

Appendix D
Data Sets Used for the
Lake Roosevelt Portion of the TMDL

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Table D-1. Spokane Tribe Data

Locations	15 stations in Lake Roosevelt
Timeframe	May 2001 through 2002
Sample Type	Grab samples from boat that was allowed to drift or held steady in the wind to keep the hydrolab cable vertical
Frequency	Every 2 weeks to 1 month, less or not at all in winter
Equipment	Hydrolab Surveyor 4a and Data Sonde 4
Frequency of Calibration and Maintenance	Prior to the first day of each sampling round: every 2 weeks from May – October 2001 and monthly from May – October 2002.
Calibration for BP Procedure	Hydrolab was calibrated to barometric pressure from Fairchild Air Force Base
Calibration for TGP Procedure	Hydrolab was calibrated to barometric pressure from Fairchild Air Force Base and 200 mm Hg plus barometric pressure from Fairchild AFB, corrected pressure generated by a Digimon gage
Quality Control of Data	Electronic and manual data records checked against each other; data compared to readings from the U.S. Bureau of Reclamation stations data from the international border and Grand Coulee Forebay
Data Recording	Electronically and manually
Depth of Measurements	Every 3 meters from 0 to 33 meters depth
Period of Equilibration	At least 90 seconds at each depth sampled; prior to commencement of sampling hydrolab was allowed to equilibrate for 15 minutes in the reservoir
Period of Equilibration	At least 90 seconds at each depth sampled; prior to commencement of sampling hydrolab was allowed to equilibrate for 15 minutes in the reservoir.
Frequency of Data Download	N/A
Service/Maintenance Records	N/A
Maintenance Procedures	N/A
Data Download Procedure	N/A
Cross-sectional Representation	N/A

BP – barometric pressure

TGP – total gas pressure

Table D-2. Environment Canada Station

Locations	Ecology station on the east bank of the Columbia River 1.4 km upstream of the Pend Oreille River Confluence
Timeframe	June, august and Mid-September through November 1999.
Sample Type	Equipment was housed in the Teck Cominco Water Quality Sampling Station
Data Resolution	Hourly
Equipment	N/A
Frequency of Calibration and Maintenance	Every other week during spill season; monthly during off-season
Calibration Procedure for BP	Primary field sensor calibrated to a NIST-certified mercury barometer sensor (in lab), to a secondary standardized barometer during FMS calibration.
Calibration for TGP Procedure	Probe readings compared to NIST tested Hydrolab in field before and after being pulled; if readings vary by more than 2 mm Hg meter is closely checked for source of dysfunction or replaced; Annual servicing in laboratory includes calibration of TGP meter at two pressures.
Quality Control of Data	An excel spreadsheet was used to review the data and identify suspect or obviously erroneous readings. Methods used to identify suspect data were graphical presentations, data sorts, and comparison with secondary TGP readings.
Data Recording	Electronic
Depth of Measurements	N/A
Period of Equilibration	N/A
Frequency of Data Download/Broadcast	N/A
Service/Maintenance Records	N/A
Maintenance Procedure	Clean; replace membrane; check TDG membrane for operability during field servicing. Pre- and post-deployment calibration checks for TDG, temperature, and barometric sensors against primary or secondary standards.
Data Download Procedure	N/A
Cross-sectional Representation	N/A

Table D-3. Teck Cominco - Pend Oreille 1999; Collected by RL&L Environmental Services Ltd.

Locations	1 station in Waneta Dam Forebay between turbine units 2 & 3
Timeframe	April 1, 1999 through early November 1999
Sample Type	A floating platform supporting a submerged 4 m standpipe was used to house the probe, which was in an insulated aluminum cabinet. The equipment was secured to the dam face by two tethers.
Frequency	10 minutes
Equipment	Common Sensing TBO-F unit with external Onset DL3 data logger
Frequency of Calibration and Maintenance	Every 2 weeks; the 1st and 15th of each month.
Calibration Procedure for Barometric Pressure	The station meter barometer readings were compared to a second calibrated instrument, the station meter was then calibrated to current atmospheric pressure by removing the silastic membrane and exposing the probe to the atmosphere
Calibration Procedure for TGP	After comparing the station meter total pressure readings against a second calibrated instrument, the station meter was then calibrated to current atmospheric pressure by removing the silastic membrane and exposing the probe to the atmosphere. To ensure accurate TGP readings, the silastic membrane on the station probe was exchanged with a new membrane in order to limit the amount of algal growth on the membrane and to prevent condensation from forming within the membrane.
Quality Control of Data	An excel spreadsheet was used to review the data and identify suspect or obviously erroneous readings. Methods used to identify suspect data were graphical presentations, data sorts, and comparison with secondary TGP readings.
Data Recording	Electronic
Depth of Measurements	3-4 meters
Period of Equilibration	N/A
Frequency of Data Download	Every 2 weeks
Service/Maintenance Records	N/A
Maintenance Procedure	A typical service visit involved an inspection for damage and the calibration and maintenance of the station probe.
Data Download Procedure	Data downloaded to portable computer at time of field servicing for long-term stations and at time of removal for short-term stations.
Cross-sectional Representation	The station location between turbine 2 and 3 was selected based on the assumption of complete mixing of water from upstream facilities by the time the water reached Waneta Dam forebay.

