Appendix A

2009 Total Dissolved Gas

Fixed Monitoring Stations

Introduction:

The Corps fixed monitoring station (FMS) system is composed of 28 gages that collect hourly readings of total dissolved gas, barometric pressure, % TDG saturation and temperature. This data is associated with 19 projects on the Columbia and Lower Snake Rivers that are involved or affected by the total dissolved gas issues which are listed on Table 1, which provides general information on the projects. More detailed information about the FMS is found in Tables 2 and 3 and the section afterwards. Figure 1 provides a map of the FMS locations.

Table 1
Project Information

Project Name	Project Code	River Name	River Mile	Number of Spill Bays	Location of Spill Bays	Number of Power Houses	Number of Generating Units	Hydraulic Capacity, kcfs	Generation Capacity, MW
Albeni Falls	ALF	Pend Oreille	86.9	10	Left Bank	1	3	33	49
Bonneville	BON	Columbia River	146.1	18	Mid-River	2	18	288	1207
Chief Joseph	CHJ	Columbia River	545.1	19	Right Bank	1	27	219	2614
Dworshak	DWR	North Fork, Clearwater River	1.9	2	Left Bank	1	3	10.5	460
Grand Coulee	GCL	Columbia River	596.6	11	Mid-River	3	24	280	7416
Hungry Horse	HGH	Flathead River, South Fork	5.2	3	Right Bank	1	4	8.9	328
Ice Harbor	IHR	Snake River	9.7	10	Right Bank	1	6	106	693
John Day	JDA	Columbia River	215.6	20	Right Bank	1	16	322	2485
Libby	LIB	Kootenai River	221.9	2	Mid-River	1	5	24	604
Little Goose	LGS	Snake River	70.3	8	Mid-River	1	6	130	932
Lower Granite	LWG	Snake River	107.5	8	Mid-River	1	6	130	932
Lower Monumental	LMN	Snake River	41.6	8	Left Bank	1	6	130	932
McNary	MCN	Columbia River	292	22	Right Bank	1	14	232	1127
Priest Rapids	PRD	Columbia River	397.1	22	Right Bank	1	10	187	907
Rock Island	RIS	Columbia River	453.4	31	Mid-River	2	18	220	613
Rocky Reach	RRH	Columbia River	473.7	12	Left Bank	2	11	220	1212
The Dalles	TDA	Columbia River	191.5	23	Mid-River	1	22	375	2052
Wanapum	WAN	Columbia River	415.8	13	Right Bank	1	10	178	956
Wells	WEL	Columbia River	515.1	10	Mid-River	1	10	220	890

Table 2
Corps Total Dissolved Gas (TDG) Monitoring Station Data Summary

Station Name	Station Code	Years of Operation	Dates of Operation	River Name	River Mile	Bank	Latitude[1]	Longitude[1]	Project	Location Description	Maintanence Responsibility	Maintenance Sequence	Calibration Responsibility	Owner
Albeni Falls Forebay	ALFI	2004-Present	April 1-Sept 15	Pend Oreille River	87.0	Right Bank	48° 10' 40.2"	116° 59' 52.3"	Albani Falls Dam	Forebay	Columbia Basin Environmental	Bi-weekly	Columbia Basin Environmental	US Army Corps of Engineers, Seattle District
Albeni Falls Tailwater	ALQI	2005-Present	April 1-Sept 15	Pend Oreille River	86.8	Left Bank	48° 10' 40.1"	117° 00' 08.7"	Albeny Falls Dam	Tailwater	Columbia Basin Environmental	Bi-weekly	Columbia Basin Environmental	US Army Corps of Engineers, Seattle District
Anatone	ANQW	1999-Present	April 1-Sept 15	Snake River	167.5	Left Bank	46° 05' 50.8"	116° 58' 41.2"	None	River	US Geological Survey, Pasco Office	Bi-weekly	US Geological Survey, Pasco Office	US Army Corps of Engineers, Walla Walla District
Bonneville Forebay	BON	1986-Present	Year Round	Columbia River	146.1	Right Bank	45° 38' 44.4"	121° 56' 24.3"	Bonneville Dam	Forebay	US Geological Survey, Portland Office	Bi-weekly	US Geological Survey, Portland Office	US Army Corps of Engineers, Portland District
Camas-Washougal	CWMW	1993-Present	April 1-Sept 15	Columbia River	121.7	Right Bank	45° 34' 38.4"	122° 22' 43.3"	None	River	US Geological Survey, Portland Office	Bi-weekly	US Geological Survey, Portland Office	US Army Corps of Engineers, Portland District
Cascades Island	CCIW	2004-Present	April 1-Sept 15	Columbia River	145.9	Right Bank	45° 38' 44.4"	121° 56' 44.3"	Bonneville Dam	Tailwater	US Geological Survey, Portland Office	Bi-weekly	US Geological Survey, Portland Office	US Army Corps of Engineers, Portland District
Chief Joseph Forebay	CHJ	1985-Present	April 1-Sept 15	Columbia River	545.1	Left Bank	47° 59' 38.7"	119° 38' 42.6"	Chief Joseph Dam	Forebay	Columbia Basin Environmental	Bi-weekly	Columbia Basin Environmental	US Army Corps of Engineers, Seattle District
Chief Joseph Tailwater	CHQW	1997-Present	April 1-Sept 15	Columbia River	544	Right Bank	48° 00' 17.2"	119° 39' 30.3"	Chief Joseph Dam	Tailwater	Columbia Basin Environmental	Bi-weekly	Columbia Basin Environmental	US Army Corps of Engineers, Seattle District
Dworshak Tailwater	DWQI	1993-Present	Year Round	North Fork, Clearwater River	0.5	Left Bank	46° 30' 11.6"	116° 19' 16.4"	Dworshak Dam	Tailwater	US Geological Survey, Pasco Office	Bi-weekly	US Geological Survey, Pasco Office	US Army Corps of Engineers, Walla Walla District
Ice Harbor Forebay	IHRA	2005-Present	Year Round	Snake River	10.2	Right Bank	46° 15' 5.8"	118° 52' 39.0"	Ice Harbor Dam	Forebay	US Geological Survey, Pasco Office	Bi-weekly	US Geological Survey, Pasco Office	US Army Corps of Engineers, Walla Walla District
Ice Harbor Tailwater	IDSW	1994-Present	Year Round	Snake River	6.1	Right Bank	46° 14' 27.6"	118° 57' 13.7"	Ice Harbor Dam	Tailwater	US Geological Survey, Pasco Office	Bi-weekly	US Geological Survey, Pasco Office	US Army Corps of Engineers, Walla Walla District
John Day Forebay	JDY	2004-Present	April 1 - Sept 15	Columbia River	215.7	Right Bank	45° 43' 13.4"	120° 41' 41.2"	John Day Dam	Forebay	US Geological Survey, Portland Office	Bi-weekly	US Geological Survey, Portland Office	US Army Corps of Engineers, Portland District
John Day Tailwater	JHAW	1995-Present	April 1-Sept 15	Columbia River	214.8	Right Bank	45° 42' 48.4"	120° 42' 39.2"	John Day Dam	Forebay	US Geological Survey, Pasco Office	Bi-weekly	US Geological Survey, Pasco Office	US Army Corps of Engineers, Walla Walla District
Lewiston	LEWI	1996-Present	April 1-Sept 15	Clearwater River	5.0	Right Bank	46° 25' 52.1"	116° 56' 44.0"	None	River	US Geological Survey, Pasco Office	Bi-weekly	US Geological Survey, Pasco Office	US Army Corps of Engineers, Walla Walla District

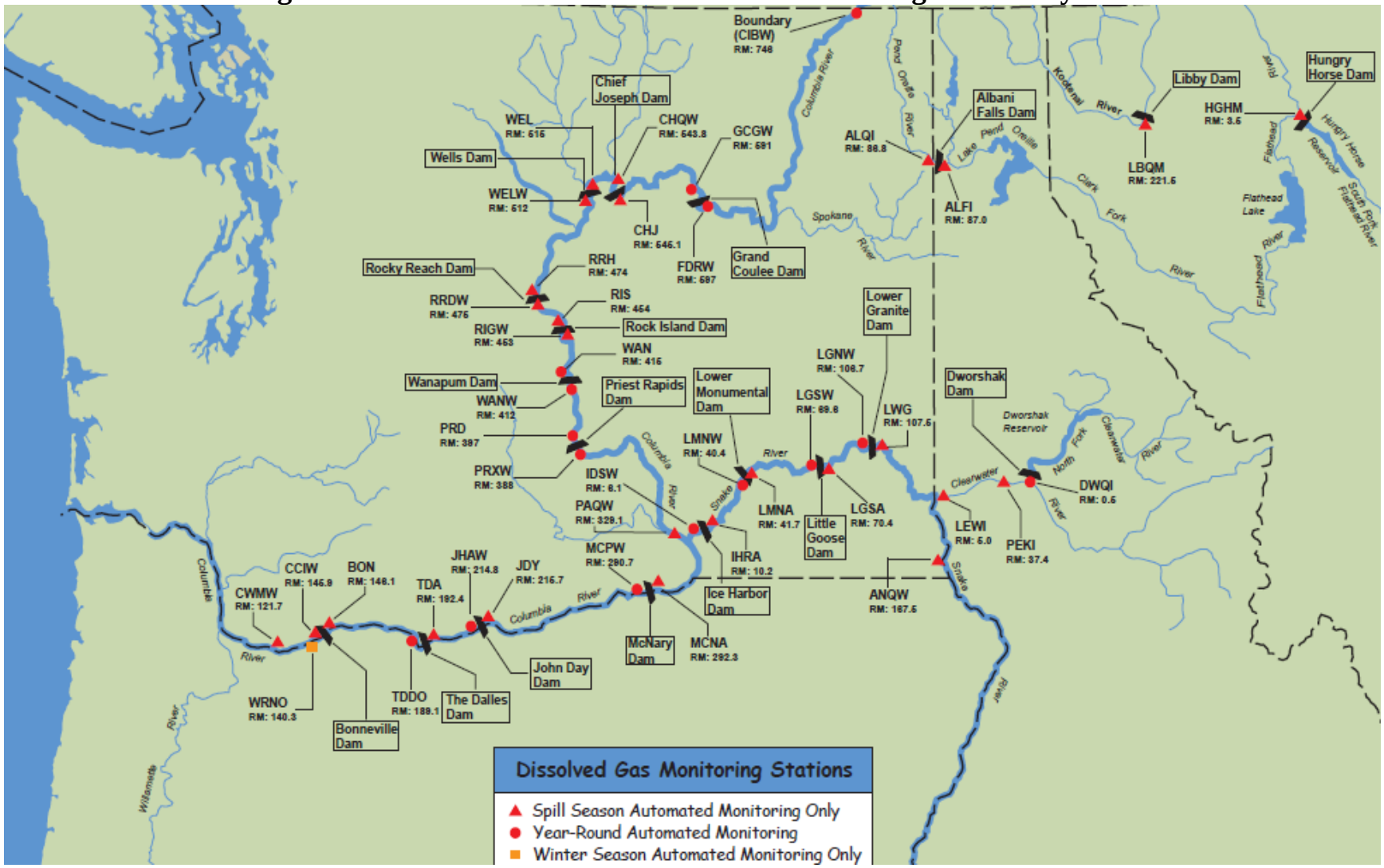
Lat/long coordinates are in NAD-83 datum

