

Total Dissolved Gas Monitoring 2013: Chief Joseph Dam, Albeni Falls Dam, and Libby Dam



TDG Monitoring 2013

- Introduction

- 5 monitoring sites

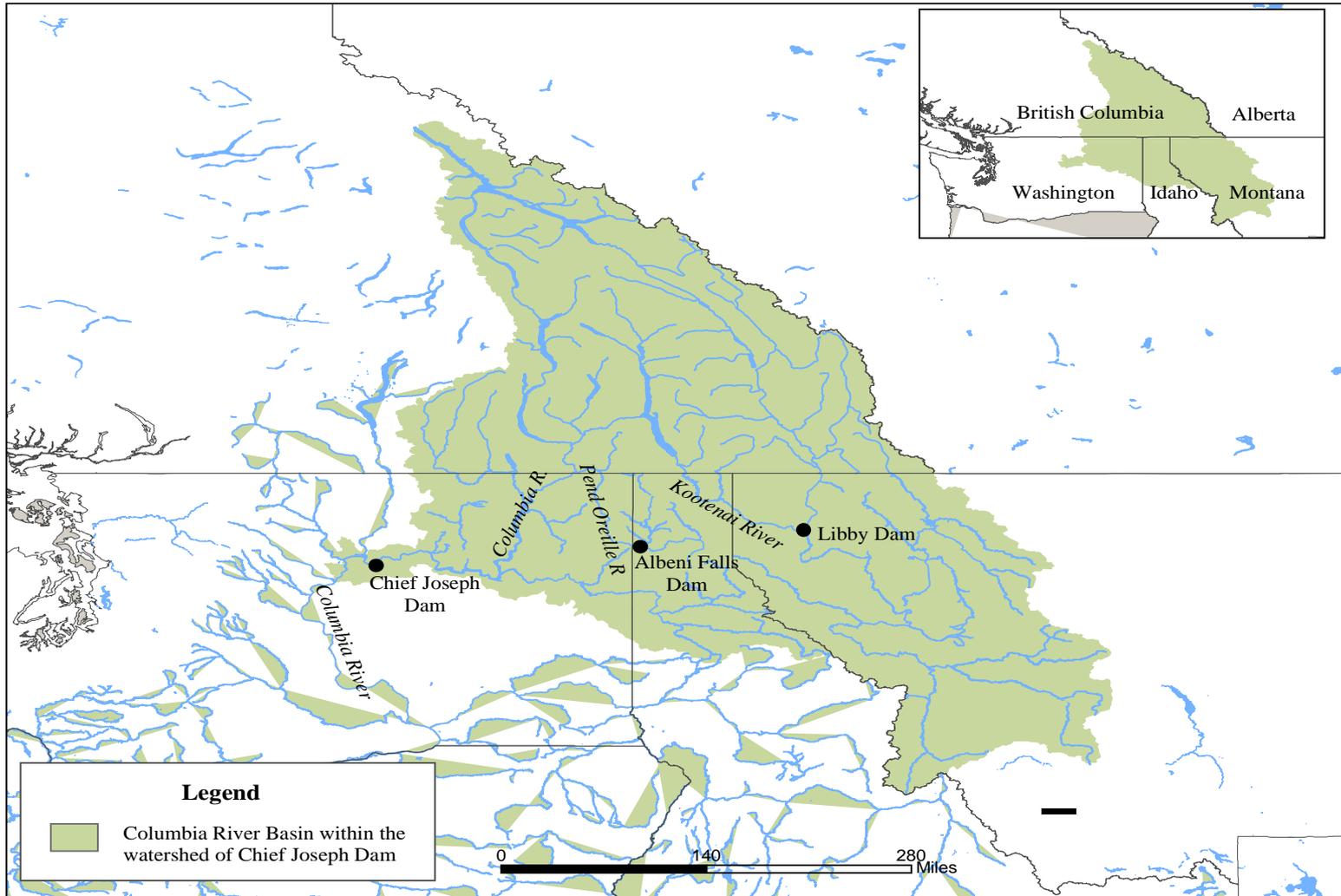
- Libby tailwater
 - Chief Joseph forebay and tailwater
 - Albeni Falls forebay and tailwater

- Seasonal sites

- Libby/Chief Joseph: April 1 – September 30
 - Albeni Falls: All year

- Calibration schedule

- Sites calibrated every two weeks (April–September) and every month (October–March)