Table D-4. Teck Cominco and BC Hydro Data - Kootenai River 1995-1996; Collected by RL&L Environmental Services Ltd.

Locations	2 long-term stations Brilliant Dam forebay (100m Upstream of the dam on the North shore) and Brilliant Dam tail race (2 km downstream of the dam on the South shore)
Timeframe	June July and September 1995
Sample Type	N/A
Frequency	One- or five-minute intervals
Equipment	2 - Common Sensing TBO-F (DL) units with Onset DL3 data loggers
Frequency of Calibration and Maintenance	Every 2 weeks at long-term stations, maintenance between deployment for other instruments
Calibration Procedure for Barometric Pressure	The station meter barometer readings were compared to a second calibrated instrument, the station meter was then calibrated to current atmospheric pressure by removing the silastic membrane and exposing the probe to the atmosphere
Calibration Procedure for TGP	After comparing the station meter total pressure readings against a second calibrated instrument, the station meter was then calibrated to current atmospheric pressure by removing the silastic membrane and exposing the probe to the atmosphere. To ensure accurate TGP readings, the silastic membrane on the station probe was exchanged with a new membrane in order to limit the amount of algal growth on the membrane and to prevent condensation from forming within the membrane.
Quality Control of Data	The data were checked to identify any suspicious or obviously erroneous data. Methods used included graphical Presentations, sorts and comparisons with secondary data.
Data Recording	Electronic
Depth of Measurements	3-4 meters
Period of Equilibration	20 minutes
Frequency of Data Download	Every 2 weeks at long-term stations, maintenance between deployment for other instruments
Service/Maintenance Records	N/A
Maintenance Procedure	A typical service visit involved an inspection for damage and the calibration and maintenance of the station probe.
Data Download Procedure	Data downloaded to portable computer at time of field servicing
Cross-sectional Representation	N/A

Table D-5. BC Hydro Data - Pend Oreille River 1995-1998; Collected by RL&L Environmental Services Ltd.

Locations	3 stations; one in Seven Mile Dam Forebay one in Seven Mile Dam tail race and one upstream of the Seven Mile Dam near the Salmo River confluence.
Timeframe	June 1-18, 1998
Sample Type	
Frequency	5-minute intervals at Seven Mile Tail Race and Forebay; Ten-Minute intervals at the Salmo station.
Equipment	2 - Omnidata Easylogger & 1 - Commonsensing DL-3
Frequency of Calibration and Maintenance	N/A
Calibration Procedure for Barometric Pressure	N/A
Calibration Procedure for TGP	After comparing the station meter total pressure readings against a second calibrated instrument, the station meter was then calibrated to current atmospheric pressure by removing the silastic membrane and exposing the probe to the atmosphere. To ensure accurate TGP readings, the silastic membrane on the station probe was exchanged with a new membrane in order to limit the amount of algal growth on the membrane and to prevent condensation from forming within the membrane.
Quality Control of Data	N/A
Data Recording	Electronic
Depth of Measurements	3-4 meters
Period of Equilibration	20 minutes
Frequency of Data Download	N/A
Service/Maintenance Records	N/A
Maintenance Procedure	A typical service visit involved an inspection for damage and the calibration and maintenance of the station probe.
Data Download Procedure	Data downloaded to portable computer at time of field servicing
Cross-sectional Representation	N/A

Table D-6. Teck Cominco Data - Pend Oreille River 1997; Collected by RL&L Environmental Services Ltd.