Table 3
Corps Total Dissolved Gas (TDG) Monitoring Station Data Summary

Station Name	Station Code	Years of Operation	Dates of Operation	River Name	River Mile	Bank	Latitude[1]	Longitude[1]	Project	Location Desciption	Maintanence Responsibility	Maintenance Sequence	Calibration Responsibility	Owner
Libby Tailwater	LBQM	2004-Present	April 1 - Sept 15	Kootenai River	221.5	Left Bank	48° 24' 2.4"	115° 19' 7.0"	Libby Dam	Tailwater	US Geological Survey, Pasco Office	Bi-weekly	US Geological Survey, Pasco Office	US Army Corps of Engineers, Walla Walla District
Little Goose Forebay	LGSA	2005-Present	April 1 - Sept 15	Snake River	70.4	Left Bank	46° 34' 58.8"	118° 01' 29.2"	Little Goose Dam	Forebay	US Geological Survey, Pasco Office	Bi-weekly	US Geological Survey, Pasco Office	US Army Corps of Engineers, Walla Walla District
Little Goose Tailwater	LGSW	1995-Present	April 1 - Sept 15	Snake River	69.6	Right Bank	46° 35' 0.5"	118° 02' 37.4"	Little Goose Dam	Tailwater	US Geological Survey, Pasco Office	Bi-weekly	US Geological Survey, Pasco Office	US Army Corps of Engineers, Walla Walla District
Lower Granite Forebay	LWG	1985-Present	Year Round	Snake River	107.5	Mid-River	46° 39' 34.2"	117° 25' 34.9"	Lower Granite Dam	Forebay	US Geological Survey, Pasco Office	Bi-weekly	US Geological Survey, Pasco Office	US Army Corps of Engineers, Walla Walla District
Lower Granite Tailwater	LGNW	1995-Present	Year Round	Snake River	106.7	Right Bank	46° 39' 58.1"	117° 26' 19.3"	Lower Granite Dam	Tailwater	US Geological Survey, Pasco Office	Bi-weekly	US Geological Survey, Pasco Office	US Army Corps of Engineers, Walla Walla District
Lower Monumental Forebay	LMNA	2005-Present	April 1 - Sept 15	Snake River	41.7	Mid-River	46° 33' 45.2"	118° 32' 4.4"	Lower Monumental Dam	Forebay	US Geological Survey, Pasco Office	Bi-weekly	US Geological Survey, Pasco Office	US Army Corps of Engineers, Walla Walla District
Lower Monumental Tailwater	LMNW	1995-Present	April 1 - Sept 15	Snake River	40.4	Left Bank	46° 33' 4.5"	118° 32' 59.0"	Lower Monumental Dam	Tailwater	US Geological Survey, Pasco Office	Bi-weekly	US Geological Survey, Pasco Office	US Army Corps of Engineers, Walla Walla District
McNary Forebay	MCNA	2005-Present	Year Round	Columbia River	292.3	Right Bank	45° 56' 28.8"	119° 17' 35.5"	McNary Dam	Forebay	US Geological Survey, Pasco Office	Bi-weekly	US Geological Survey, Pasco Office	US Army Corps of Engineers, Walla Walla District
McNary Tailwater	MCPW	1995-Present	Year Round	Columbia River	290.7	Right Bank	45° 56' 2.8"	119° 19' 35.5"	McNary Dam	Tailwater	US Geological Survey, Pasco Office	Bi-weekly	US Geological Survey, Pasco Office	US Army Corps of Engineers, Walla Walla District
Pasco	PAQW	1999-Present	April 1 - Sept 15	Columbia River	329.1	Left Bank	46° 13' 26.3"	119° 06' 57.3"	McNary Dam	River	US Geological Survey, Pasco Office	Bi-weekly	US Geological Survey, Pasco Office	US Army Corps of Engineers, Walla Walla District
Peck	PEKI	1996-Present	April 1 - Sept 15	Clearwater River	37.4	Left Bank	46° 30' 0.9"	116° 23' 32.4"	Dworshak Dam	River	US Geological Survey, Pasco Office	Bi-weekly	US Geological Survey, Pasco Office	US Army Corps of Engineers, Walla Walla District
The Dalles Forebay	TDA	1985-Present	April 1 - Sept 15	Columbia River	192.4	Left Bank	45° 37' 11.4"	121° 07' 16.3"	The Dalles	Forebay	US Geological Survey	Bi-weekly	US Geological Survey	US Army Corps of Engineers, Portland District
The Dalles Tailwater	TDDO	1996-Present	April 1 - Sept 15	Columbia River	189.1	Left Bank	45° 36' 26.4"	121° 10' 24.3"	The Dalles	Tailwater	US Geological Survey	Bi-weekly	US Geological Survey	US Army Corps of Engineers, Portland District
Warrendale	WRNO	1985-Present	Year Round	Columbia River	140.3	Left Bank	45° 36' 29.4"	122° 02' 18.3"	Bonneville Dam	Tailwater	US Geological Survey	Bi-weekly	US Geological Survey	US Army Corps of Engineers, Portland District

Lat/long coordinates are in NAD-83 datum

Figure 1- 2009 Total Dissolved Gas Fixed Monitoring Stations System

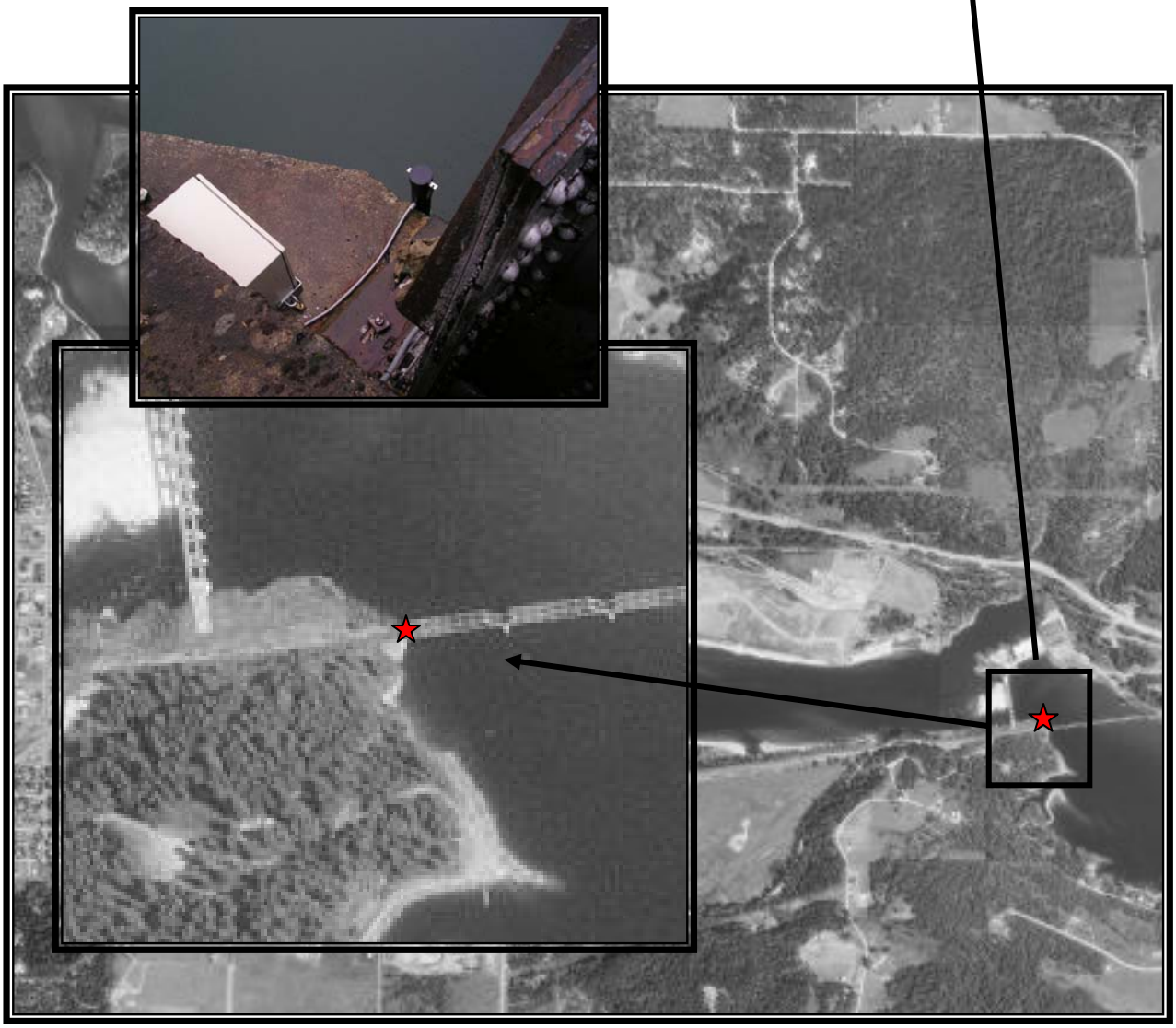


FMS Detailed Information

1. Albeni Falls Forebay TDG Monitoring Station (ALFI)

Gage Elevation: Fixed
Latitude: 48° 10' 40.2" N
Longitude: 116° 59' 52.3" W
Datum: NAD-83
River: Pend Orielle
River Mile: 87.0
USGS-ID:
Owner: U.S. Army Corps of Engineers
Gauge Type: Hydrosonde
Data Transmission: Radio Transmission
Dates of Operation: 1 April – September 15
Years of Operation: 2004 – Present
River Conditions: Forebay Monitor
Location: This gauge is located in the forebay of Albeni Falls dam and is attached to the railroad bridge pier on the southern shore of Lake Pend Orielle.

Comment:



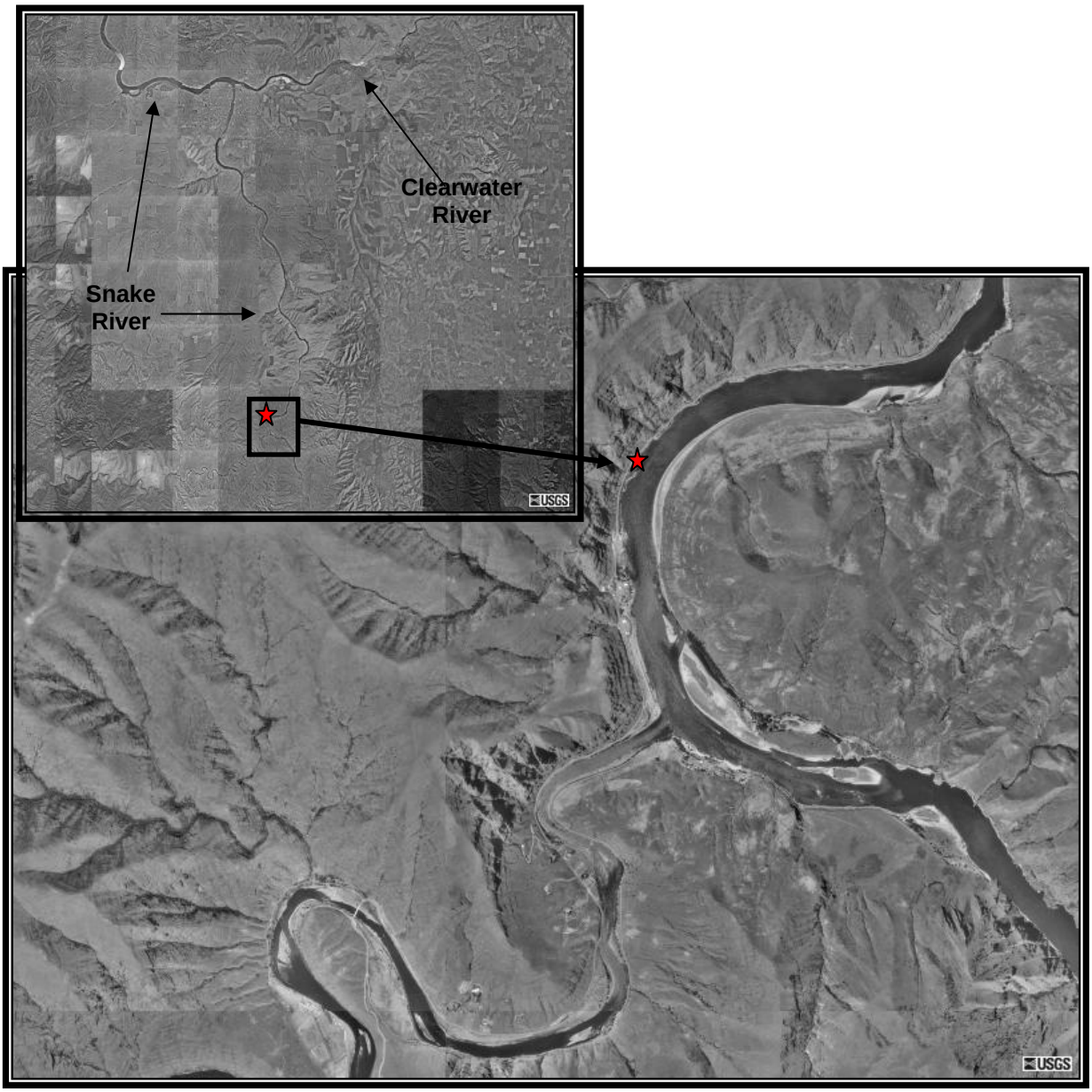
2. Albeni Falls Tailwater TDG Monitoring Station (ALQI)

Gage Elevation: Fixed
Latitude: 48° 10' 40.1" N
Longitude: 117° 00' 8.7" W
Datum: NAD-83
River: Pend Orielle
River Mile: 86.8
USGS-ID:
Owner: U.S. Army Corps of Engineers
Gauge Type: Hydrosonde
Data Transmission: Radio Transmission
Dates of Operation: 1 April – 15 September
Years of Operation: 2005 - Present
River Conditions: Tailwater Monitor
Location: This gauge is located in the tailwater of Albeni Falls dam approximately 700 feet downstream of the dam on the southern shoreline of the Pend Orielle River.

