

Post Construction Water Quality Monitoring Plan

For The
Gibson Dam Hydroelectric Project
FERC No. 12478-002

Dated
February 10, 2009

In Appendix B of its 10-Jul-2008 letter to the applicant, FERC requests a Post Construction Water Quality Monitoring Plan. FERC guidance for the Post Construction Water Quality Monitoring Plan reads as follows:

(7) Post-Construction Water Quality Monitoring
Your APEA states that existing data suggests that project operations would cause dissolved oxygen levels in the Sun River below Gibson Dam to fall below state standards for early life stages of fish during the July through September period; however, you do not propose any measures to enhance dissolved oxygen during this period because you contend that: the 3-mile-long affected river reach is isolated by fish migration barriers upstream (Gibson dam) and downstream (Diversion dam); and natural water falls and the generally high gradient characteristics of this 3-mile-long reach would re-aerate the water to meet state standards downstream. According to the APEA, the Sun River immediately downstream of Gibson dam supports multiple fish species and may provide for a recreational fishery. Because proposed project operations have the potential to decrease dissolved oxygen levels in this reach of the Sun River as compared to existing conditions, and we have no way to accurately estimate the level of degradation, we anticipate that dissolved oxygen levels will need to be monitored during the initial project operations. In order to accurately assess the costs and benefits of such a monitoring plan, please develop a post-construction water quality monitoring plan and file it with your application. The plan, at a minimum, shall include the following:

- a means and schedule for monitoring the project's effects on dissolved oxygen in Sun River downstream of the proposed project during the first full year of project operations.

- a thorough description of specific monitoring locations, equipment to be used, sampling frequency, and approximate cost for the water quality monitoring.
- Documentation of consultation with Montana Department of Environmental Quality (DEQ), Forest Service, Reclamation, Montana DFWP, BLM, and FWS prior to preparing the plan and copies of agency comments or recommendations on the completed plan; and
- specific descriptions of how all of the agency comments and recommendations are accommodated by the plan and, if you do not adopt a recommendation, explain why using project specific information. Allow the agencies at least 30 days to comment on the plan before filing it with your license application.

Introduction

Gibson Dam was completed on the Sun River in 1929 and is operated by the Bureau of Reclamation to provide water for downstream irrigation users. The proposed hydropower project will not alter the timing or volume of water from the dam, but will utilize existing flows to generate power. Data collected by MT DEQ in 2007-2008 showed that there is a substantial drop in DO saturation as one approaches the bottom of Gibson reservoir near the dam (**Figure 1.1 – 1.4**). Currently, water is drawn from the reservoir and passes into the tailrace pool through two large pipes where, due to turbulent flow, re-aeration likely occurs and DO levels probably move closer to saturation. After the turbines are in place, water will be drawn from the existing intakes near the bottom of the reservoir and then, after passing through the turbines, will enter the tailrace pool quiescently. The benefit of re-aeration could be lost, which could potentially impact salmonid fishes in the tailrace pool.

DO monitoring undertaken by DEQ in 2004, 2007 and 2008 documented that, during July to September, DO levels at the bottom of Gibson Reservoir reach a low of 6.9 to 8.2 mg/L. As documented in the Project PDEA (Gibson Dam Hydroelectric Company, 2007) DO levels immediately downstream of the dam outlet valves are 1.0 mg/L to 1.5 mg/L higher than DO levels for reservoir water at the upstream end of the outlet pipes. This oxygenation effect is attributed to the turbulent release of water through the existing jet valves installed at Gibson Dam. Based on these monitoring results, it was determined that DO is a potential concern only during late summer hydroelectric operations from July to September.

Figure 1.1. 2004 to 2008 combined DO monitoring results for Gibson Reservoir.