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

TDG Monitoring 2013

- **Chief Joseph**

- Equipment

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

- **Albeni Falls**

- Equipment

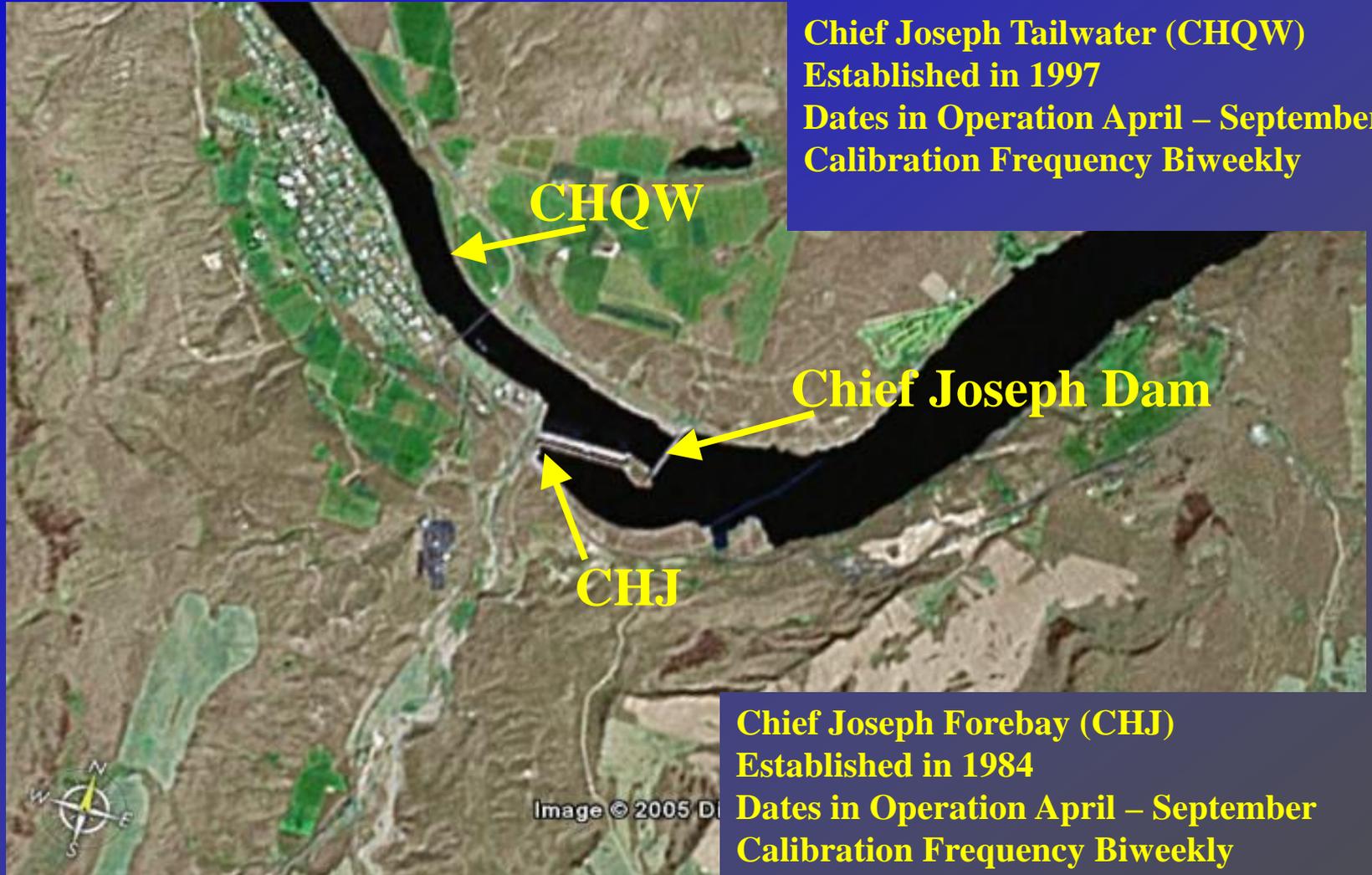
- Hydrolab MiniSonde 4a TDG sensor/Sutron barometer
 - Sutron 9210 XLite DCP, AC and Solar Power
 - Radio transmission station

- **Libby**

- Equipment

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

TDG Monitoring 2013



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

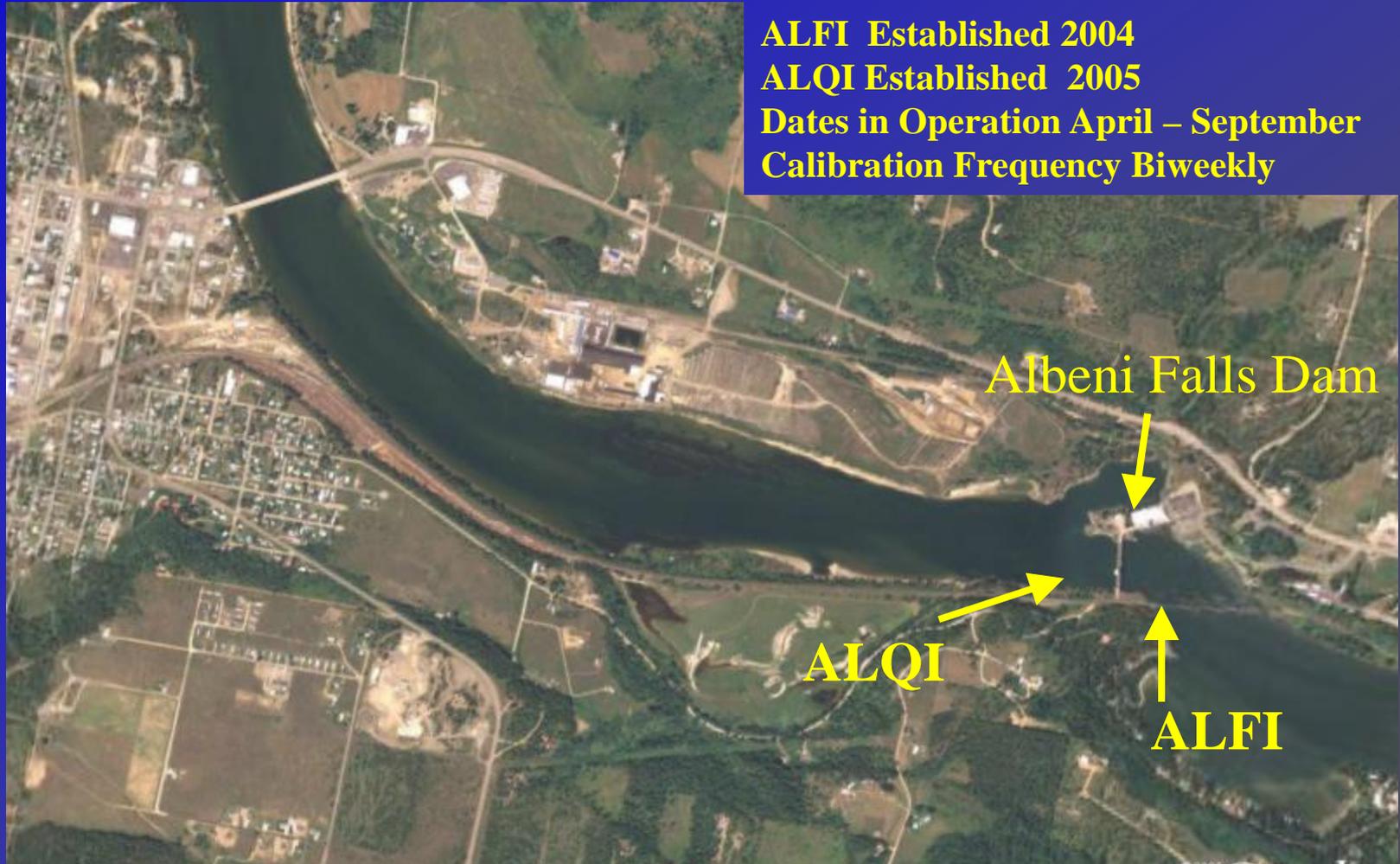
Chief Joseph Dam

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

Chief Joseph Total Dissolved Gas Monitoring System

TDG Monitoring 2013

ALFI Established 2004
ALQI Established 2005
Dates in Operation April – September
Calibration Frequency Biweekly