Comment: This gauge was initiated at this site on July 28, 2005 due to sediment burying the previous Albeni Falls tailwater TDG monitoring station (ALFW) site several times. This newer location is immediately below the spillway aerated zone in deeper water which should minimize sedimentation problems.

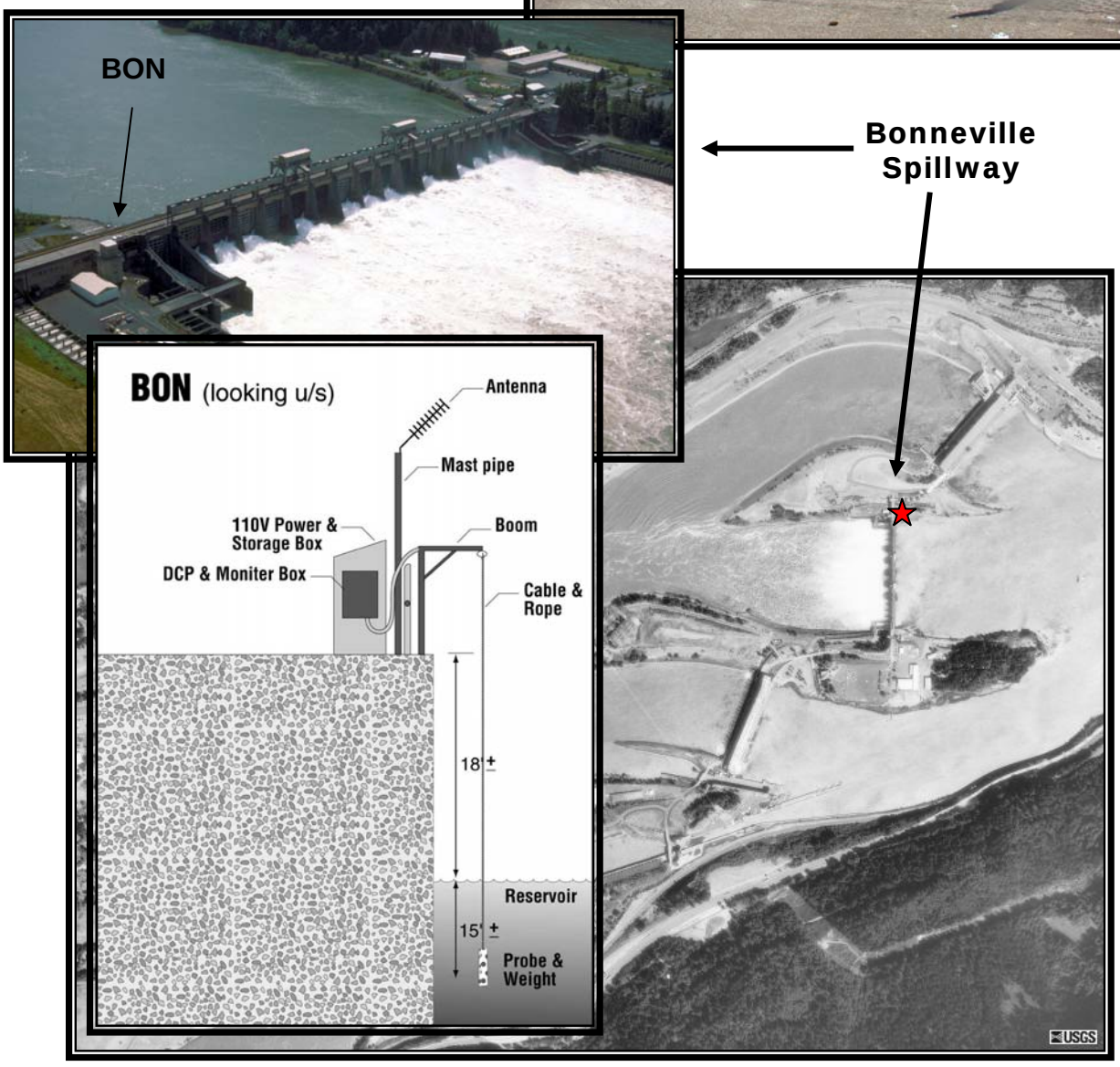
3. Anatone TDG Monitoring Station on the Snake River (ANQW)

Gage Elevation: Fixed
Latitude: 46° 05' 50.8" N
Longitude: 116° 58' 41.2" W
Datum: NAD-83
River: Snake
River Mile: 167.5
USGS-ID: 13334300
Owner: U.S. Army Corps of Engineers
Gauge Type: Hydrosonde
Data Transmission: GOES Satellite
Dates of Operation: April 1 – Sept. 15
Years of Operation: 1999 - Present
River Conditions: Open River
Location: This gauge is located on the Washington shoreline of the Snake River approximately 1.3 miles downstream of the Grande Ronde river confluence. It is co-located with the USGS Anatone streamgauge (ANAW).



4. Bonneville Forebay TDG Monitoring Station (BON)

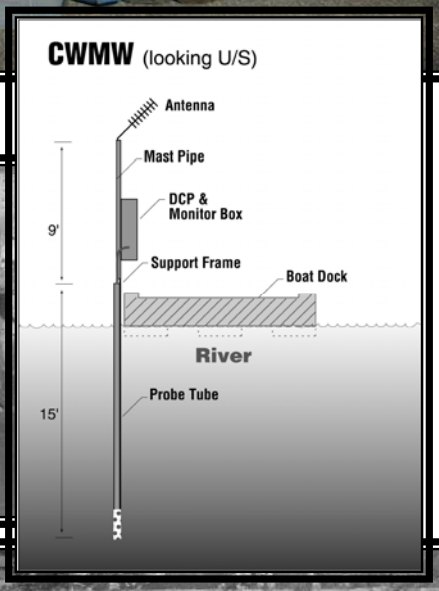
Gage Elevation: Fixed
Latitude: 45° 38' 44.4" N
Longitude: 121° 56' 24.3" W
Datum: NAD-83
River: Columbia
River Mile: 146.1
USGS-ID: 453845121562000
Owner: U.S. Army Corps of Engineers
Gauge Type: Hydrosonde
Data Transmission: GOES Satellite
Dates of Operation: Year-round
Years of Operation: 1986 – Present.
River Conditions: Forebay Monitor.
Location: This gauge is located in the forebay of Bonneville Dam on the northern side of the spillway channel on Cascade Island just upstream of spillbay #1.



5. Camas-Washougal TDG Monitoring Station (CWMW)

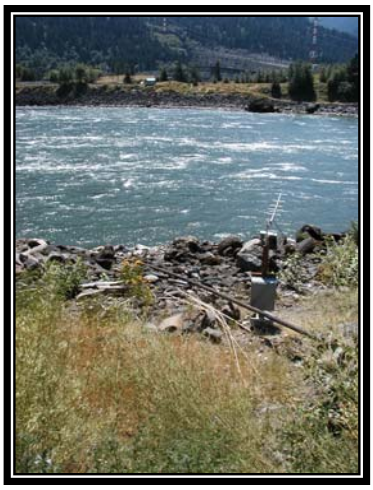
Gage Elevation: Variable
Latitude: 45° 34' 38.4" N
Longitude: 122° 22' 43.3" W
Datum: NAD-83
River: Columbia
River Mile: 121.7
USGS-ID: 453439122223900
Owner: U.S. Army Corps of Engineers
Gauge Type: Hydrosonde
Data Transmission: GOES Satellite
Dates of Operation: 1 April – August 31
Years of Operation: 1993 – Present
River Conditions: Mixed River
Location: This gauge is located at the Port of Camas/Washougal (Washington Hwy 14 at S. Second Street, Camas WA) approximately 24 miles downstream of Bonneville Dam. The gauge is fixed to the boat dock at the outer edge of the harbor.

Comment: This gauge is currently being utilized as a surrogate forebay gauge for the management of spill at Bonneville Dam.

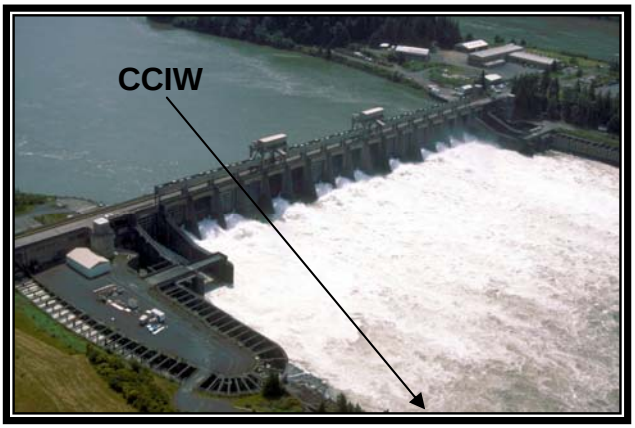


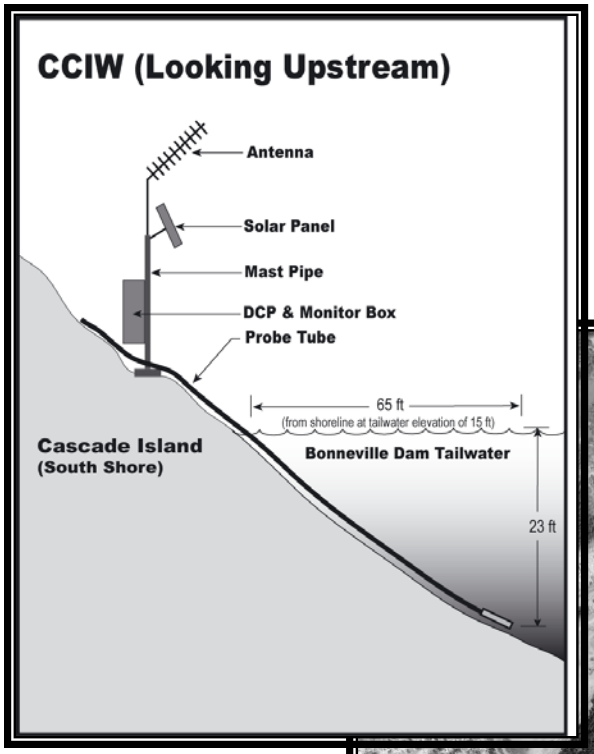
6. Cascades Island TDG Monitoring Station (CCIW)