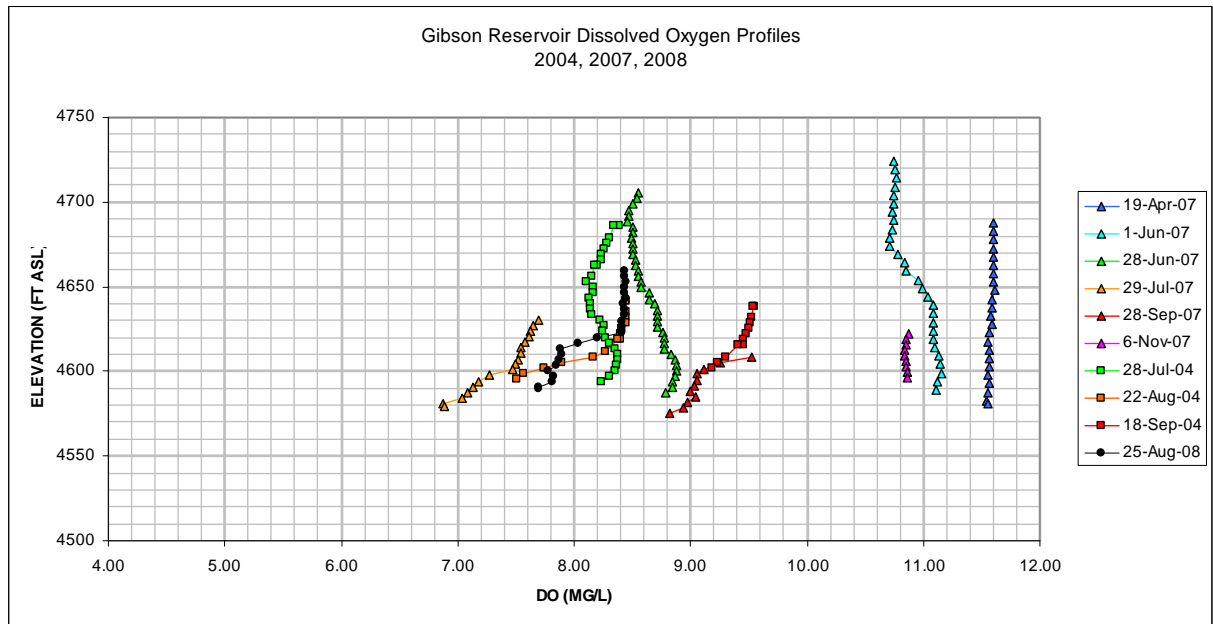


Figure 1.2 2004 DO monitoring results for Gibson Reservoir

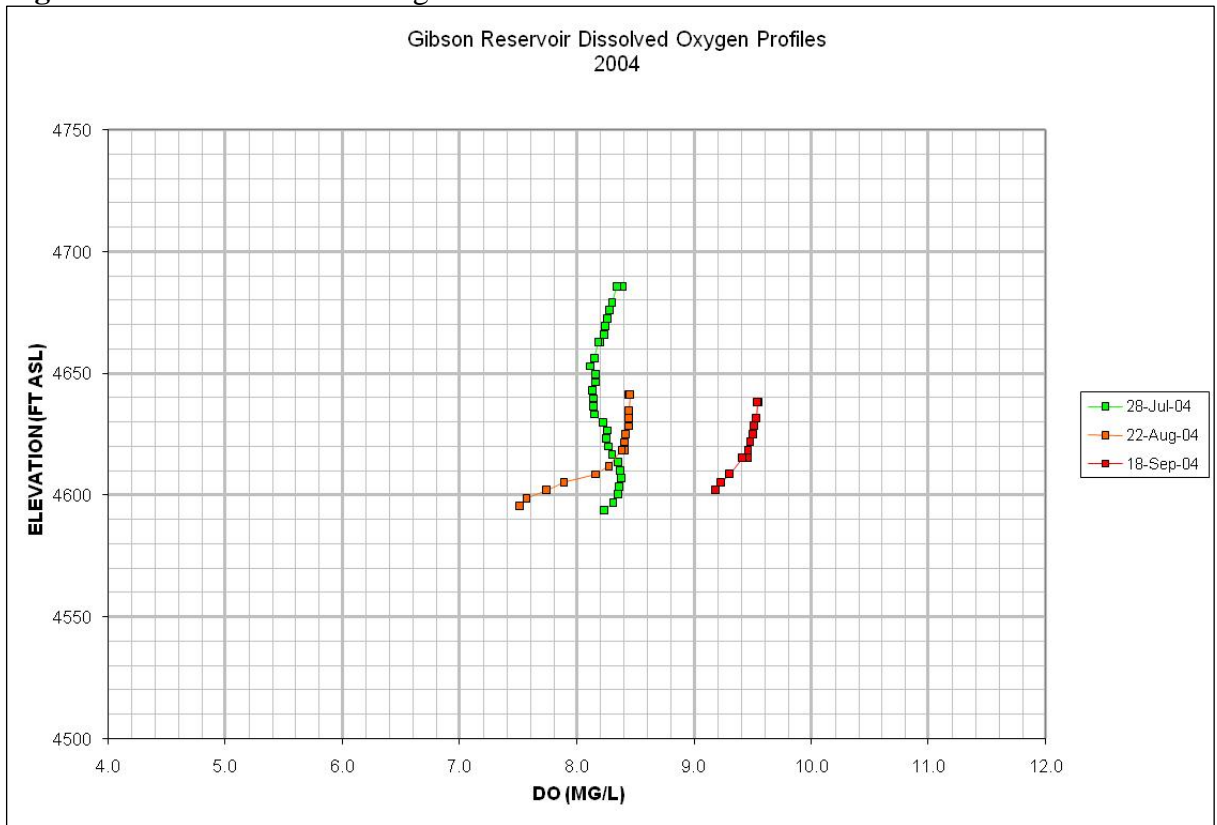


Figure 1.3 2007 DO monitoring results for Gibson Reservoir