Albeni Falls Total Dissolved Gas Monitoring System

TDG Monitoring 2013



Established 2003
Dates in Operation
April – September
Calibration Frequency Biweekly

Libby Dam Total Dissolved Gas Monitoring System

TDG Data Completeness 2013

Station Name	Station Abbreviation	Planned monitoring in hours	Number of missing hourly values	Number of hourly values not passing QA	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	2	100.0	99.9
Chief Joseph Tailwater	CHQW	4392	56	4	98.7	98.6
Albeni Falls Forebay	ALFI	4392	1	8	99.9	99.8
Albeni Falls Tailwater	ALQI	4392	1	39	99.9	99.1
Libby Tailwater	LBQM	4392	558	2	87.3	87.2

Temperature Data Completeness 2013

Station Name	Station Abbreviation	Planned monitoring in hours	Number of missing hourly values	Number of hourly values not passing QA	Percentage of real-time Temperature data received	Percentage of real-time Temperature data received and passing quality assurance
Chief Joseph Forebay	CHJ	4392	0	0	100.0	100.0
Chief Joseph Tailwater	CHQW	4392	0	0	100.0	100.0
Albeni Falls Forebay	ALFI	4392	1	1	99.9	99.9
Albeni Falls Tailwater	ALQI	4392	2	40	99.9	99.0
Libby Tailwater	LBQM	4392	558	0	87.3	87.3

TDG Monitoring 2013

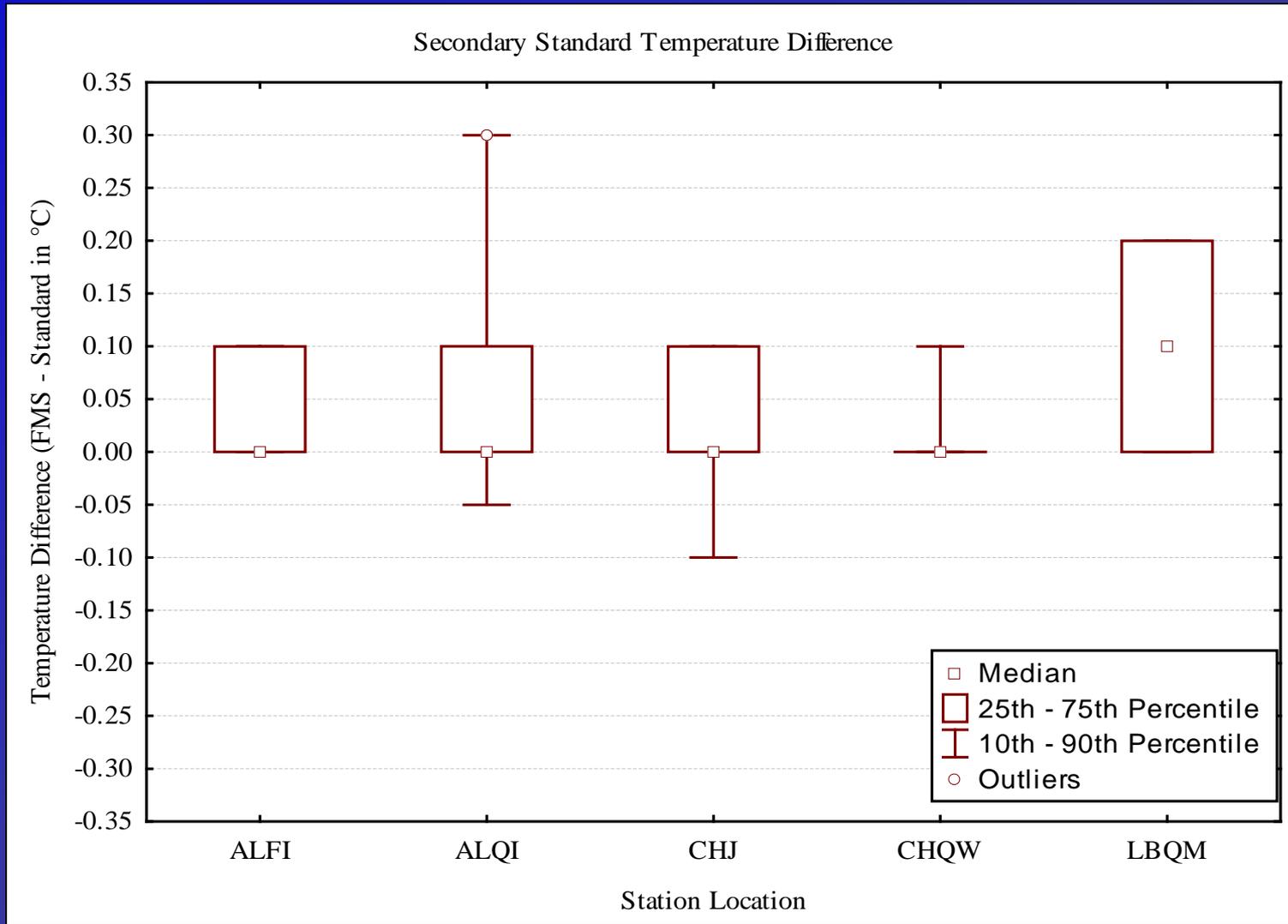
- Overview of 2013 TDG and Temperature Data
 - Data completeness
 - Chief Joseph Forebay (CHJ) and Tailwater (CHQW)
 - DCP malfunctions and programming problems
 - Calibration visits
 - Albeni Falls Forebay (ALFI) and Tailwater (ALQI)
 - DCP malfunctions and programming problems
 - Vandalism
 - Calibration visits
 - Libby Tailwater (LBQM)
 - Contract problems
 - Calibration visits