Locations	1 station at Waneta Dam forebay and Tow stations at Waneta Dam Tail Race The forebay station was located on the deck of the dam. The tail race station was 100 m downstream from the Waneta Bridge.
Timeframe	June through September 1997
Sample Type	Continuous and spot measurements
Frequency	N/A
Equipment	Common Sensing TBO-F (DL) monitor with Onset DL3 data loggers
Frequency of Calibration and Maintenance	Every 2 weeks
Calibration Procedure for Barometric Pressure	The station meter barometer readings were compared to a second calibrated instrument, the station meter was then calibrated to current atmospheric pressure by removing the silastic membrane and exposing the probe to the atmosphere
Calibration Procedure for TGP	After comparing the station meter total pressure readings against a second calibrated instrument, the station meter was then calibrated to current atmospheric pressure by removing the silastic membrane and exposing the probe to the atmosphere. To ensure accurate TGP readings, the silastic membrane on the station probe was exchanged with a new membrane in order to limit the amount of algal growth on the membrane and to prevent condensation from forming within the membrane.
Quality Control of Data	The data were checked to identify any suspicious or obviously erroneous data. Methods used included graphical Presentations, sorts and comparisons with secondary data.
Data Recording	Electronic
Depth of Measurements	N/A
Period of Equilibration	N/A
Frequency of Data Download	monthly
Service/Maintenance Records	N/A
Maintenance Procedure	A typical service visit involved an inspection for damage and the calibration and maintenance of the station probe.
Data Download Procedure	N/A
Cross-sectional Representation	N/A

Table D-7. Teck Cominco Data - Pend Oreille River 1995-1996; Collected by RL&L Environmental Services Ltd.

Locations	2 stations at Waneta Dam forebay. The 1995 station was located 40 m upstream of the dam on the North reservoir bank. The 1996 station was located on the deck of the dam. Spot measurements were taken in the tail race of the dam.
Timeframe	July 7 & 8 1995; December 1995 - December 1996; Spot measurements taken in May, June, July, September and October 1995
Sample Type	N/A
Frequency	One- or five-minute intervals
Equipment	Common Sensing TBO-F (DL) monitor with Onset DL3 data loggers
Frequency of Calibration and Maintenance	Every 2 weeks
Calibration Procedure for Barometric Pressure	The station meter barometer readings were compared to a second calibrated instrument, the station meter was then calibrated to current atmospheric pressure by removing the silastic membrane and exposing the probe to the atmosphere
Calibration Procedure for TGP	After comparing the station meter total pressure readings against a second calibrated instrument, the station meter was then calibrated to current atmospheric pressure by removing the silastic membrane and exposing the probe to the atmosphere. To ensure accurate TGP readings, the silastic membrane on the station probe was exchanged with a new membrane in order to limit the amount of algal growth on the membrane and to prevent condensation from forming within the membrane.
Quality Control of Data	The data were checked to identify any suspicious or obviously erroneous data. Methods used included graphical Presentations, sorts and comparisons with secondary data.
Data Recording	Electronic
Depth of Measurements	3-4 meters
Period of Equilibration	20 minutes
Frequency of Data Download	Every 2 weeks
Service/Maintenance Records	N/A
Maintenance Procedure	A typical service visit involved an inspection for damage and the calibration and maintenance of the station probe.
Data Download Procedure	Data downloaded to portable computer at time of field servicing
Cross-sectional Representation	N/A

Table D-8. Columbia River Integrated Environmental Monitoring Program Data - Hugh Keenleyside Dam 1995-1998; Collected by RL&L Environmental Services Ltd.