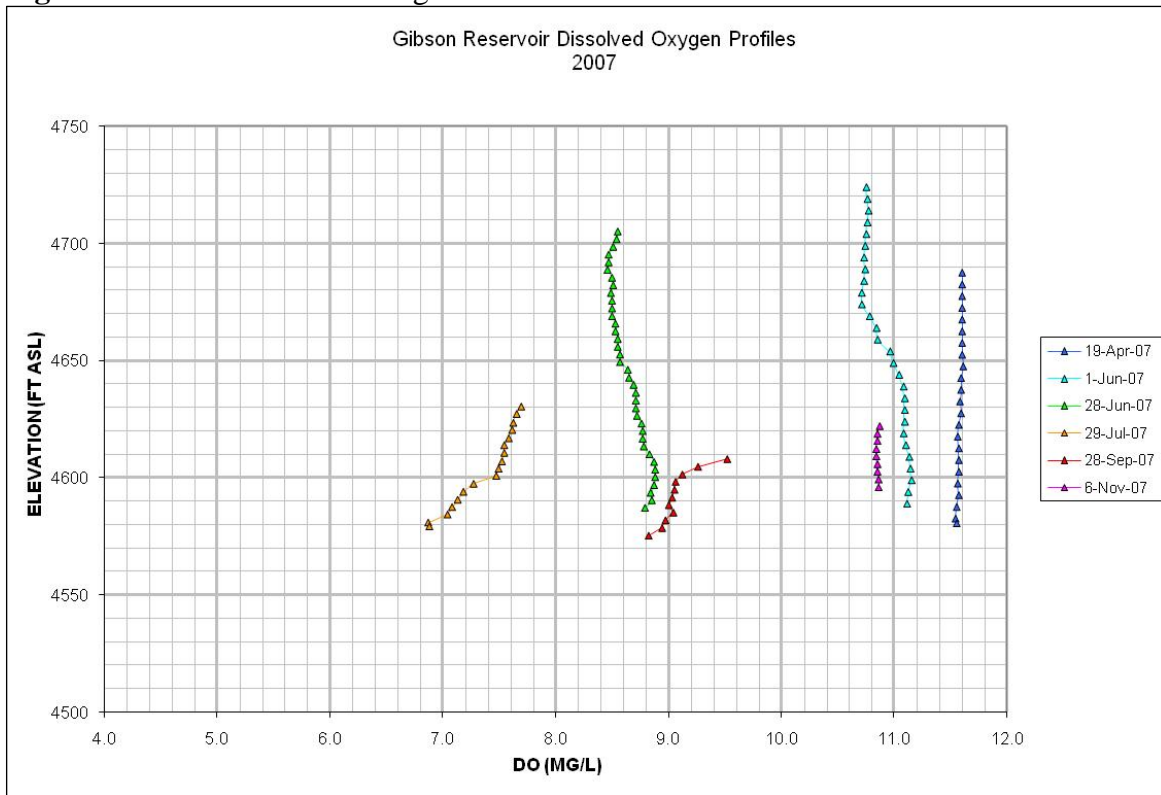
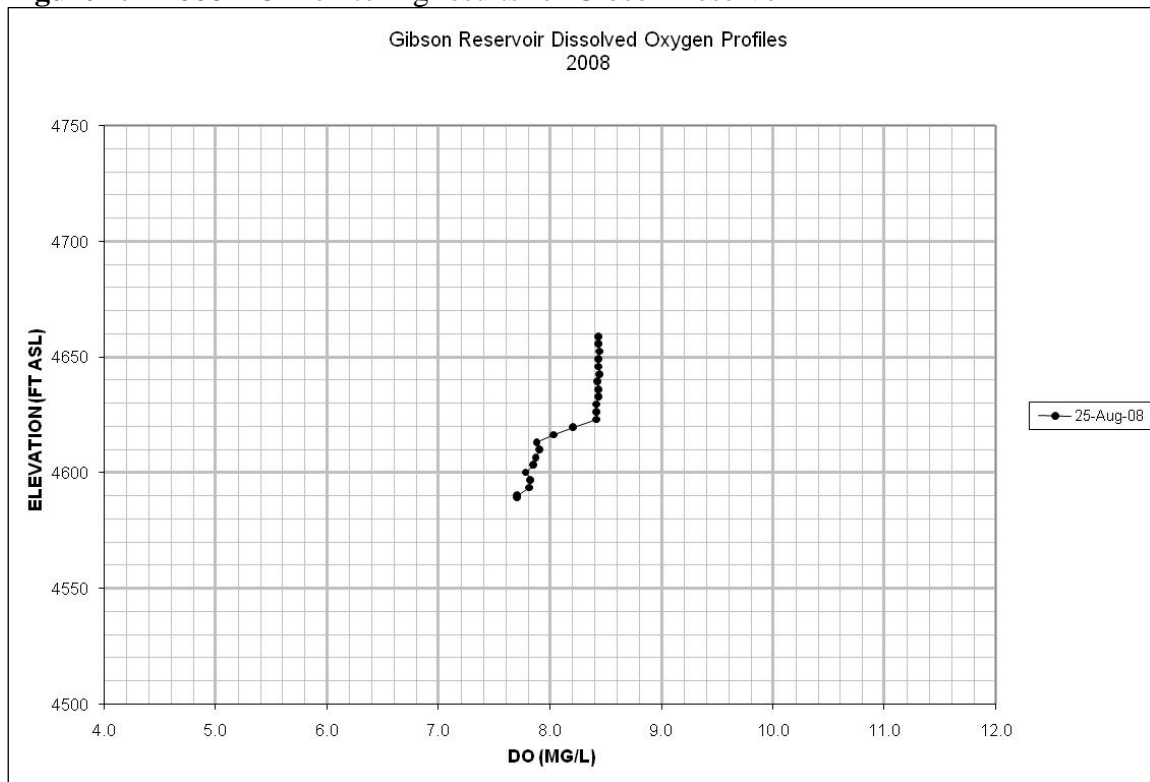


Figure 1.4 2008 DO monitoring results for Gibson Reservoir



Late summer 2008 DO sampling within the Sun River streambed show that intergravel DO is reduced by 0.48 mg/L to 2.32 mg/L relative to water column DO, with greater differences occurring for fine grained streambed sediment (**Table 1**).