TDG and Temperature QA/QC 2013

	Temperature	Total Dissolved Gas Percent			
	°C	100	113	126	140
Num	63	63	63	63	63
min	-0.12	-0.25	-0.25	-0.28	-0.39
max	0.13	0.33	0.47	0.47	0.33
median	0.01	-0.03	0.03	-0.03	-0.05
avg	0.02	-0.02	0.02	0.00	-0.04
sd	0.06	0.11	0.13	0.14	0.13

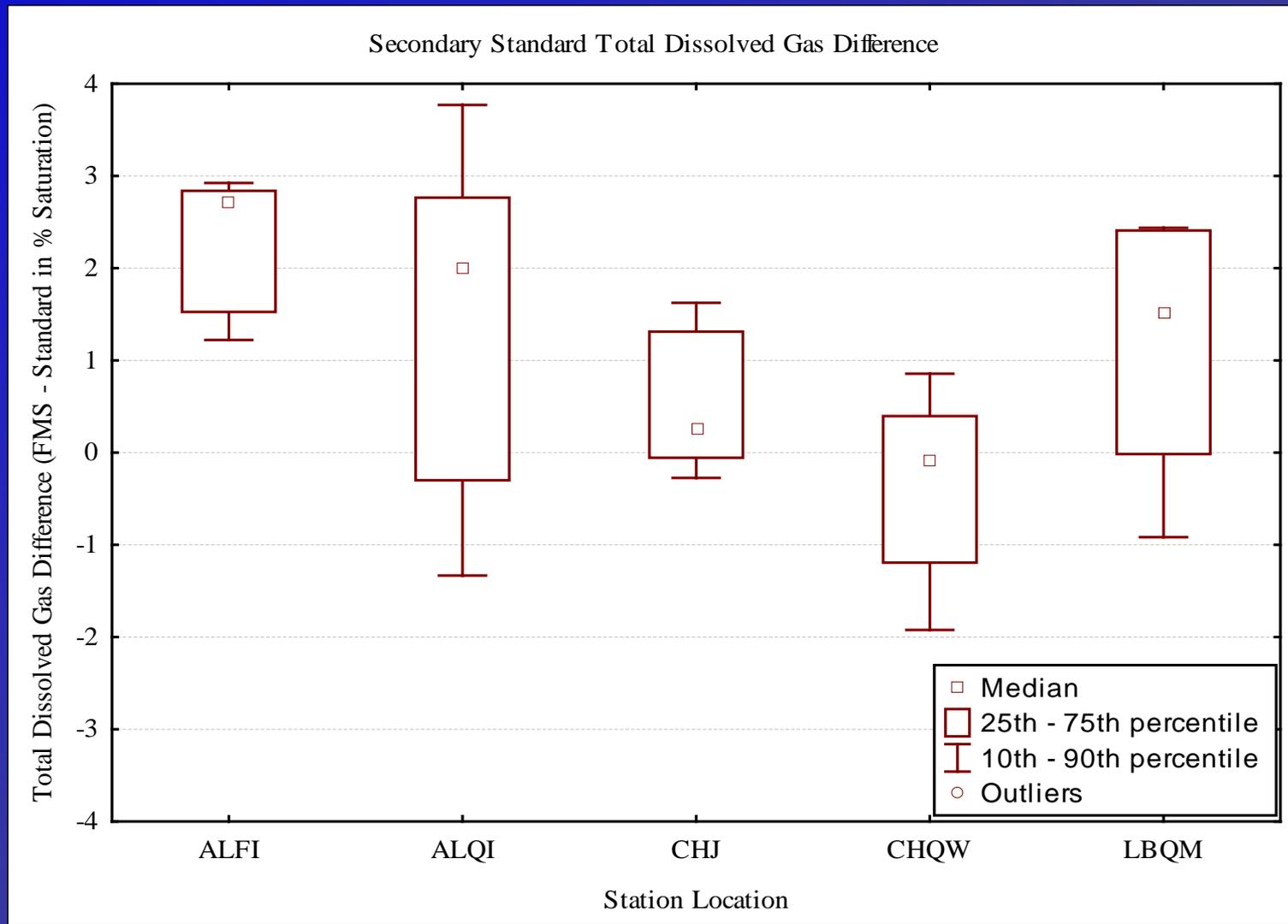
Difference between the primary standard and total dissolved gas instrument.

