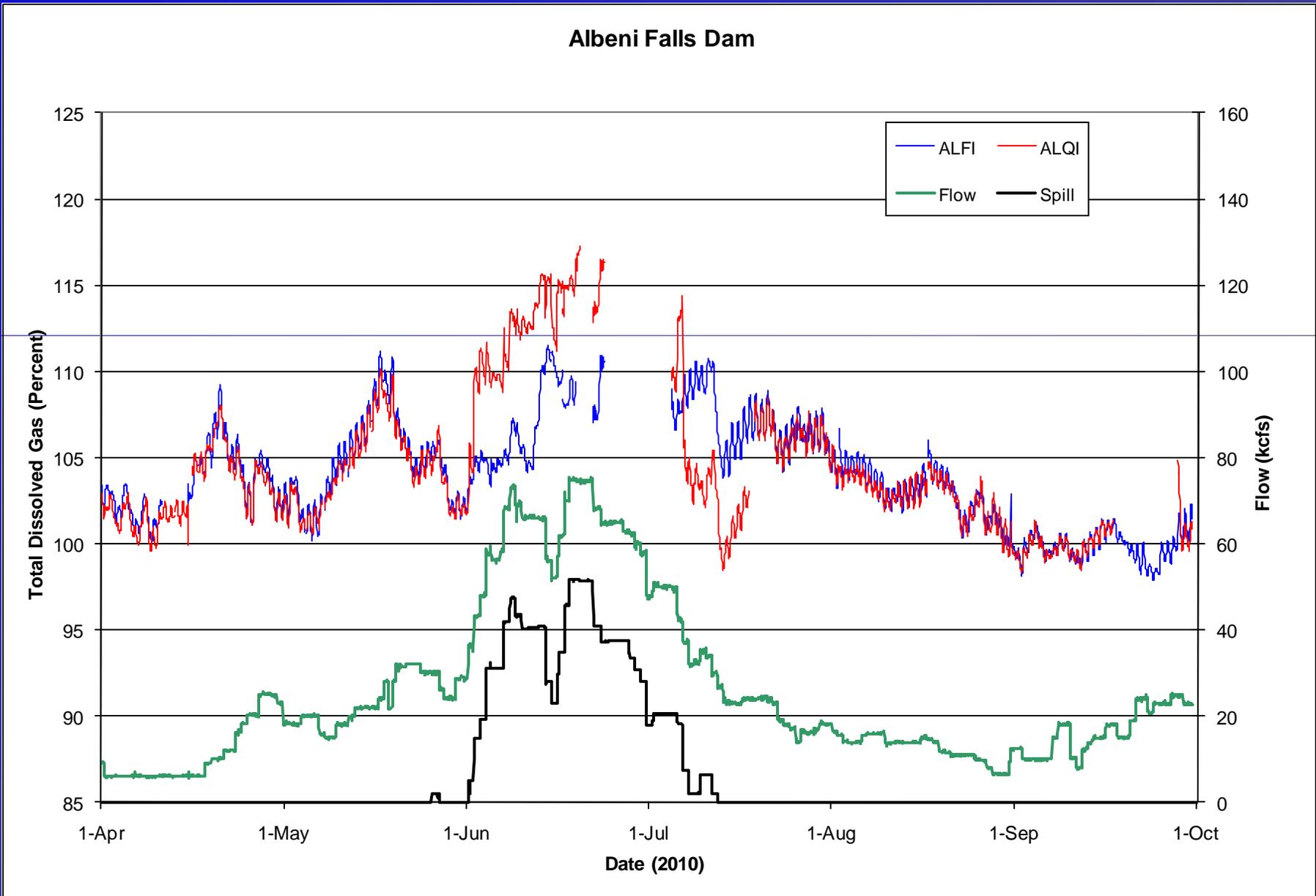
TDG Monitoring 2010



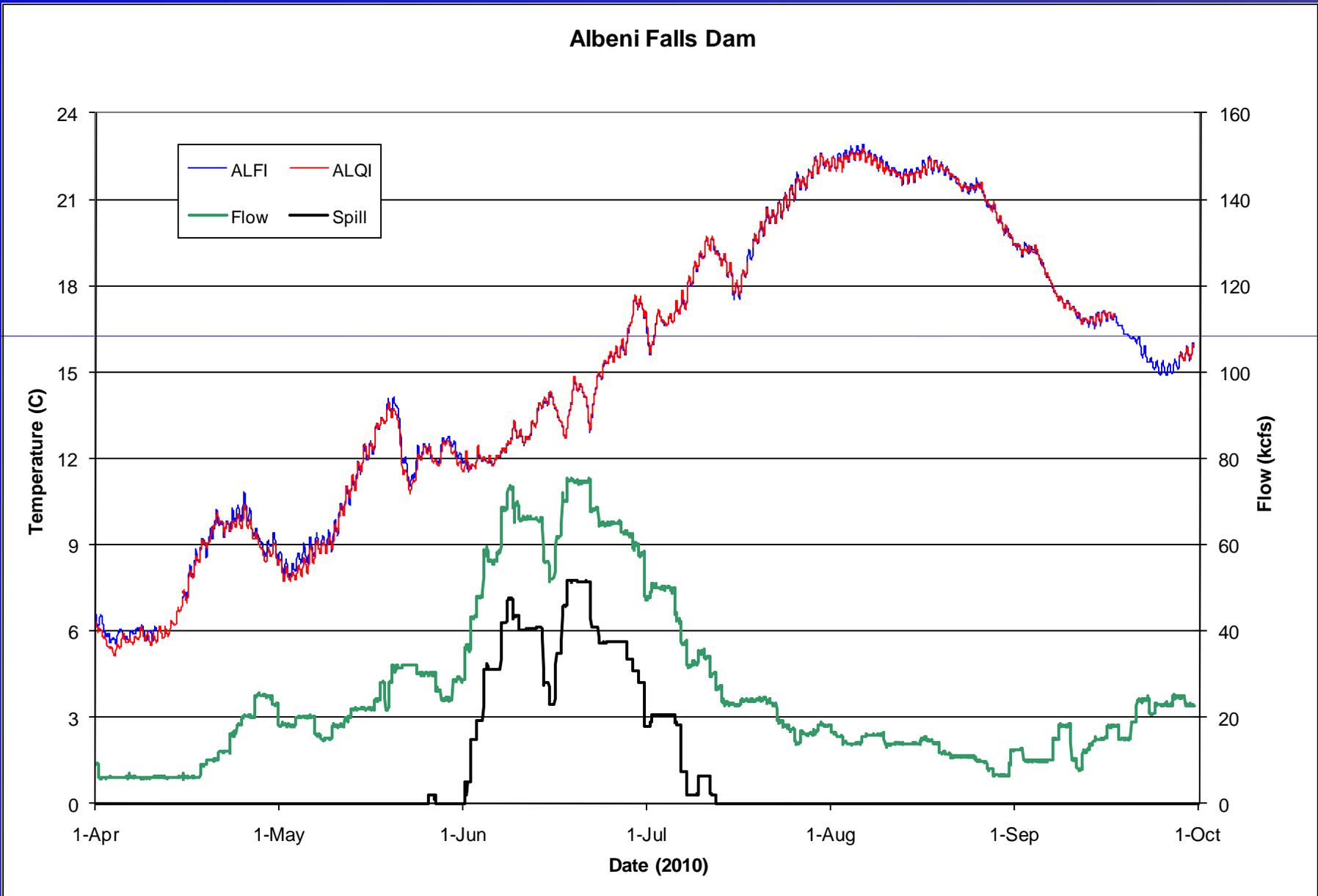
TDG Monitoring 2010

- 2010 Spill Season Results for Albeni Falls Dam
 - TDG-Forebay (ALFI)
 - Forebay TDG levels were largely a function of upstream TDG levels
 - Highest TDG value recorded was about 111%
 - TDG-Tailwater (ALFW and ALQI)
 - Highest TDG value recorded was about 116%
 - Higher spill volumes did not produce higher TDG saturations
 - TDG saturations largely a function of forebay TDG, head, and number of spillbays used
 - Temperature-Forebay/Tailwater
 - Forebay and tailwater exceeded IDEQ daily average temperature standard (19°C) from about July through the end of August
 - Forebay and tailwater exceeded IDEQ maximum daily temperature standard (22°C) from about mid July through mid August