Locations	2 long-term stations: Hugh Keenleyside Dam Forebay (HLK) station (est. 1991) UTM 04440008E 5465751N; 10m upstream of the dam face on the north side of the forebay guidewall and Robson station (est. 1993) UTM 044886E 546501N
Timeframe	1995-1998
Sample Type	HLK - meter and logger were placed in side the dam control room connected to the probe by a cable; Robson the meter has been housed in a weatherproof cabinet from 1998 onward, the probe is in a 35m long pipe that extends into the water; from 1998 on the pipe was 100mm diameter ABS and is entrenched.
Frequency	5 minutes
Equipment	2 Common Sensing TBO-FDL with Onset Instrument Inc. DL3 logger. Two TBO-DL units, manufactured by collaboration between Point Four Systems Inc. and Common Sensing Inc. were used for calibration.
Frequency of Calibration and Maintenance	Every 2 weeks
Calibration Procedure for Barometric Pressure	The station meter barometer readings were compared to a second calibrated instrument, the station meter was then calibrated to current atmospheric pressure by removing the silastic membrane and exposing the probe to the atmosphere
Calibration Procedure for TGP	After comparing the station meter total pressure readings against a second calibrated instrument, the station meter was then calibrated to current atmospheric pressure by removing the silastic membrane and exposing the probe to the atmosphere. To ensure accurate TGP readings, the silastic membrane on the station probe was exchanged with a new membrane in order to limit the amount of algal growth on the membrane and to prevent condensation from forming within the membrane.
Quality Control of Data	N/A
Data Recording	Electronic
Depth of Measurements	3-4 meters
Period of Equilibration	20 minutes
Frequency of Data Download	Every 2 weeks
Service/Maintenance Records	N/A
Maintenance Procedure	A typical service visit involved an inspection for damage and the calibration and maintenance of the station probe.
Data Download Procedure	Data downloaded to portable computer at time of field servicing
Cross-sectional Representation	Horizontal and vertical cross sectional TGP profiles of the Columbia River were conducted in 1996 and indicated that complete mixing had occurred at the Robson station.

Table D-9. Columbia River Integrated Environmental Monitoring Program Data - Birchbank Station 1996; Collected by RL&L Environmental Services Ltd.

Locations	Birchbank station was located at a water gaging and monitoring station 25 km upstream of the international border and 24 km downstream of Castelgar on the east bank of the Columbia River.
Timeframe	1996
Sample Type	meter has been housed in a weatherproof cabinet the probe was in a 35m long pipe that extends into the water
Frequency	5 minutes
Equipment	Common Sensing TBO-FDL with Onset Instrument Inc. DL3 logger. A TBO-DL unit, manufactured by collaboration between Point Four Systems Inc. and Common Sensing Inc. was used for calibration.
Frequency of Calibration and Maintenance	Every 2 weeks
Calibration Procedure for Barometric Pressure	The station meter barometer readings were compared to a second calibrated instrument, the station meter was then calibrated to current atmospheric pressure by removing the silastic membrane and exposing the probe to the atmosphere
Calibration Procedure for TGP	After comparing the station meter total pressure readings against a second calibrated instrument, the station meter was then calibrated to current atmospheric pressure by removing the silastic membrane and exposing the probe to the atmosphere. To ensure accurate TGP readings, the silastic membrane on the station probe was exchanged with a new membrane in order to limit the amount of algal growth on the membrane and to prevent condensation from forming within the membrane.
Quality Control of Data	N/A
Data Recording	Electronic
Depth of Measurements	3-4 meters
Period of Equilibration	20 minutes
Frequency of Data Download	Every 2 weeks
Service/Maintenance Records	N/A
Maintenance Procedure	A typical service visit involved an inspection for damage and the calibration and maintenance of the station probe.
Data Download Procedure	Data downloaded to portable computer at time of field servicing
Cross-sectional Representation	N/A

Table D-10. Columbia River Integrated Environmental Monitoring Program Data - Brilliant Dam 1997 & 2000; Collected by RL&L Environmental Services Ltd.

Locations	2 continuous monitoring stations (Brilliant Dam forebay and tail race); 5 short-term stations (Slocan Pool, Slocan Confluence, Kootenai Canal tail race, South Slocan forebay and Lower Bonnington Forebay); 9 grab sample locations
Timeframe	1997
Sample Type	At long-term monitoring stations, equipment was housed in metal cabinets, Brilliant tail race station is installed in a standpipe founded in bedrock,
Frequency	10 minutes
Equipment	2 - Common Sensing TBO-F units with external Onset DL3 data loggers, 3 - Common Sensing TBO-F(DL) units with internal Onset DL3 data loggers, 3 - Common Sensing/Point Four Systems TBO-DL units, one Hydrolab Minisonde and one Novatek portable meter
Frequency of Calibration and Maintenance	N/A
Calibration Procedure for Barometric Pressure	The station meter barometer readings were compared to a second calibrated instrument, the station meter was then calibrated to current atmospheric pressure by removing the silastic membrane and exposing the probe to the atmosphere
Calibration Procedure for TGP	After comparing the station meter total pressure readings against a second calibrated instrument, the station meter was then calibrated to current atmospheric pressure by removing the silastic membrane and exposing the probe to the atmosphere. To ensure accurate TGP readings, the silastic membrane on the station probe was exchanged with a new membrane in order to limit the amount of algal growth on the membrane and to prevent condensation from forming within the membrane.
Quality Control of Data	N/A
Data Recording	Electronic at the long-term and short-term stations.
Depth of Measurements	3-5 meters
Period of Equilibration	20 minutes
Frequency of Data Download	N/A
Service/Maintenance Records	N/A
Maintenance Procedure	A typical service visit involved an inspection for damage and the calibration and maintenance of the station probe.
Data Download Procedure	Data downloaded to portable computer at time of field servicing for long-term stations and at time of removal for short-term stations.
Cross-sectional Representation	N/A