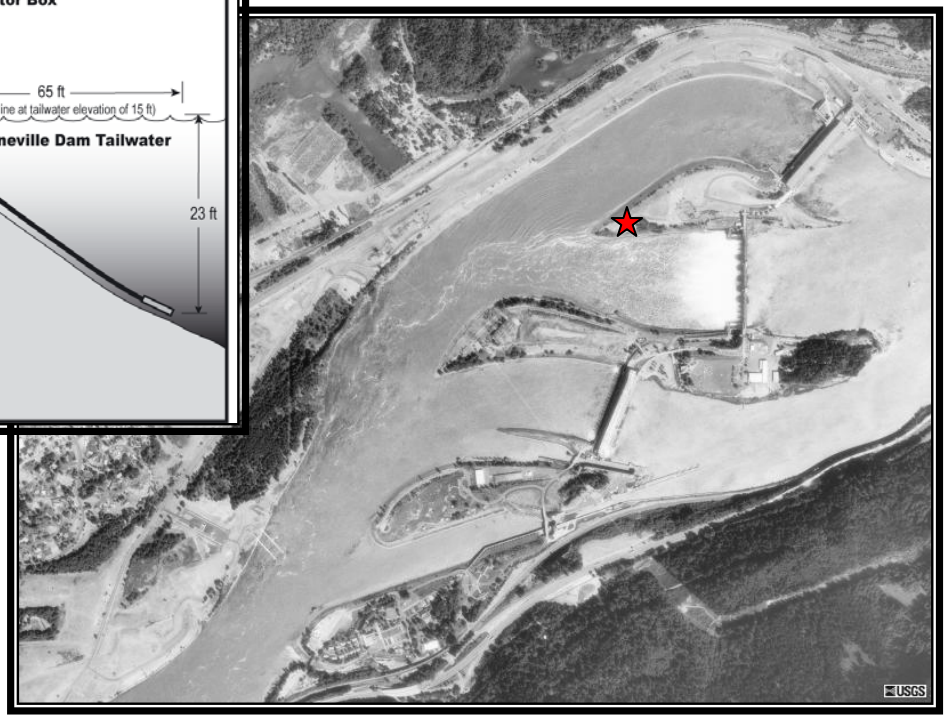
Gage Elevation: Fixed
Latitude: 45° 38' 44.4" N
Longitude: 121° 56' 44.3" W
Datum: NAD-83
River: Columbia
River Mile: 145.9
USGS-ID: 453845121564001
Owner: U.S. Army Corps of Engineers
Gauge Type: Hydrosonde
Data Transmission: GOES Satellite
Dates of Operation: April 1 – Sept. 31
Years of Operation: 2004 – Present
River Conditions: Spillway Monitor
Location: This gauge is located within the Bonneville Dam spillway channel on Cascade Island approximately 1400 feet downstream of the spillway gates.



Comment: This gauge is currently used as the spillway tailrace gauge for management of spill at Bonneville Dam.

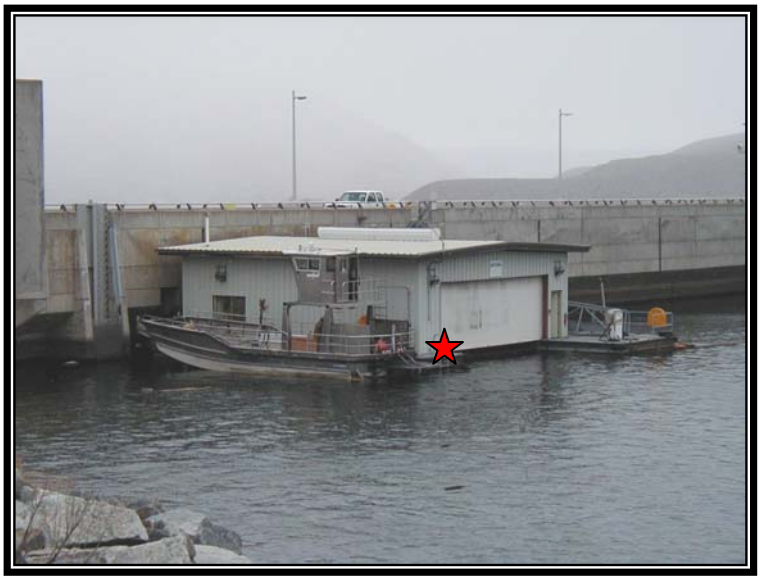






7. Chief Joseph Forebay TDG Monitoring Station (CHJ)

Gage Elevation: Fixed
Latitude: 47° 59' 38.7" N
Longitude: 119° 38' 42.6" W
Datum: NAD-83
River: Columbia
River Mile: 545.1
USGS-ID:
Owner: U.S. Army Corps of Engineers
Gauge Type: Hydrosonde
Data Transmission: GOES Satellite and Radio Transmission
Dates of Operation: April 1 – Sept. 15
Years of Operation: 1985 - Present
River Conditions: Forebay Monitor
Location: The monitor is located in the forebay of the dam along the southern edge of Lake Rufus Woods inside the boat house.

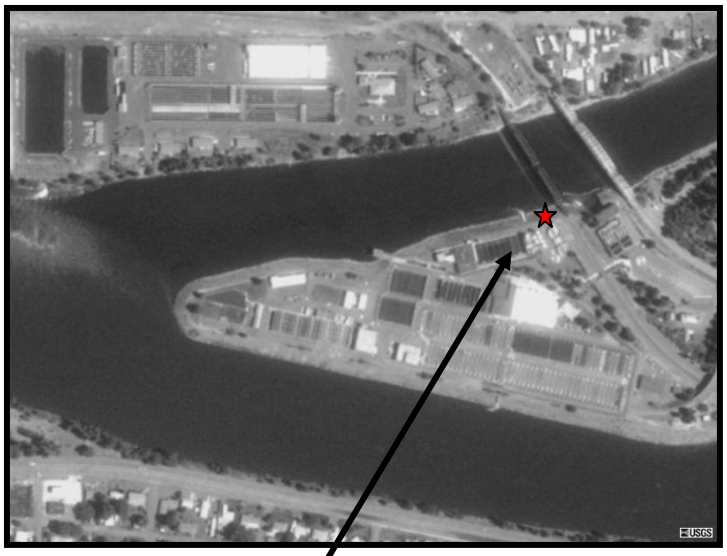


8. Chief Joseph Tailwater TDG Monitoring Station (CHQW)

Gage Elevation: Fixed
Latitude: 48° 00' 17.2" N
Longitude: 117° 39' 30.3" W
Datum: NAD-83
River: Columbia
River Mile: 543.8
USGS-ID:
Owner: U.S. Army Corps of Engineers
Gauge Type: Hydrosonde
Data Transmission: GOES Satellite and Radio Transmission
Dates of Operation: April 1 – Sept. 15
Years of Operation: 1997 - Present
River Conditions: Tailwater Monitor
Location: The monitor is located approximately 1 mile downstream of the dam on the northern bank of the river, just downstream of the Highway 17 bridge.

9. Dworshak TDG Monitoring Station (DWQI)

Gage Elevation: Fixed
Latitude: 46° 30' 11.6" N
Longitude: 116° 19' 16.4" W
Datum: NAD-83
River: North Fork, Clearwater River
River Mile: 0.5
USGS-ID:
Owner: U.S. Army Corps of Engineers
Gauge Type: Hydrosonde
Data Transmission: GOES Satellite
Dates of Operation: Year Round
Years of Operation: 1993 - Present
River Conditions: Mixed River, Tailwater
Location: On the southern bank of the North Fork, Clearwater River between the bridge and the U.S. Fish and Wildlife Service Fish Hatchery outflow pipe about 1.5 miles downstream of the dam.



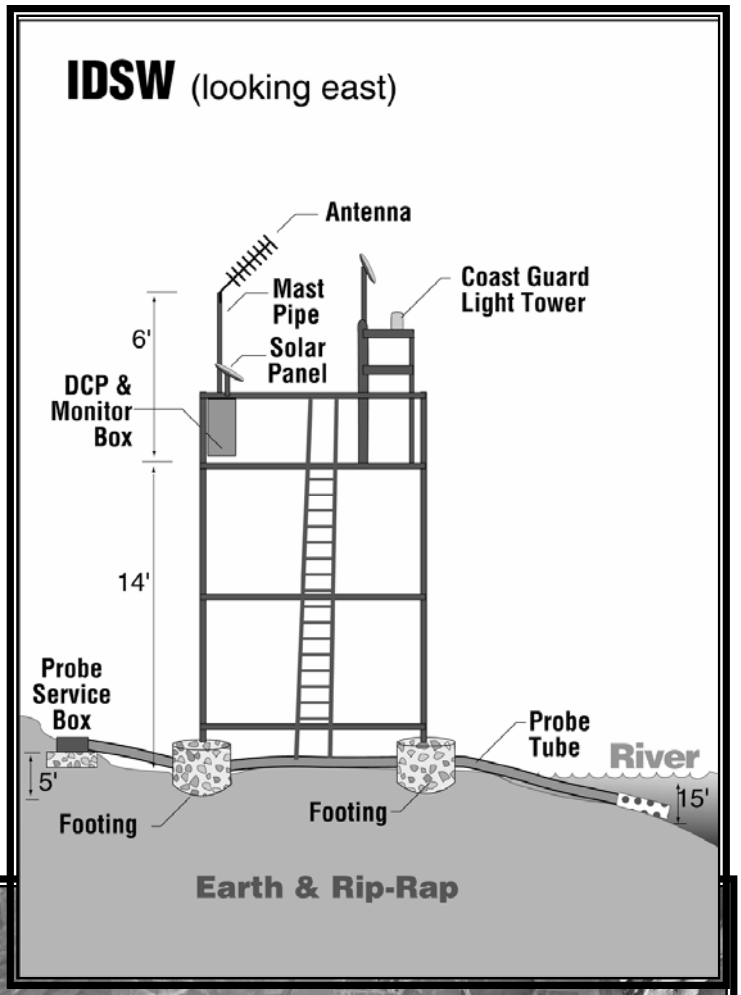
10. Ice Harbor Forebay TDG Monitoring Station (IHRA)

Gage Elevation: Fixed
Latitude: 46° 15' 5.8" N
Longitude: 118° 52' 39.0" W
Datum: NAD-83
River: Snake
River Mile: 10.2
USGS-ID: 13352950
Owner: U.S. Army Corps of Engineers
Gauge Type: Hydrosonde
Data Transmission: GOES Satellite
Dates of Operation: Year-round
Years of Operation: 2005 – Present.
River Conditions: Forebay Monitor.
Location: This gauge is located in the forebay of Ice Harbor Dam at the upstream end of the navigation lock guidewall.

Comments: This gauge was established in April 2005 to replace the previous Ice Harbor Forebay gauge (IHR) that was located on the face of the dam at a depth of about 5 meters.

11. Ice Harbor Tailwater TDG Monitoring Station (IDSW)

Gage Elevation: Fixed
Latitude: 46° 14' 27.6" N
Longitude: 118° 57' 13.7" W
Datum: NAD-83
River: Snake
River Mile: 6.1
USGS-ID: 13353010
Owner: U.S. Army Corps of Engineers
Gauge Type: Hydrosonde
Data Transmission: GOES Satellite
Dates of Operation: Year-round
Years of Operation: 1994 – Present.
River Conditions: Mixed River, Tailwater.
Location: This gauge is located on the northern shore of the Snake River approximately 3.6 miles downstream of Ice Harbor Dam.



12. John Day Forebay TDG Monitoring Station (JDY)

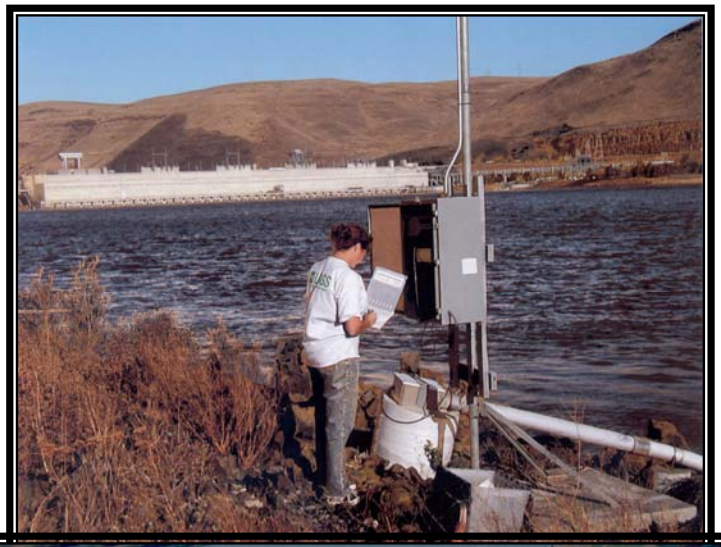
Gage Elevation: Variable
Latitude: 45° 43' 13.4" N
Longitude: 120° 41' 41.2" W
Datum: NAD-83
River: Columbia
River Mile: 215.7
USGS-ID: 453439122223900
Owner: U.S. Army Corps of Engineers
Gauge Type: Hydrosonde
Data Transmission: GOES Satellite
Dates of Operation: April 1 – Sept. 15
Years of Operation: 2004 – Present
River Conditions: Forebay Monitor
Location: This gauge is located at the end of the navigation lock guidewall in the forebay of the dam.