TDG and Temperature QA/QC 2013



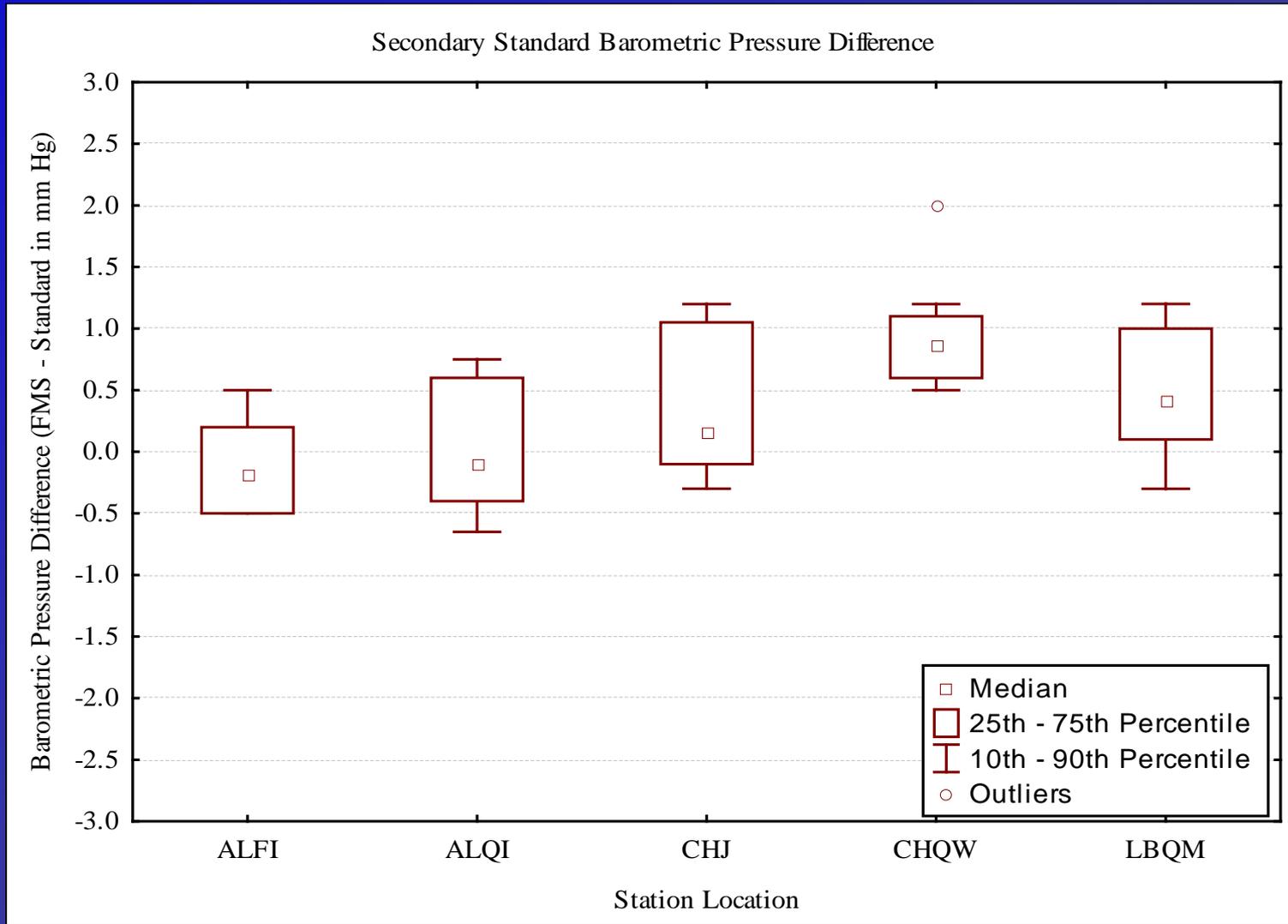
Difference between the secondary standard and the field thermometer

TDG and Temperature QA/QC 2013



Difference between the secondary standard and the TDG instrument

TDG and Temperature QA/QC 2013



Difference between the secondary standard and the Barometer

TDG Monitoring 2013

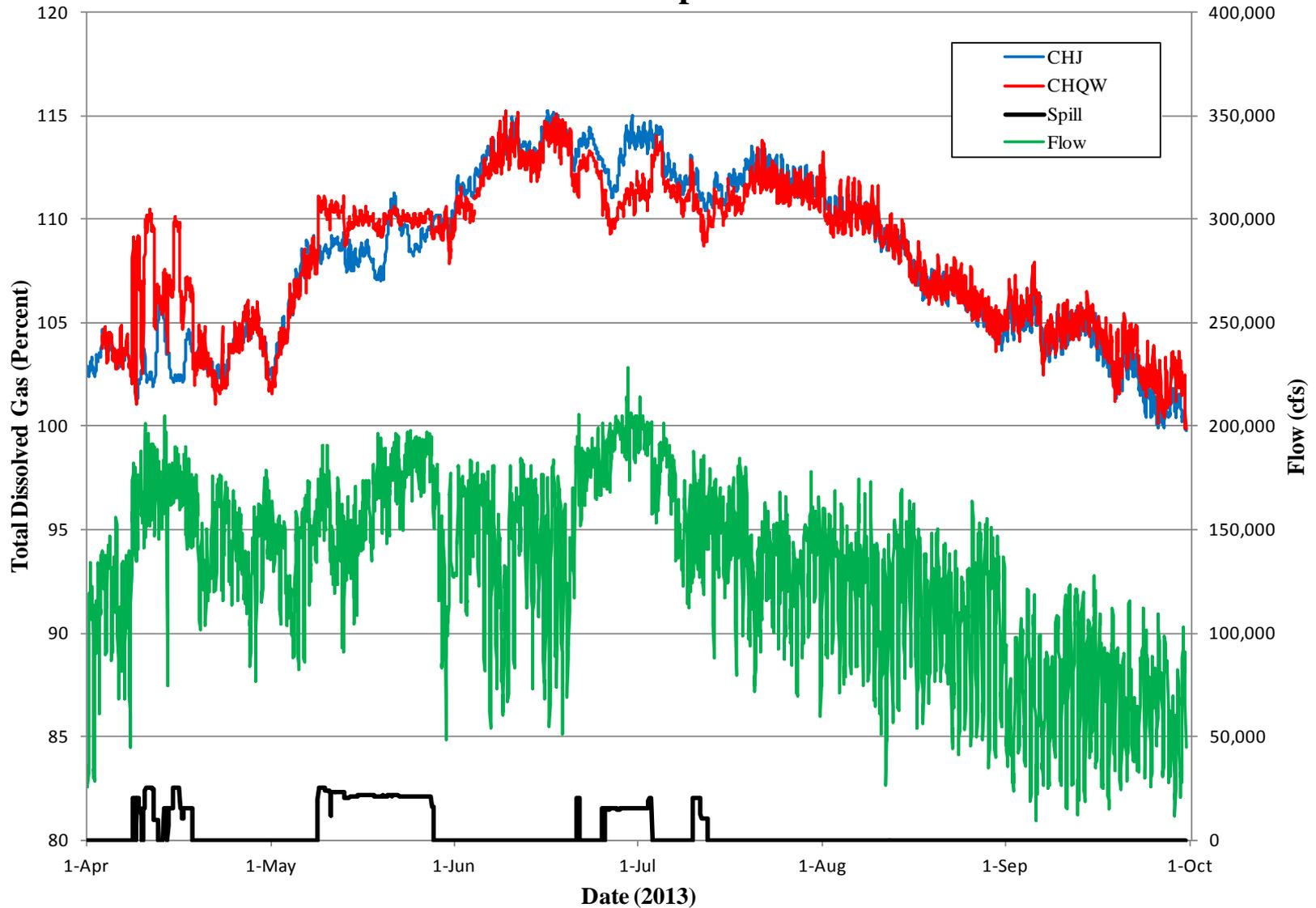
- Overview of 2013 Data QA/QC
 - Laboratory calibration data were good and within 0.1 ° C for temperature and 1% saturation for TDG
 - Field calibration data were good and generally within 0.2 ° C for temperature , 2mm Hg for barometric pressure, and 2% saturation for TDG at all stations