Table 1. Dissolved oxygen differential between water column and streambed sediments.

Station	Δ DO, mg/L (water column DO minus intergravel DO)		Sediment description
	31-Jul-2008	25-Aug-2008	
Tail-out	0.48	0.65	coarse gravel and cobble
Blacktail bridge	1.07	0.72	slightly finer than tail-out
Hannan bridge	2.32	2.13	fine gravel and sand

Objectives and Design of the Investigation

The work outlined in this plan is intended to answer the following question:

When the powerhouse is operating, what is the water column and intergravel DO level at various points on the Sun River between Gibson Dam and Diversion Dam?

Sampling Timeframe

Sampling will begin during the first July to September time period after project startup and continue until July to September data have been collected for three years. During each period, DO will be measured on a bi-weekly basis (every two weeks) at each sampling location, unless prevented by ice conditions.

Field Sampling Methods

Three sampling locations, shown in **Figure 2**, will correspond with intergravel DO sampling sites utilized by DEQ during their 2007-2008 sampling program. Sites will be located (from upstream to downstream) at: the pool tail-out of the tailrace pool (47.6029, 112.7586), the Blacktail bridge crossing (47.6070, 112.7536), and at the Hannan Gulch bridge crossing (47.6162, 112.7342). All locations have been selected to be accessible on foot. A YSI 85 handheld sonde or equivalent will be employed for the DO measurements. The dissolved oxygen meter will be calibrated prior to measuring DO at each site per the manufacturer's instructions.



Figure 2. DO Monitoring Station Locations.

Intergravel DO concentrations will be measured at each site using a steel standpipe as shown in **Figure 3**. The device will be pounded in to the stream bottom so that the series of perforating holes will be centered 12 cm below the sediment-water interface. 12 cm was selected as it represents a typical burial depth of a rainbow trout redd, and falls midrange between the depth where streambed scouring would begin to affect a rainbow trout redd (10 cm) and the depth where scouring would cause total egg loss (25 cm). The standpipe will be placed in the location selected by MDEQ during their 2008 DO monitoring program (MDEQ, 2008). Once the standpipe is pounded in place, the water that fills inside the pipe will be drawn out using a manually operated hand pump and, then, the standpipe will be allowed to refill with intergravel water. The DO probe will be lowered to the depth where the perforations are located and the DO concentration and temperature of the refilled water will be measured. Water column DO will also be measured at each site at a location near the intergravel measurement.