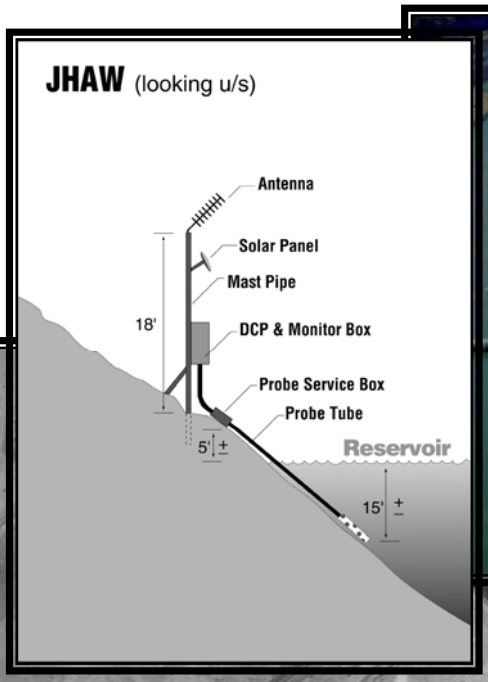
Comment: This forebay gauge was relocated from it previous site on the face of the dam in 2004 (JDA).

13. John Day Tailwater TDG Monitoring Station (JHAW)

Gage Elevation: Fixed
Latitude: 45° 42' 48.4" N
Longitude: 120° 42' 39.2" W
Datum: NAD-83
River: Columbia
River Mile: 214.8
USGS-ID: 454249120423500
Owner: U.S. Army Corps of Engineers
Gauge Type: Hydrosonde
Data Transmission: GOES Satellite
Dates of Operation: April 1 – Sept. 15
Years of Operation: 1995 – Present
River Conditions: Tailwater Monitor
Location: This gauge is located about 0.8 miles downstream of the dam on the Washington shore.

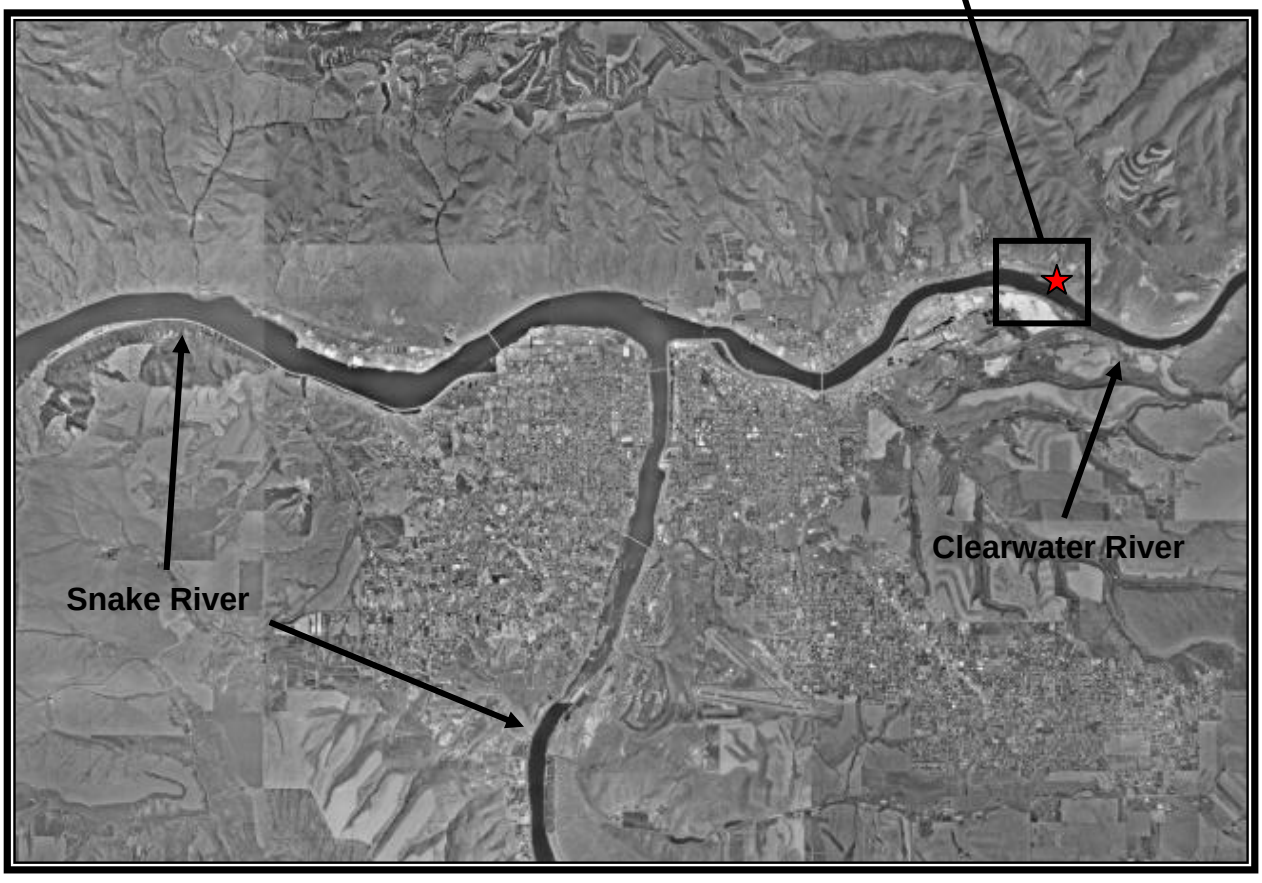
Comment:





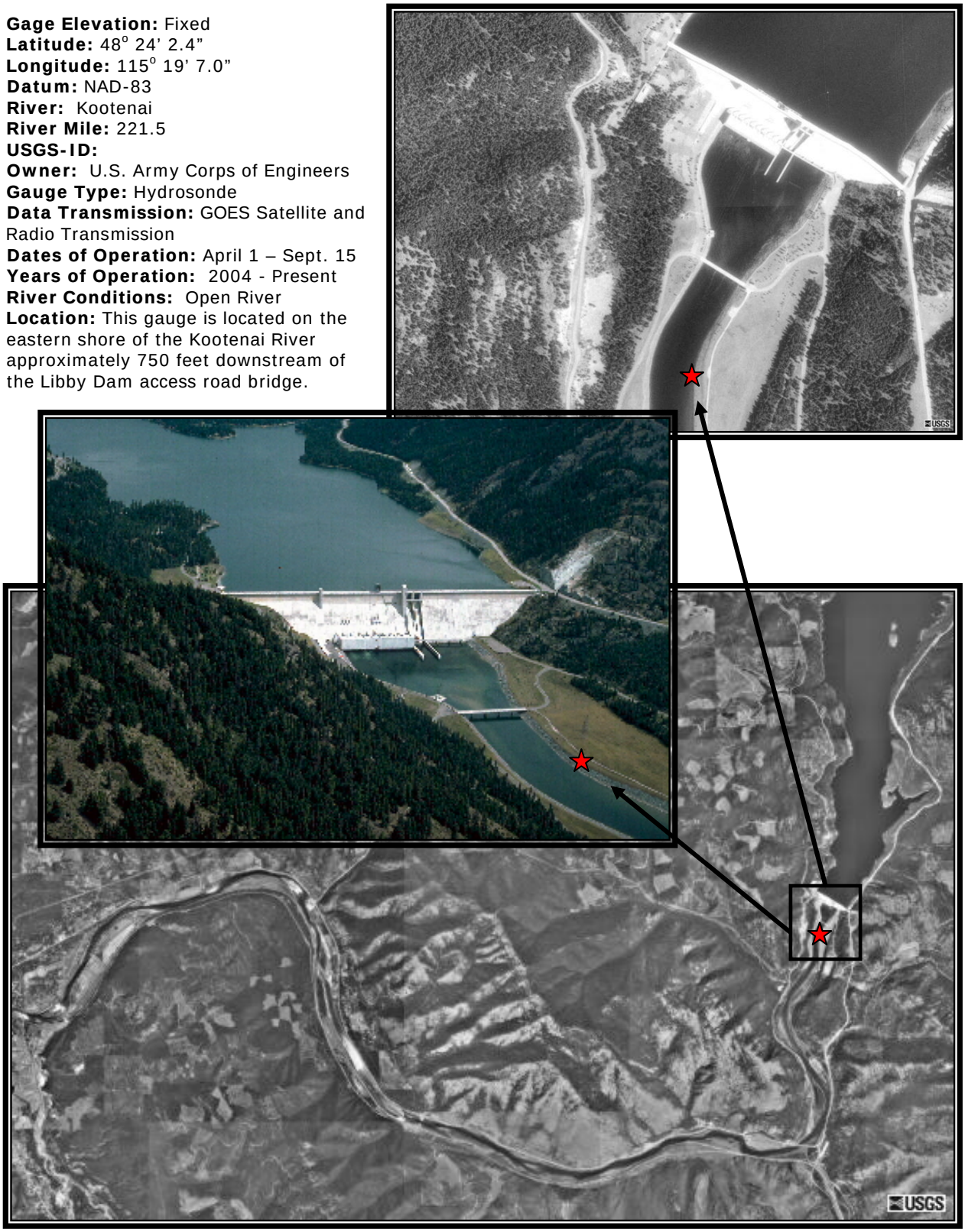
14. Lewiston TDG Monitoring Station (LEWI)

Gage Elevation: Fixed
Latitude: 46° 25' 52.1"
Longitude: 116° 56' 44.0"
Datum: NAD-83
River: Columbia
River Mile: 5.0
USGS-ID: 13343000
Owner: U.S. Army Corps of Engineers
Gauge Type: Hydrosonde
Data Transmission: GOES Satellite
Dates of Operation: April 1 – Sept. 15
Years of Operation: 1996 - Present
River Conditions: Open River
Location: This gauge is located on the northern shore of the Clearwater River just east of the City of Lewiston, Idaho near the junction of Hatwai Road and Central Grade Road.



15. Libby Tailwater TDG Monitoring Station (LBQM)

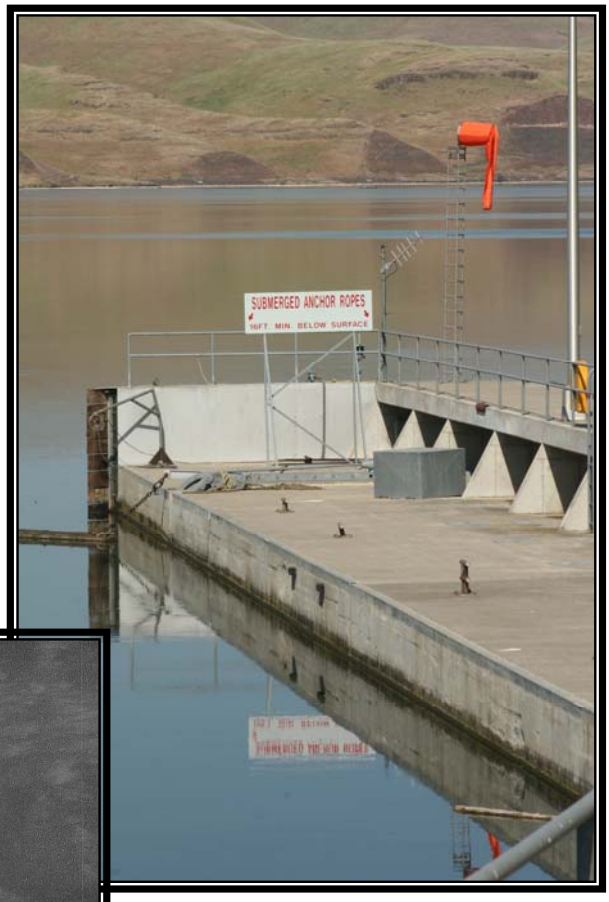
Gage Elevation: Fixed
Latitude: 48° 24' 2.4"
Longitude: 115° 19' 7.0"
Datum: NAD-83
River: Kootenai
River Mile: 221.5
USGS-ID:
Owner: U.S. Army Corps of Engineers
Gauge Type: Hydrosonde
Data Transmission: GOES Satellite and Radio Transmission
Dates of Operation: April 1 – Sept. 15
Years of Operation: 2004 - Present
River Conditions: Open River
Location: This gauge is located on the eastern shore of the Kootenai River approximately 750 feet downstream of the Libby Dam access road bridge.