TDG Monitoring 2013

- 2013 Spill Season Results for Chief Joseph Dam
 - TDG-Forebay (CHJ)
 - Forebay TDG levels a function of Grand Coulee tailwater TDG
 - Maximum forebay TDG about 115%
 - TDG-Tailwater (CHQW)
 - Low spill volumes
 - Station located in undiluted spillway flow, not mixed river
 - Max TDG about 115% during period of no spill
 - Temperature-Forebay/Tailwater
 - Little difference between forebay and tailwater temperatures

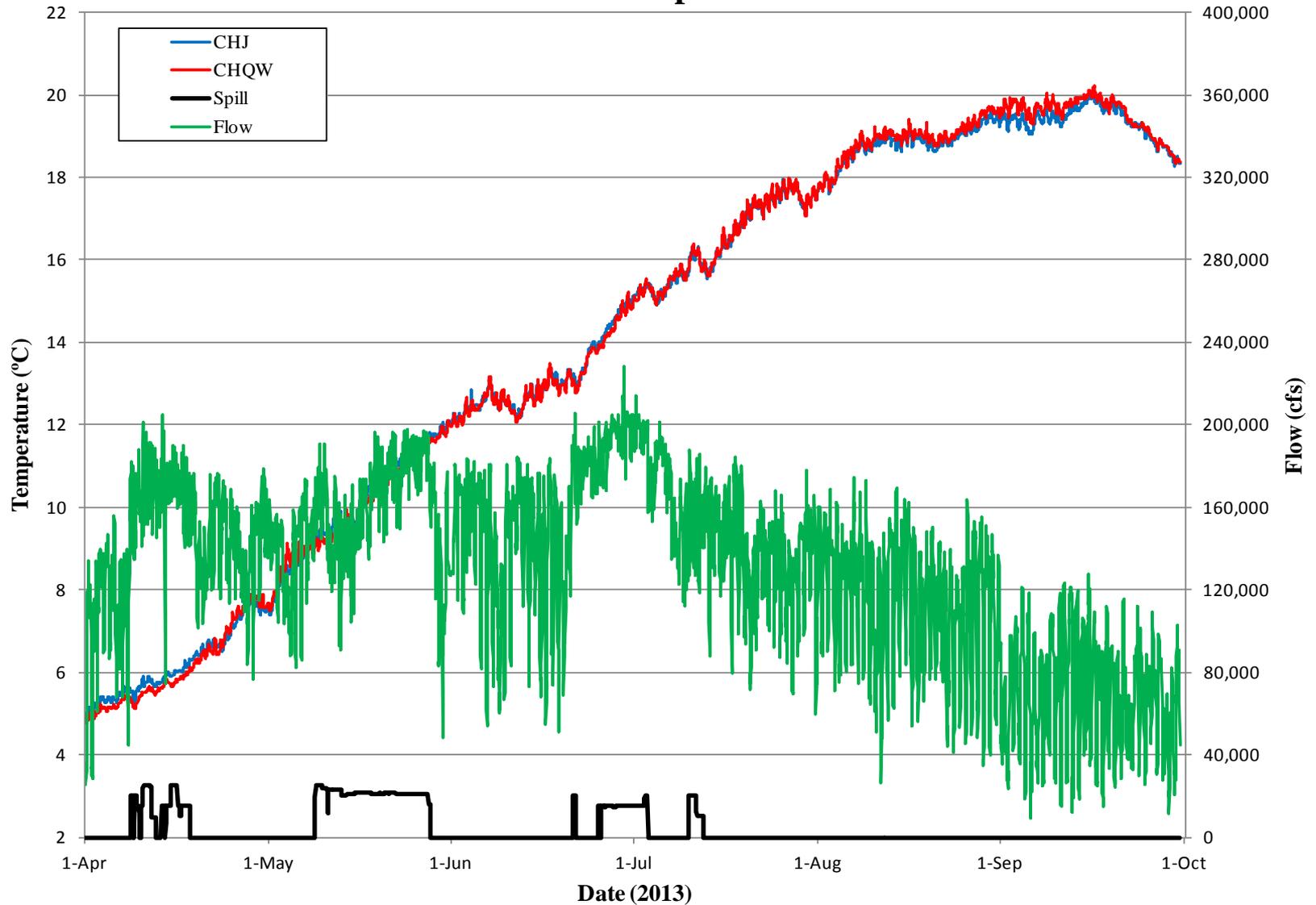
TDG Monitoring 2013

Chief Joseph Dam



TDG Monitoring 2013

Chief Joseph Dam

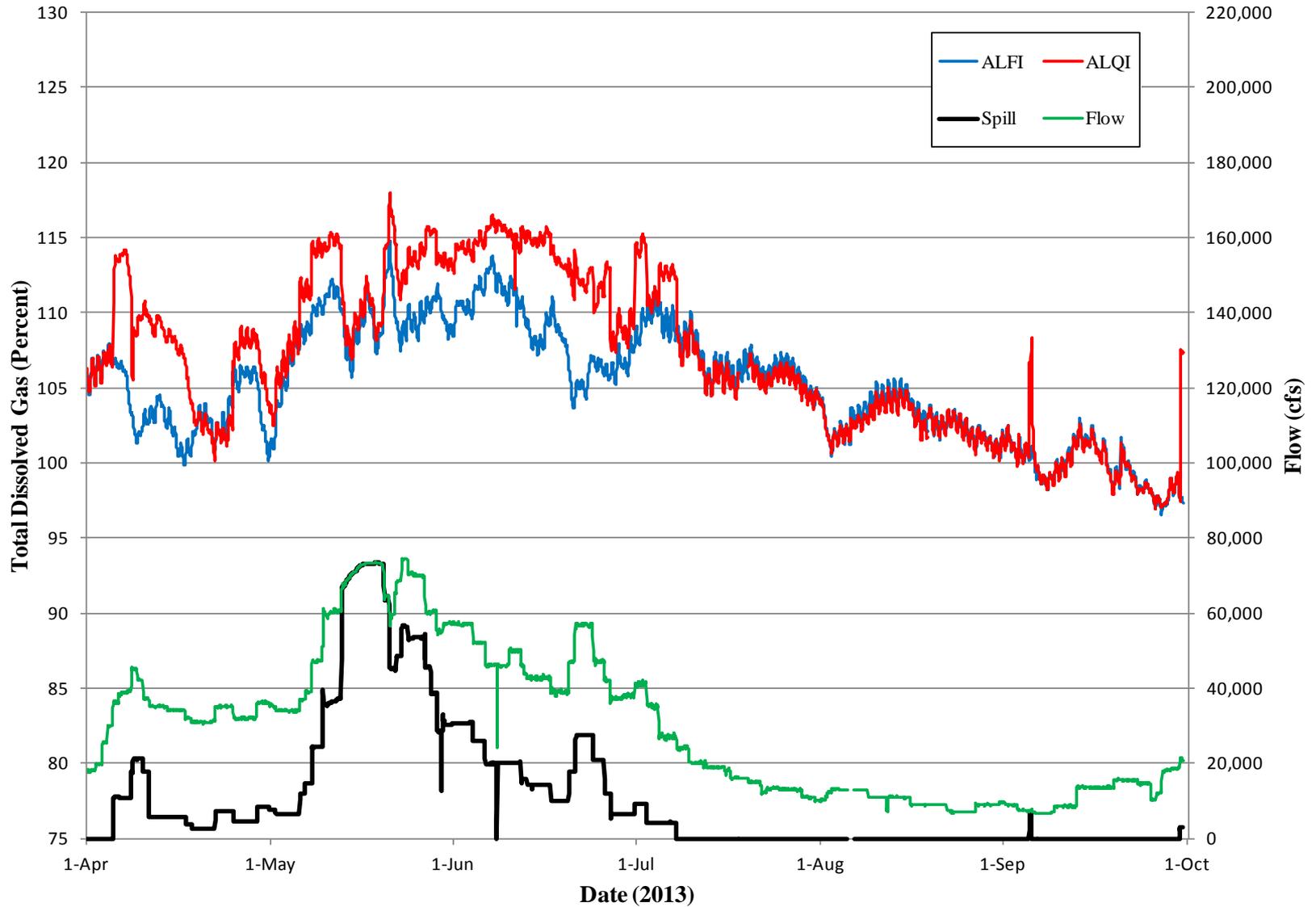


TDG Monitoring 2013