Table D-11. Columbia River Integrated Environmental Monitoring Program Data - Kootenai River 2000; Collected by RL&L Environmental Services Ltd.

Locations	2 long-term stations Brilliant Dam forebay (UTM: 0455075E, 5463600N) and Brilliant Dam tail race (UTM: 0454180E, 5462625N)
Timeframe	April 13 to August 1, 2000
Sample Type	At long-term monitoring stations, equipment was housed in metal cabinets, Brilliant tail race station is installed in a standpipe founded in bedrock,
Frequency	10 minutes
Equipment	initially 2 Common Sensing/Point Four Systems TBO-DL units were use, on April 27 there was a malfunction in the forebay station and it was replaced with the TBO-DL unit from the tail race and a Campbell Scientific I CR10X custom configured data logger was installed in the tail race station.
Frequency of Calibration and Maintenance	Every 2 weeks
Calibration Procedure for Barometric Pressure	The station meter barometer readings were compared to a second calibrated instrument, the station meter was then calibrated to current atmospheric pressure by removing the silastic membrane and exposing the probe to the atmosphere
Calibration Procedure for TGP	After comparing the station meter total pressure readings against a second calibrated instrument, the station meter was then calibrated to current atmospheric pressure by removing the silastic membrane and exposing the probe to the atmosphere. To ensure accurate TGP readings, the silastic membrane on the station probe was exchanged with a new membrane in order to limit the amount of algal growth on the membrane and to prevent condensation from forming within the membrane.
Quality Control of Data	N/A
Data Recording	Electronic
Depth of Measurements	3-5 meters
Period of Equilibration	20 minutes
Frequency of Data Download	CR10X data logger in tail race daily;
Service/Maintenance Records	N/A
Maintenance Procedure	A typical service visit involved an inspection for damage and the calibration and maintenance of the station probe.
Data Download Procedure	TBO-DL data downloaded to portable computer at time of field servicing; CR10X data downloaded remotely on a daily basis.
Cross-sectional Representation	N/A

Table D-12. Columbia River Integrated Environmental Monitoring Program Data - Kootenai River 1999; Collected by RL&L Environmental Services Ltd.

Locations	3 long-term stations (Brilliant Dam forebay and tail race and Corra Linn forebay); 5 short-term stations (Slocan Pool, Slocan Confluence, Kootenai Canal tail race, South Slocan forebay and Lower Bonnington Forebay); 9 grab sample locations
Timeframe	1999
Sample Type	At long-term monitoring stations, equipment was housed in metal cabinets, Brilliant tail race station is installed in a standpipe founded in bedrock,
Frequency	10 minutes
Equipment	2 - Common Sensing TBO-F units with external Onset DL3 data loggers, 3 - Common Sensing TBO-F(DL) units with internal Onset DL3 data loggers, 3 - Common Sensing/Point Four Systems TBO-DL units, one Hydrolab Minisonde and one Novatek portable meter
Frequency of Calibration and Maintenance	Every 2 weeks at long-term stations, maintenance between deployment for other instruments
Calibration Procedure for Barometric Pressure	The station meter barometer readings were compared to a second calibrated instrument, the station meter was then calibrated to current atmospheric pressure by removing the silastic membrane and exposing the probe to the atmosphere
Calibration Procedure for TGP	After comparing the station meter total pressure readings against a second calibrated instrument, the station meter was then calibrated to current atmospheric pressure by removing the silastic membrane and exposing the probe to the atmosphere. To ensure accurate TGP readings, the silastic membrane on the station probe was exchanged with a new membrane in order to limit the amount of algal growth on the membrane and to prevent condensation from forming within the membrane.
Quality Control of Data	N/A
Data Recording	Electronic at the long-term and short-term stations.
Depth of Measurements	3-4 meters
Period of Equilibration	20 minutes
Frequency of Data Download	Every 2 weeks at long-term stations, maintenance between deployment for other instruments
Service/Maintenance Records	N/A
Maintenance Procedure	A typical service visit involved an inspection for damage and the calibration and maintenance of the station probe.
Data Download Procedure	Data downloaded to portable computer at time of field servicing for long-term stations and at time of removal for short-term stations.
Cross-sectional Representation	Prior to study a survey was performed in March 1999. A combination of visual assessments of flow and spot TGP measurements were used to determine representative monitoring sites. Measurements were taken at three points in a cross-section of the river to verify consistency of readings at Corra Linn Forebay and Brilliant Dam tail race.