16. Little Goose Forebay TDG Monitoring Station (LGSA)

Gage Elevation: Variable (15 m depth)
Latitude: 46° 34' 58.8" N
Longitude: 118° 01' 29.2" W
Datum: NAD-83
River: Snake
River Mile: 70.4
USGS-ID: 13343855
Owner: U.S. Army Corps of Engineers
Gauge Type: Hydrosonde
Data Transmission: GOES Satellite
Dates of Operation: April 1-Sept. 15
Years of Operation: 2005 – Present.
River Conditions: Forebay Monitor.
Location: This gauge is located in the forebay of Little Goose Dam at the upstream end of the navigation lock guidewall.

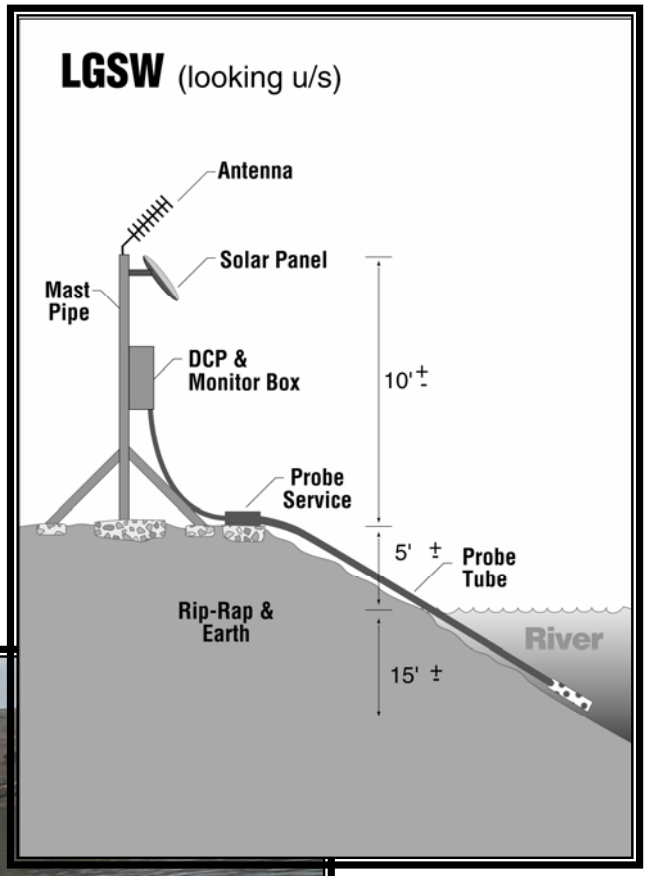
Comments: This gauge was established in April 2005 to replace the previous Little Goose Forebay gauge (LGS) that was located on the face of the dam at a depth of about 5 meters.



17. Little Goose Tailwater TDG Monitoring Station (LGSW)

Gage Elevation: Fixed
Latitude: 46° 35' 00.5" N
Longitude: 118° 02' 37.4" W
Datum: NAD-83
River: Snake
River Mile: 69.6
USGS-ID: 13343860
Owner: U.S. Army Corps of Engineers
Gauge Type: Hydrosonde
Data Transmission: GOES Satellite
Dates of Operation: April 1-Sept. 15.
Years of Operation: 1995 – Present.
River Conditions: Tailwater monitor.
Location: This gauge is located on the northern shore of the Snake River approximately 0.7 miles downstream of Little Goose Dam

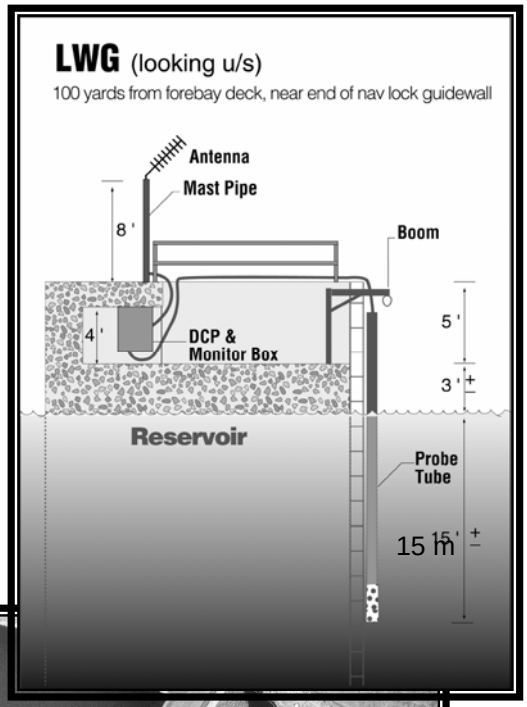
Comments:



18. Lower Granite Forebay TDG Monitoring Station (LWG)

Gage Elevation: Fixed
Latitude: 46° 39' 34.2" N
Longitude: 117° 25' 34.9" W
Datum: NAD-83
River: Snake
River Mile: 107.5
USGS-ID: 13343590
Owner: U.S. Army Corps of Engineers
Gauge Type: Hydrosonde
Data Transmission: GOES Satellite
Dates of Operation: Year Round
Years of Operation: 1985 – Present.
River Conditions: Forebay Monitor.
Location: This gauge is located in the forebay of Lower Granite Dam at the upstream end of the navigation lock guidewall.

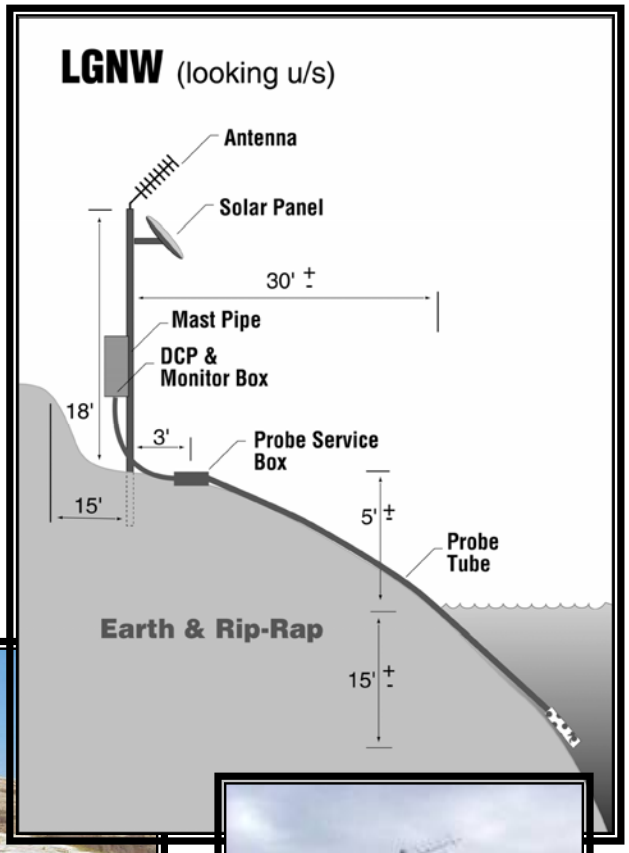
Comments: In March, 2005, this gauge was moved from a depth of 5 meters to a depth of 15 meters. The geographic location of the gauge was not changed.



19. Lower Granite Tailwater TDG Monitoring Station (LGNW)

Gage Elevation: Fixed
Latitude: 46° 39' 58.1" N
Longitude: 117° 26' 19.3" W
Datum: NAD-83
River: Snake
River Mile: 106.7
USGS-ID: 13343595
Owner: U.S. Army Corps of Engineers
Gauge Type: Hydrosonde
Data Transmission: GOES Satellite
Dates of Operation: Year Round
Years of Operation: 1995 – Present.
River Conditions: Tailwater Monitor.
Location: This gauge is located approximately 0.8 miles downstream of Lower Granite Dam on the northeastern shore of the Snake River.

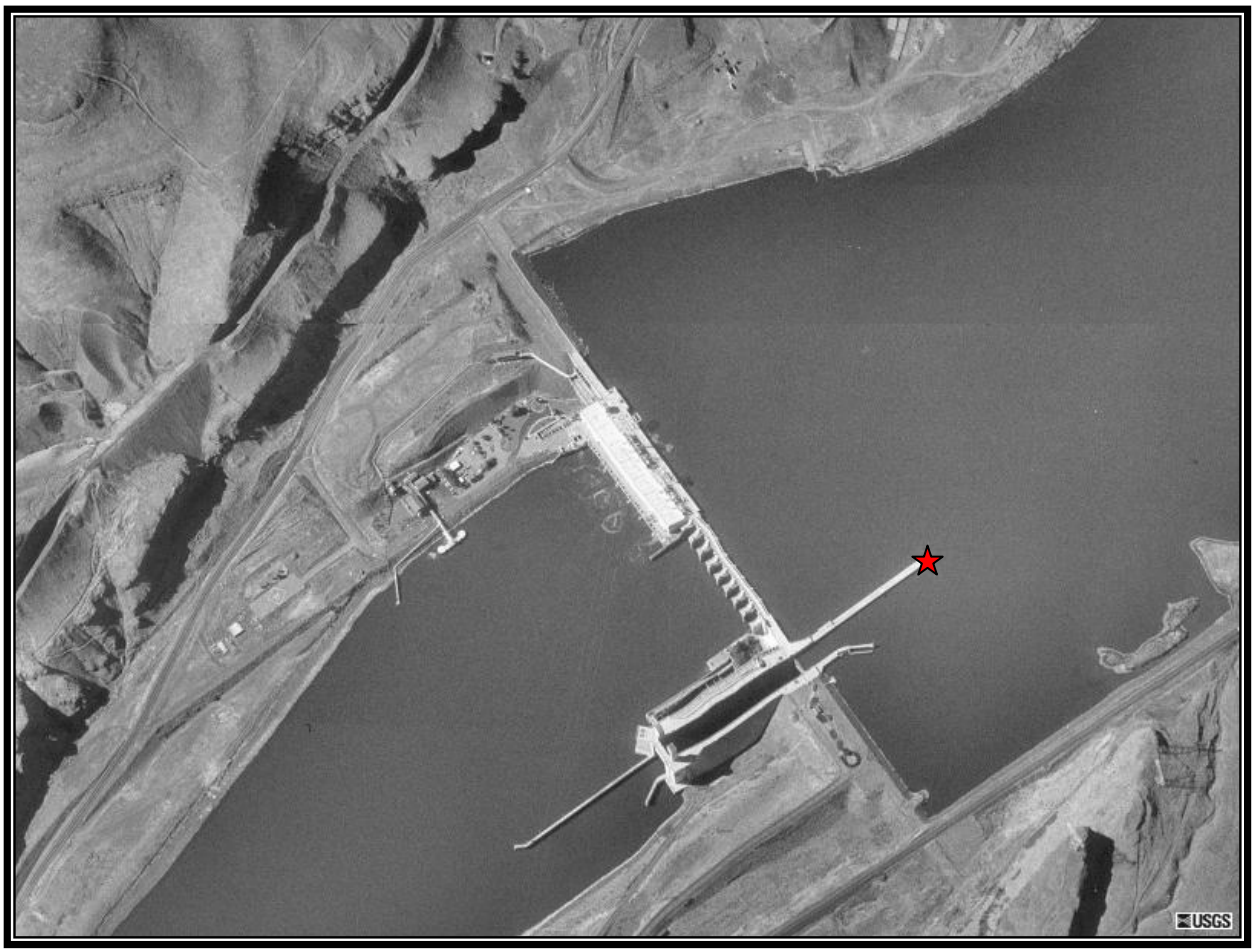
Comments:



20. Lower Monumental Forebay TDG Monitoring Station (LMNA)

Gage Elevation: Fixed
Latitude: 46° 33' 45.2" N
Longitude: 118° 32' 4.4" W
Datum: NAD-83
River: Snake
River Mile: 41.7
USGS-ID: 13352595
Owner: U.S. Army Corps of Engineers
Gauge Type: Hydrosonde
Data Transmission: GOES Satellite
Dates of Operation: April 1-Sept. 15.
Years of Operation: 2005 – Present.
River Conditions: Tailwater monitor.
Location: This gauge is located in the forebay of Lower Monumental Dam at the upstream end of the navigation lock guidewall.