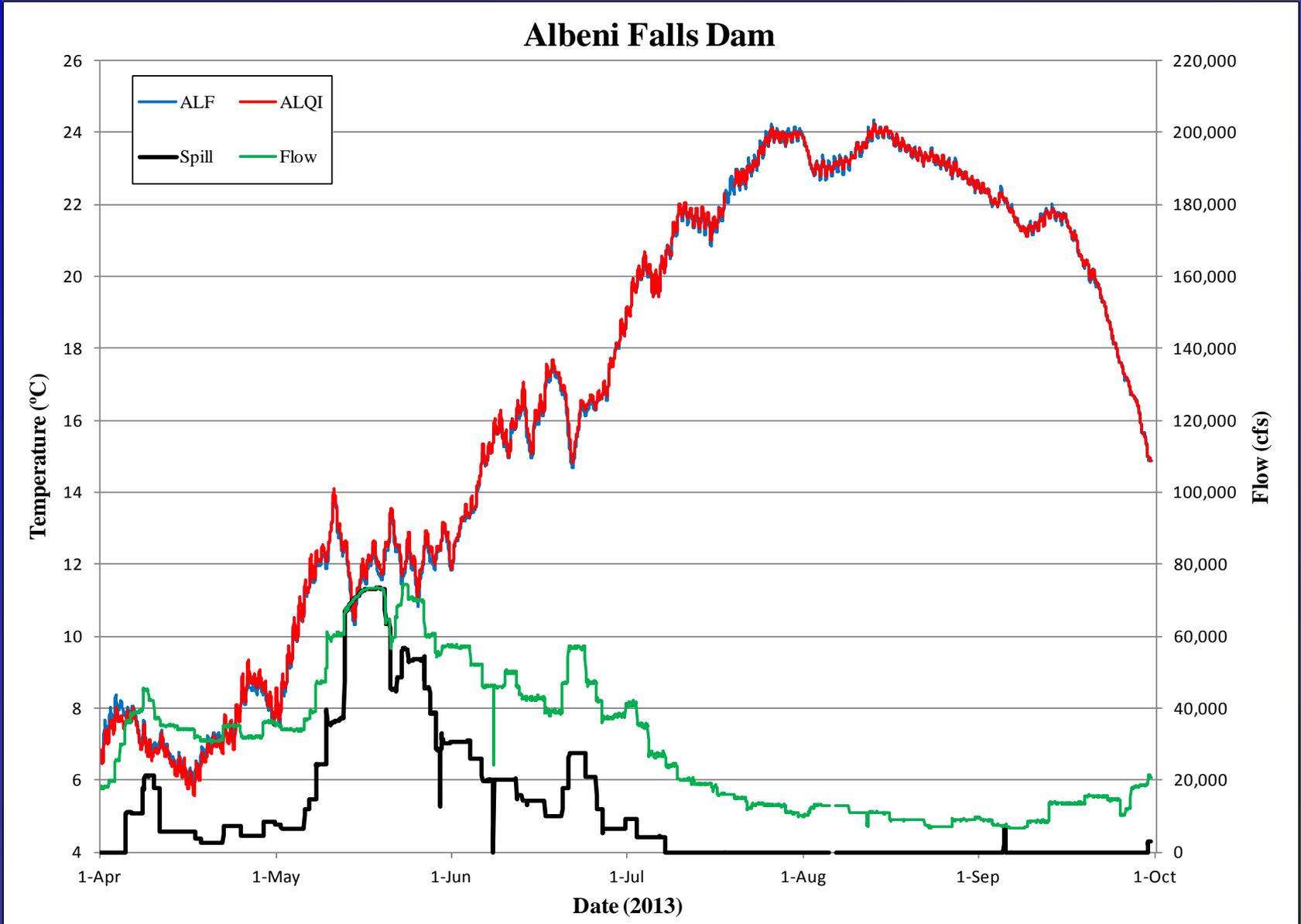
- 2013 Spill Season Results for Albeni Falls Dam
 - TDG-Forebay (ALFI)
 - Function of upstream TDG saturations
 - Highest TDG value was about 115%
 - TDG-Tailwater (ALQI)
 - Highest TDG value was about 118% during 46 kcfs spill
 - Higher spill volumes did not produce higher TDG saturations
 - Increase in tailwater TDG saturations largely a function of forebay TDG, head, and number of spillbays used
 - Max tailwater TDG increase (10%) during spills of 11 kcfs via 5 of 10 bays, and 25 kcfs via 6 of 10 bays
 - Temperature-Forebay/Tailwater
 - Forebay and tailwater temperatures are similar, no stratification