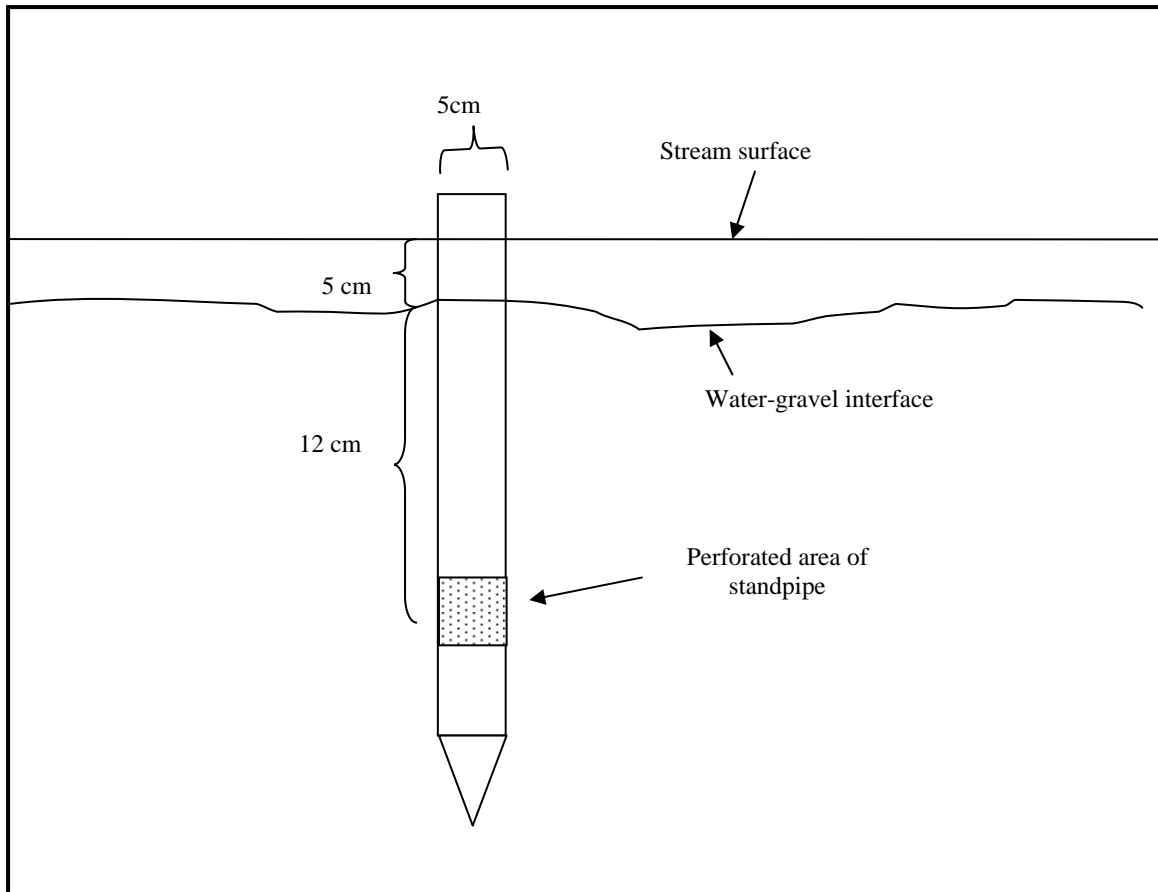


Figure 3. Profile view of the standpipe used for intergravel DO measurement.

Sample Handling Procedures

Only real-time measurements will be collected. Standard MDEQ Water Quality Planning Bureau site visit/chain of custody forms will be used to document and track samples collected in the project. Forms will be maintained at the Gibson Dam powerhouse during the duration of the project.

Laboratory Analytical Measurements

None.

Data Analysis, Record Keeping, and Reporting Requirements

Data generated during this project will be recorded on a MT DEQ site visit/Chain of Custody field form (**APPENDIX A**). All completed forms will be maintained at the Gibson Dam powerhouse office.

At the end of each year's sampling program, data will be compiled on an Excel spreadsheet and provided to MDEQ for review. Interim reports will be generated at the end of the first two sampling years and a final report will be generated at the end of the third year. The need for any actions to enhance DO levels in the Sun River below Gibson Dam will be determined based on the results of three year DO monitoring program.

Schedule

Sampling will begin on 1-Jul after project startup. After the initial sampling, during which Michael Suplee, Ph.D. (MT DEQ) will provide oversight and training, sampling will proceed at approximately 14 day intervals and will be carried out by Gibson Dam Hydroelectric Company personnel or by a subcontractor. Data collection will be completed by 30-Sep of the same year, and reporting will be completed by 31-Dec.

Cost

Total cost for DO monitoring, including equipment and labor to conduct bi-weekly measurements is estimated at \$10,000 assuming a three month monitoring period for each of three years.

References

MT DEQ (MT Department of Environmental Quality), 2005. Quality Assurance Project Plan (QAPP) Sampling and Water Quality Assessment of Streams and Rivers in Montana, 2005. *Available at*
<http://www.deq.state.mt.us/wqinfo/QAProgram/WQPBQAP-02.pdf>.