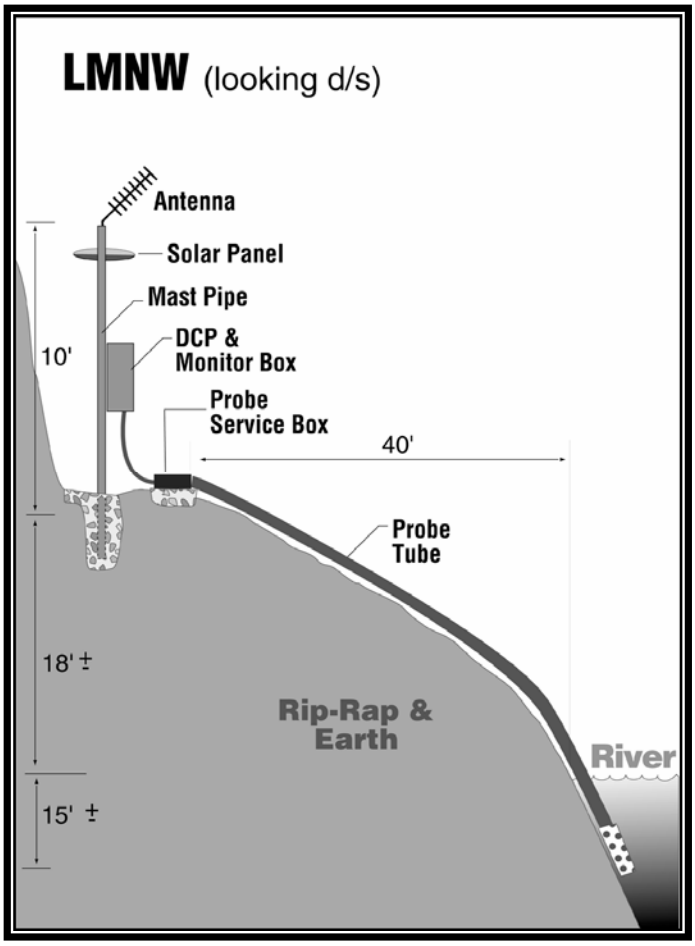
Comments: Replaced LMN in 2005.



21. Lower Monumental Tailwater TDG Monitoring Station (LMNW)

Gage Elevation: Fixed
Latitude: 46° 33' 04.5" N
Longitude: 118° 32' 59.0" W
Datum: NAD-83
River: Snake
River Mile: 40.4
USGS-ID: 13352600
Owner: U.S. Army Corps of Engineers
Gauge Type: Hydrosonde
Data Transmission: GOES Satellite
Dates of Operation: April 1-Sept. 15.
Years of Operation: 1995 – Present.
River Conditions: Tailwater monitor.
Location: This gauge is located on the southeastern shore of the Snake River approximately 1 mile downstream of Lower Monumental Dam.

Comments:

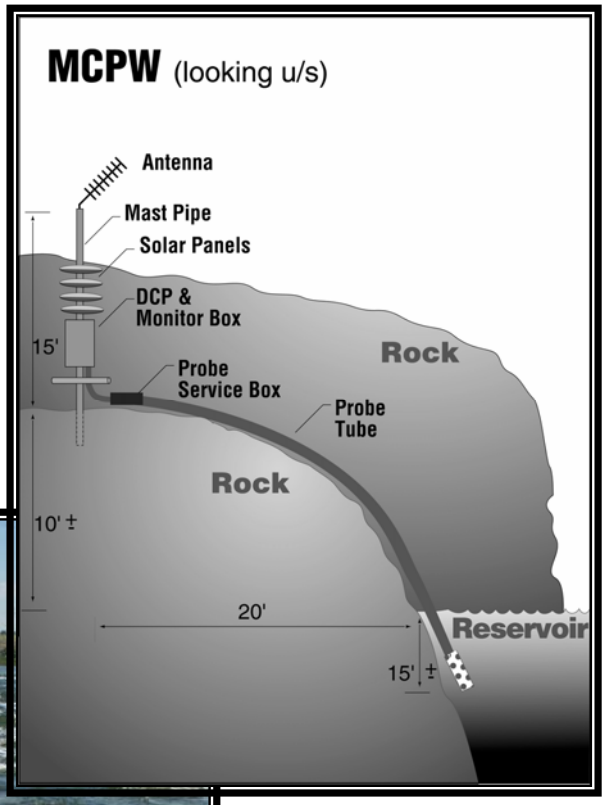


22. McNary Forebay (Washington Side) TDG Monitoring Station (MCNA)

Gage Elevation: Variable
Latitude: 45° 56' 28.8"
Longitude: 119° 17' 35.5"
Datum: NAD-83
River: Columbia
River Mile: 292.3
USGS-ID: 14019220
Owner: U.S. Army Corps of Engineers
Gauge Type: Hydrosonde
Data Transmission: GOES Satellite
Dates of Operation: Year Round
Years of Operation: 2005 - Present
River Conditions: Forebay Monitor
Location: This gauge is located at the end of the forebay navigation lock guidewall near the Washington shoreline.
Comment: This gauge moved to its present location in Spring 2005. Previously, this gauge was located on the face of the dam near the Washington side of the dam (MCQW).

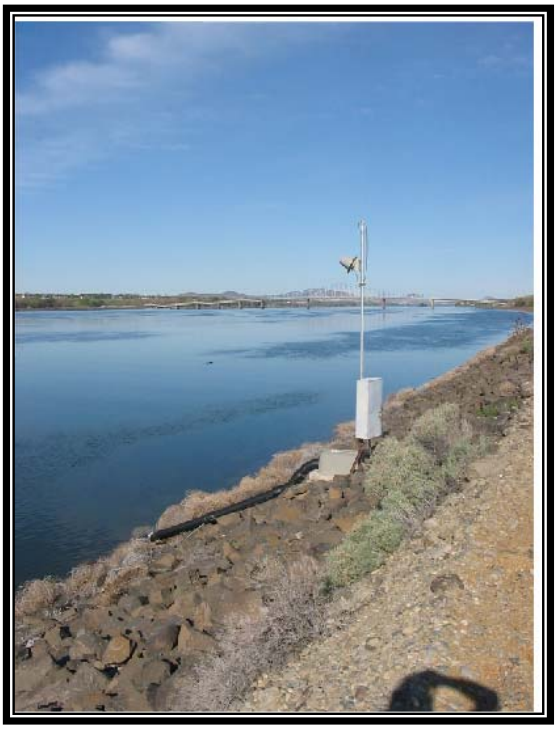
23. McNary Tailwater TDG Monitoring Station (MCPW)

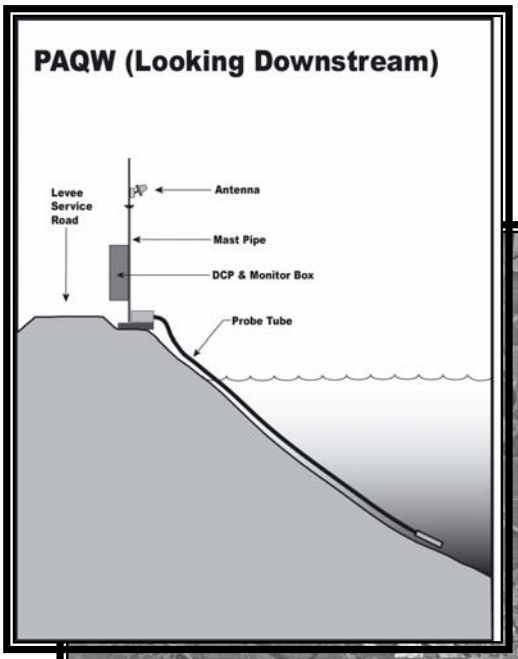
Gage Elevation: Fixed
Latitude: 45° 56' 2.8"
Longitude: 119° 19' 35.5"
Datum: NAD-83
River: Columbia
River Mile: 290.7
USGS-ID: 14019240
Owner: U.S. Army Corps of Engineers
Gauge Type: Hydrosonde
Data Transmission: GOES Satellite
Dates of Operation: Year Round
Years of Operation: 1995 - Present
River Conditions: Tailwater Monitor
Location: This gauge is located on a rocky outcrop on the Washington shore about 1.3 miles downstream of McNary dam and just upstream of the Highway 395 bridge.

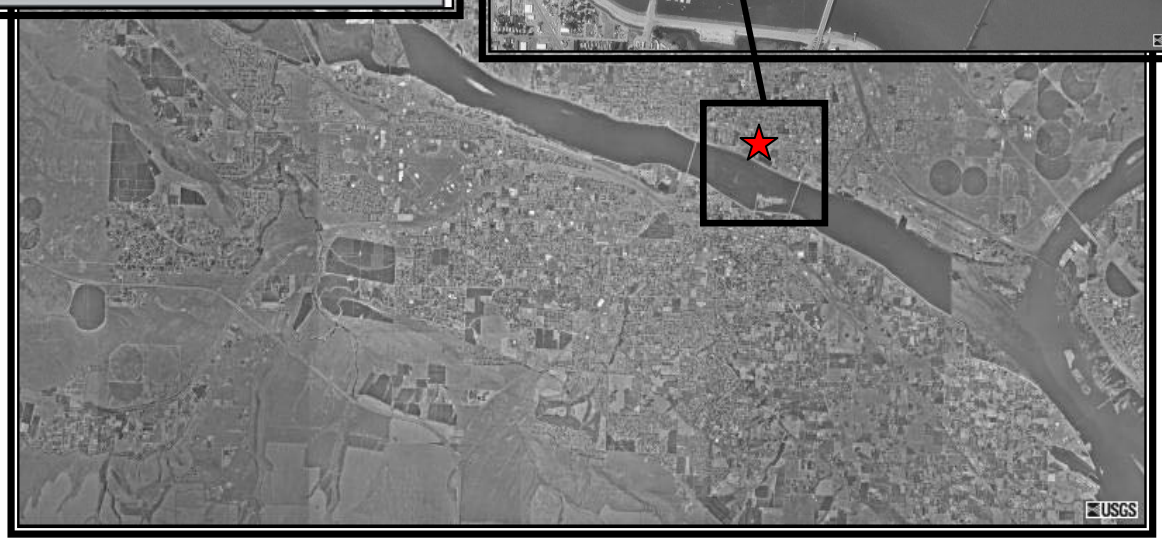


24. Pasco TDG Monitoring Station (PAQW)

Gage Elevation: Fixed
Latitude: 46° 13' 26.3"
Longitude: 119° 06' 57.3"
Datum: NAD-83
River: Columbia
River Mile: 329.1
USGS-ID: 12514400
Owner: U.S. Army Corps of Engineers
Gauge Type: Hydrosonde
Data Transmission: GOES Satellite
Dates of Operation: April 1 – Sept. 15
Years of Operation: 1999 - Present
River Conditions: Open River
Location: This gauge is located on the northern shore of the Columbia River between the S. 10th Avenue bridge and the Highway 395 bridge in Pasco, WA. It is on the levee adjacent to a wetland area near the Pasco Youth Baseball Complex. The site is within Lake Wallula approximately 5 miles upstream of the Snake River confluence.