TDG Monitoring 2013

Albeni Falls Dam



TDG Monitoring 2013

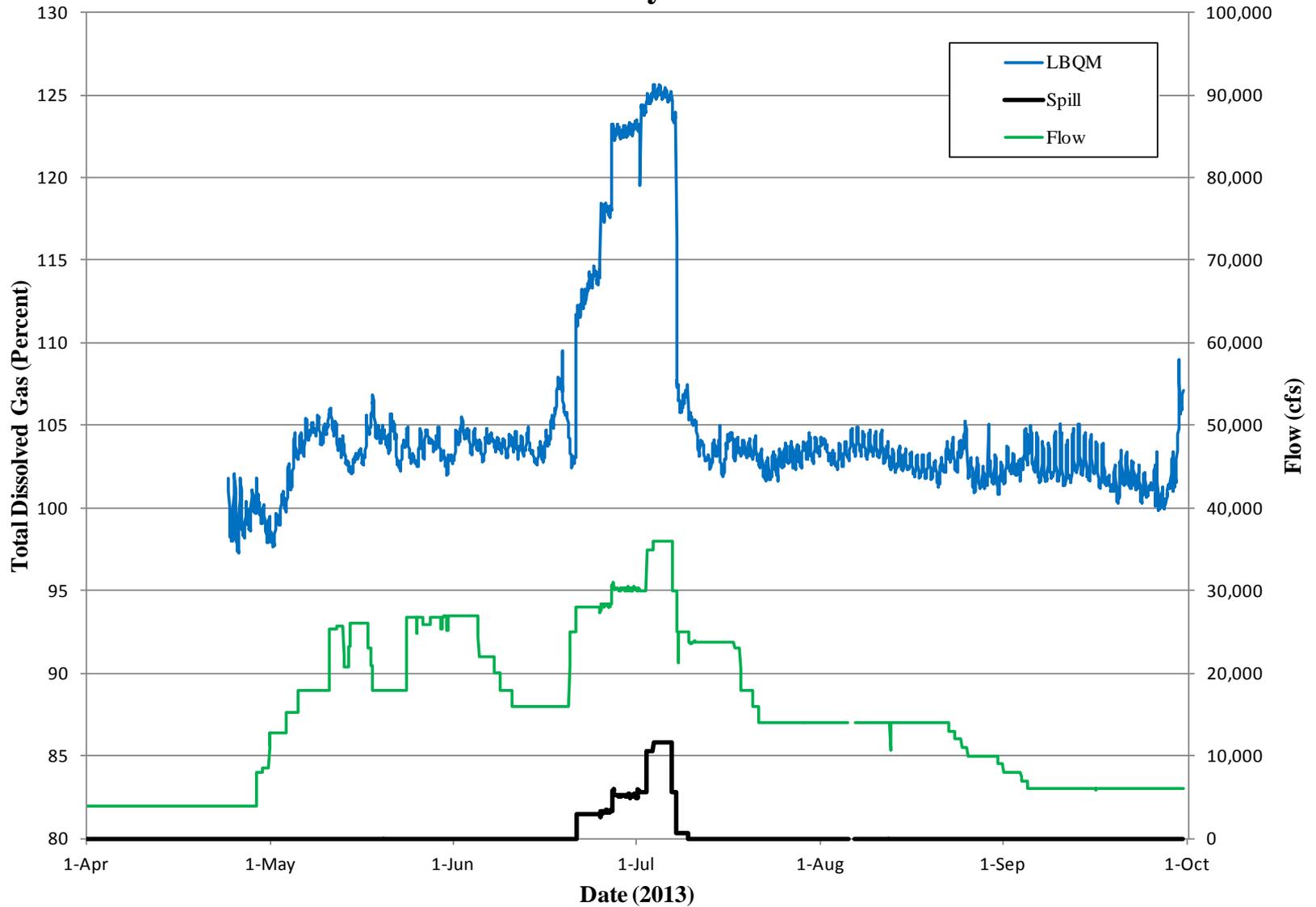


TDG Monitoring 2013

- 2013 Spill Season Results for Libby Dam
 - Spillway used during 2013
 - Max TDG of 125% during 11 kcfs spill
 - Temperature did not exceed 18°C

TDG Monitoring 2013

Libby Dam



TDG Monitoring 2013

Libby Dam