Table D-13. Columbia River Integrated Environmental Monitoring Program Data - Columbia River 1999; Collected by RL&L Environmental Services Ltd.

Locations	2 sites on the Columbia Hugh Keenleyside Dam Forebay and Robson Station, 5km downstream of dam on left bank
Timeframe	1999
Sample Type	Monitoring stations
Frequency	10 minute at the forebay station from 2/17-3/17 and at Robson station and hourly at the forebay station for the rest of the year
Equipment	Common Sensing TBO-F(HLKFB); Campbell Scientific data logger (ROB);
Frequency of Calibration and Maintenance	Every 2 weeks from April-November; As water temperature and daylight decreased from September to November, station calibration frequency was reduced to once a month due to decreased algal growth and reduced risk of condensation within the membrane.
Calibration Procedure for Barometric Pressure	The station meter barometer readings were compared to a second calibrated instrument, the station meter was then calibrated to current atmospheric pressure by removing the silastic membrane and exposing the probe to the atmosphere
Calibration Procedure for TGP	After comparing the station meter total pressure readings against a second calibrated instrument, the station meter was then calibrated to current atmospheric pressure by removing the silastic membrane and exposing the probe to the atmosphere. To ensure accurate TGP readings, the silastic membrane on the station probe was exchanged with a new membrane in order to limit the amount of algal growth on the membrane and to prevent condensation from forming within the membrane.
Quality Control of Data	N/A
Data Recording	Electronic
Depth of Measurements	3-4 meters
Period of Equilibration	20 minutes
Frequency of Data Download	Daily
Service/Maintenance Records	N/A
Maintenance Procedure	A typical service visit involved an inspection for damage and the calibration and maintenance of the station probe.
Data Download Procedure	Remote download
Cross-sectional Representation	N/A

Table D-14. US Bureau of Reclamation FMS Data

Locations	International Border, Grand Coulee Dam Forebay and Tail Race
Timeframe	1995-first quarter 2003
Sample Type	Fixed monitoring stations (FMS)
Data Resolution	Hourly (From DART site)
Equipment	Common Sensing TBO-L TDG probe and display, interfaced to a Sutron Series 8200 DCP, with battery backup and AC continuity reporting.
Frequency of Calibration and Maintenance	Every other week during spill season; monthly during off-season
Calibration Procedure for BP	Primary field sensor calibrated to a NIST-certified mercury barometer sensor (in lab), to a secondary standardized barometer during FMS calibration.
Calibration for TGP Procedure	Probe readings compared to NIST tested Hydrolab in field before and after being pulled; if readings vary by more than 2 mm Hg meter is closely checked for source of dysfunction or replaced; Annual servicing in laboratory includes calibration of TGP meter at two pressures.
Quality Control of Data	Not done
Data Recording	Electronic
Depth of Measurements	International Boundary and Grand Coulee tailrace sites are 8-20' (variable with stage height); Grand Coulee Dam forebay station fixed at elevation 1193 feet Sept. 1997. Grand Coulee Forebay site is currently operated with a fixed depth of 30' from surface.
Period of Equilibration	Generally, for periods up to 1.5 hrs (representing 95% of expected equilibration value) or until readings do not change significantly with time when compared against a calibrated secondary standard.
Frequency of Data Download/Broadcast	Data polling of TDG probe at each FMS by Sutron DCP every 15 minutes; Data is broadcast every 4 hours.
Service/Maintenance Records	None compiled in past by USBR. Reported to USACE annually at end of spill season. Complied monthly or bi-weekly from 01/03 to present by CBE, under current contract to USBR.
Maintenance Procedure	Clean; replace membrane; check TDG membrane for operability during field servicing. Pre- and post-deployment calibration checks for TDG, temperature, and barometric sensors against primary or secondary standards.
Data Download Procedure	The most current data are transmitted in a binary format to the GOES satellite. The data is received by the USBR Direct Readout Ground Station in Boise and stored in the Hydromet "DAYFILES" database and daily summary data are stored in the "ARCHIVES" database. USACE uses their own GOES receiving systems to collect and process the data independently.
Cross-sectional Representation	Study was done at three sites in the late 1990's by USBRs Regional lab. Vertical profile measurements were taken at several CSA sites with a Hydrolab Sonde. The agency concluded that TDG measurements at three extant FMS on Columbia River were consistent with cross-sectional / vertical profile measurements.