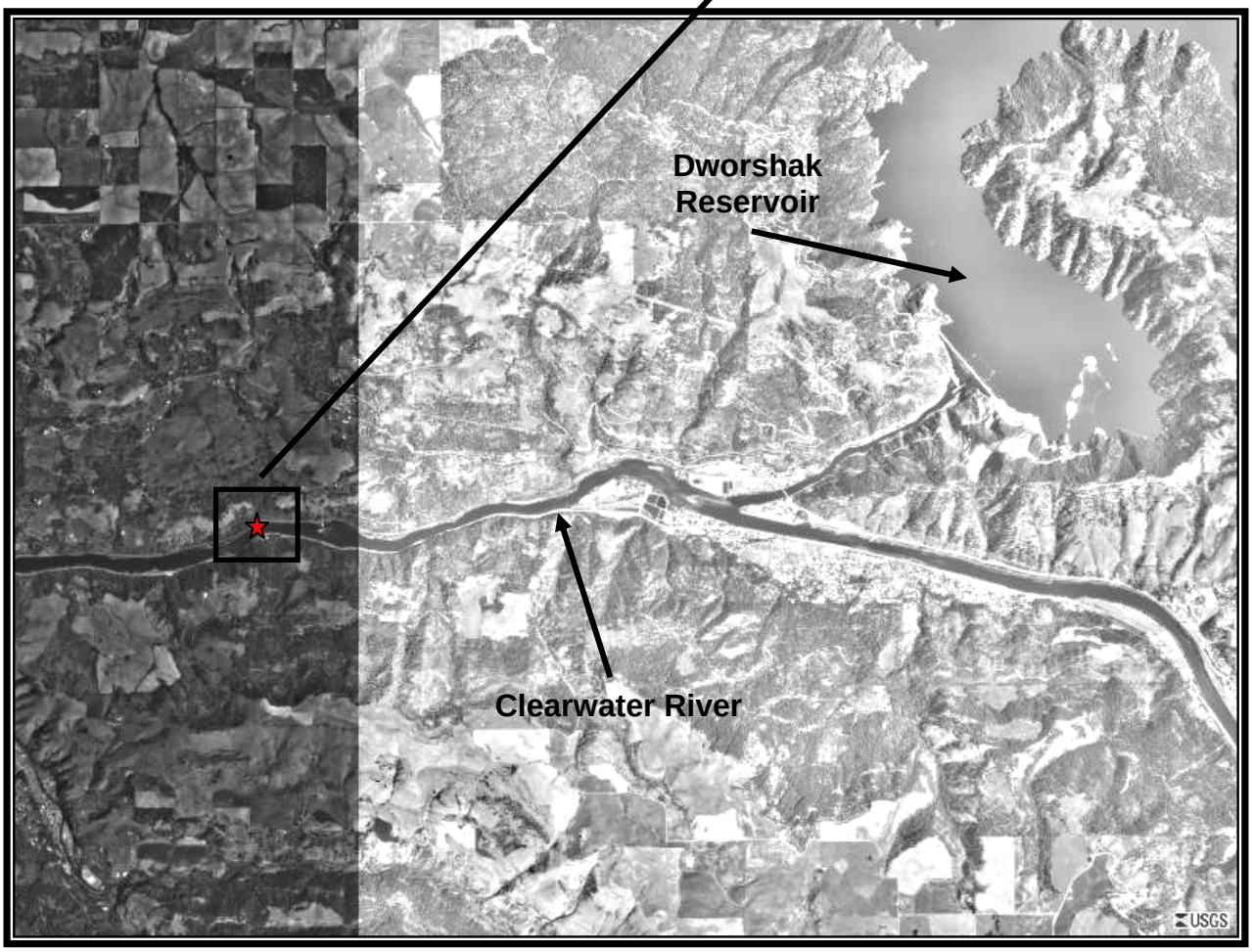






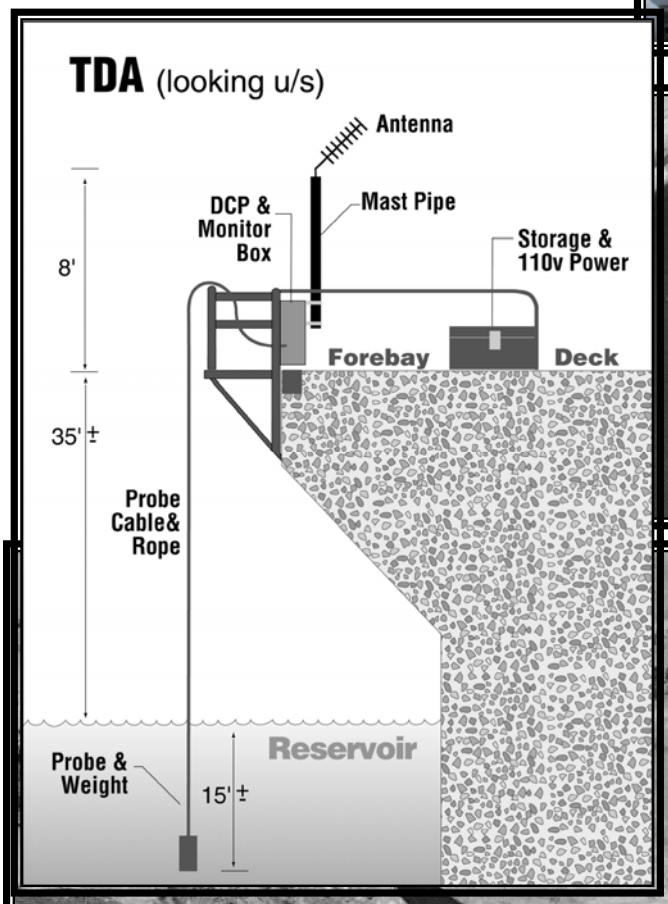
25. Peck TDG Monitoring Station (PEKI)

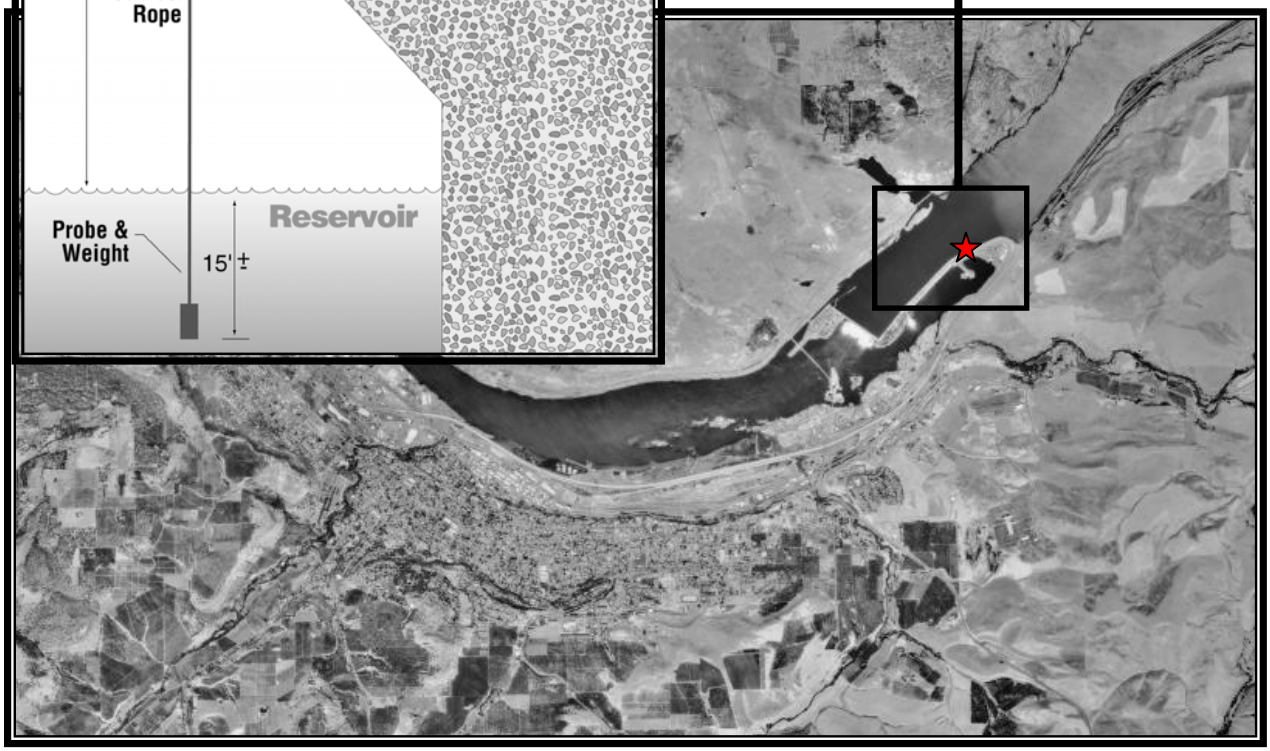
Gage Elevation: Fixed
Latitude: 46° 30' 0.9"
Longitude: 116° 23' 32.4"
Datum: NAD-83
River: Clearwater
River Mile: 37.4
USGS-ID: 13341050
Owner: U.S. Army Corps of Engineers
Gauge Type: Hydrosonde
Data Transmission: GOES Satellite
Dates of Operation: April 1 – Sept. 15
Years of Operation: 1996-Present
River Conditions: Open River
Location: This gauge is located on the southern shore of the Clearwater River approximately 3.5 miles downstream of the North Fork Clearwater River confluence.



26. The Dalles Forebay TDG Monitoring Station (TDA)

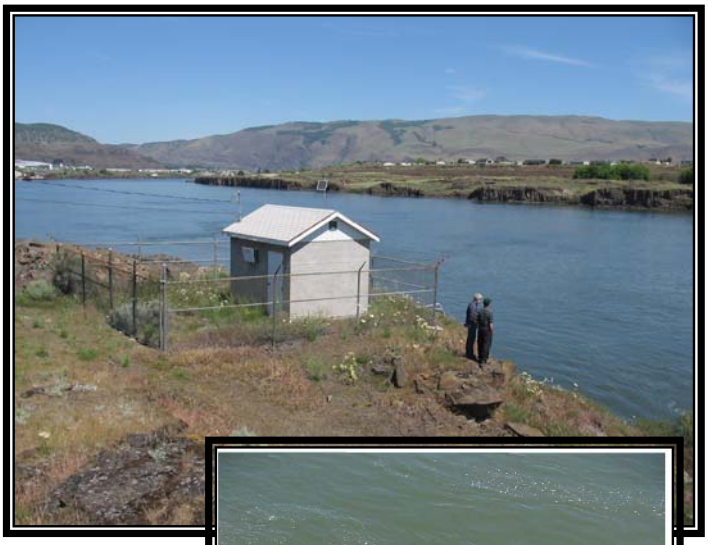
Gage Elevation: Fixed
Latitude: 45° 37' 11.5" N
Longitude: 121° 07' 16.5" W
Datum: NAD-83
River: Columbia
River Mile: 192.4
USGS-ID: 453712121071200
Owner: U.S. Army Corps of Engineers
Gauge Type: Hydrosonde
Data Transmission: GOES Satellite
Dates of Operation: April 1 – Sept. 31
Years of Operation: 1985 - Present
River Conditions: Forebay Monitor
Location: This gauge is located within The Dalles Dam forebay near the end of Powerhouse Unit #22.





27. The Dalles Tailwater TDG Monitoring Station (TDDO)

Gage Elevation: Fixed (107.6 ft)
Latitude: 45° 36' 29.7" N
Longitude: 121° 11' 23.8" W
Datum: NAD-83
River Mile: 189.1
USGS-ID: 14105700
Owner: U.S. Army Corps of Engineers
Gauge Type: Hydrosonde
Data Transmission: GOES Satellite
Dates of Operation: April 1 – Sept. 15
Years of Operation: 1996 - Present
River Conditions: Mixed River Tailwater Monitor
Location: Off Bargeway Road from Webber Street approximately 2.5 miles downstream of The Dalles spillway. Near industrial complex.



Comments:

28. Warrendale TDG Monitoring Station (WRNO)

Gage Elevation: Variable
Latitude: 45° 36' 29.1" N
Longitude: 122° 02' 19.4" W
Datum: NAD-83
River: Columbia
River Mile: 140.3
USGS-ID: 453630122021400
Owner: U.S. Army Corps of Engineers
Gauge Type: Hydrosonde
Data Transmission: GOES Satellite
Dates of Operation: 1 March – 15 May
Years of Operation: 1985 - Present
River Conditions: Mixed River
Location: This gauge is fixed to the boat dock at "The Fishery" off NE Enquist Pl in Dodson, Oregon (Near Warrendale) approximately 6 miles downstream of Bonnefille Dam.

Comment: Up until the 2004 spill season, this gauge was used at the tailwater gauge for Bonneville dam and was operated year round. Currently, this gauge is being used as a fall, winter, and spring TDG monitor only.