TDG Monitoring 2010



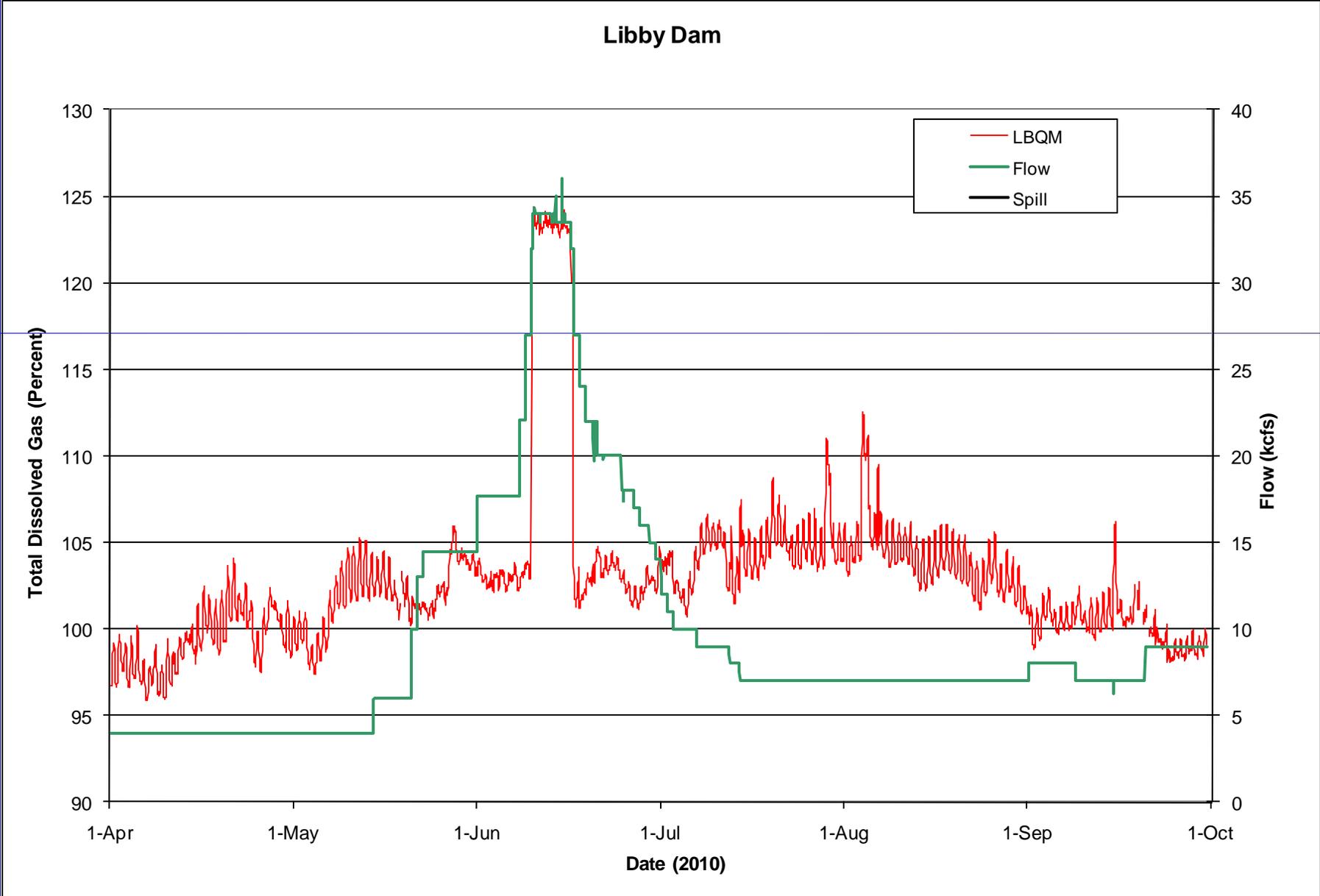
TDG Monitoring 2010



TDG Monitoring 2010

- 2010 Spill Season Results for Libby Dam
 - BiOp Spill during 2010
 - Max TDG of 125% during spill of about 9kcfs
 - Temperature did not exceed 18°C

TDG Monitoring 2010



TDG Monitoring 2010