Table D-15. Avista Data Collected by Golder Associates Ltd.

Locations	Little Falls Dam Tail Race on the Spokane River (located at the confluence of the spillway channel and the turbine tail race approx. RM 29.5)
Timeframe	1999-2002
Sample Type	Monitoring stations
Frequency	Hourly
Equipment	Common Sensing DL-3 with 100 ft. cable
Frequency of Calibration and Maintenance	1-2 weeks during spring, summer & fall; 3-4 weeks during the winter
Calibration Procedure for BP	Barometric pressure compared to a portable barometric pressure unit (TBO-L Common Sensing). Adjustments were made if measurements had a greater than 2% variability
Calibration Procedure for TGP	TGP was compared to a portable barometric pressure unit (TBO-L Common Sensing). Adjustments were made if measurements had a greater than 2% variability
Quality Control of Data	Data judged based on service record and examination of the data. Data collected when there was a power loss, water level dropped below the probe, after there was a greater than 15% change in 4 hours, or if there was a greater than 5% variability discovered during calibration was discarded.
Data Recording	Electronic
Depth of Measurements	8-15 feet during normal high water
Period of Equilibration	15 minutes
Frequency of Data Download	1-2 weeks during spring, summer & fall; 3-4 weeks during the winter
Service Record	Written at time of servicing; available
Maintenance Procedure	Real time readings documented, then probe was removed from water and inspected, washed in water and dried; probe was then calibrated in air per manufacturers instructions; after re-installation the probe readings are monitored until equilibrium and calibration is re-checked. If probe could not be calibrated or required repair it was replaced with a back up and taken to the lab.
Data Download Procedure	Downloaded on site to a portable computer.
Cross-sectional Representation	N/A

Table D-16. Seattle City Light Data Collected by U.S. Geological Survey

Locations	Boundary Dam Reservoir and Pend Oreille River at International Boundary 0.9 mi downstream of Boundary Dam
Timeframe	1999
Sample Type	Monitoring station
Frequency	Hourly
Equipment	Hydrolab MiniSonde for TGP and Sutron 8200
Frequency of Calibration and Maintenance	3-4 weeks
Calibration Procedure for BP	None
Calibration Procedure for TGP	Replacement probes calibrated in lab prior to being taken to the field; check at 3 pressures: 2#, 4# and 6#; Check in place probes' readings against calibrated probes in field, use a linear adjustment to correct data for any variance.
Quality Control of Data	Data is corrected for any variance in readings between the calibrated probe and the in-place probe; Correction is distributed linearly in time through the data from the last calibration period.
Data Recording	Electronic
Depth of Measurements	15 feet, desired depth, reservoir is on a float always at 15 feet; downstream is on a 75# weight and is sometimes lower than 15 feet due to fluctuations in the water level
Period of Equilibration	5-30 minutes whenever readings become stable
Frequency of Data Download	Satellite transmission
Service/Maintenance Record	Yes, kept by USGS, who installed and maintain station
Maintenance Procedure	Probes are replaced; Remove probe to laboratory; clean and dry membrane; re-calibrate prior to installation.
Data Download Procedure	Satellite transmission to USGS
Cross-sectional Representation	Run cross-sections consisting of 10 horizontal with 2-3 vertical points (at 2/10, 8/10 and sometimes 6/10 depth of stream) at high flow once a year; In addition a private firm unrelated to the ongoing monitoring did study over 10 day period to verify that the chosen monitoring locations provided representative cross-sectional values.