Gibson Dam Hydroelectric Company, 2007, Preliminary Draft Environmental Assessment, Gibson Dam Hydroelectric Company, LLC, Bellingham, WA

Agency Consultation

A Draft Post Construction Water Quality Monitoring Plan was initially distributed for review and comment via email on **October 27, 2008** to the following State and Federal resource agencies listed below:

Dr. Michael Suplee, Ph.D.
Water Quality Standards Section
Montana Department of Environmental Quality
1520 E. 6th Avenue
Helena, MT 59621
msuplee@mt.gov

Mr. Steve Davies
Montana Area Office
U.S. Bureau of Reclamation
P.O. Box 30137
Billings, MT 59107-0137
sdavies@gp.usbr.gov

Ms. Laura Conway
USDA Forest Service
Lewis & Clark National Forest
P.O. Box 869
Great Falls, MT 59403-0869
lconway@fs.fed.us

Mr. Glenn Phillips
Habitat Protection Bureau Chief
Montana Department of Fish, Wildlife & Parks
1420 6th Avenue East
Helena, MT 59620-0701
gphillips@mt.gov

Mr. Mike Philbin
Bureau of Land Management
5001 Southgate Dr.
Billings, MT 59101
mphilbin@blm.gov

Mr. Mark Wilson
U.S. Fish & Wildlife Service
100 North Park Avenue
Suite 320
Helena, MT 59106
Mark_wilson@fws.gov

Comments on the draft Plan were received from:

Montana Dept. of Environmental Quality	Email dated October 30, 2008
USDOI Bureau of Reclamation	Letter dated November 24, 2008
USDA Forest Service	Letter dated November 26, 2008

Comments on the draft Plan from responding Agencies are included in **Appendix B**. A summary of the Agency comments and the Applicant’s response to each as incorporated into the final Plan, follows:

ID	Agency Comment	Applicant Response
DEQ1	Suggest adding sentence to end of last paragraph under Field Sampling Methods section to read “The dissolved oxygen meter will be calibrated prior to measuring DO at each site per the manufacture’s instructions.”	Added additional wording as suggested.
BOR1	No comment on Plan.	n/a
USFS1	Request to provide a more detailed sampling location map showing area landmark features.	Provided new sampling location map (Figure 2.) with additional detail as requested.
USFS2	Request to provide separate graph for each year of DO sampling results.	Provided separate graphs as requested.

APPENDIX A

Site Visit Form

Project: GIBRES07 Trip: 2007-GIBRES07
HUC: 10030104
Sun River at road #108 bridge crossing

4231 - **Site Visit Form**
(One Station per page)

M13SUNR03

Date: 9/28/2007 Time: 12:15 Personnel: A. Welch, J Drygas

Waterbody: SUN RIVER Location: @ road # 108 bridge crossing

Station ID: M13SUNR03 Visit #: 3 HUC: 10030104 County: _____

Latitude: 47.6070 Longitude: 112.7536 Lat/Long Verified? By: _____

Elevation (m): _____ GPS Datum: NAD27 (NAD83) WGS84

Samples Collected:	Sample ID (Provide for all samples):	Sample Collection Information/Preservation:
Water <input type="checkbox"/>		GRAB
Analysis:		Preserved: HNO ₃ H ₂ SO ₄ H ₃ PO ₄ HCL None
Analysis:		Preserved: HNO ₃ H ₂ SO ₄ H ₃ PO ₄ HCL None
Analysis:		Preserved: HNO ₃ H ₂ SO ₄ H ₃ PO ₄ HCL None
Analysis:		Preserved: HNO ₃ H ₂ SO ₄ H ₃ PO ₄ HCL None
Analysis:		Preserved: HNO ₃ H ₂ SO ₄ H ₃ PO ₄ HCL None
Analysis:		Preserved: HNO ₃ H ₂ SO ₄ H ₃ PO ₄ HCL None
Analysis:		Preserved: HNO ₃ H ₂ SO ₄ H ₃ PO ₄ HCL None
Sediment <input type="checkbox"/>		SED-1
Analysis:		Preserved: None Other:
Analysis:		Preserved: None Other:
Chlorophyll a <input type="checkbox"/>		C=Core H=Hoop T=Template N= No Sample
Composite at Lab <input type="checkbox"/>	Transect: 1 ___ 2 ___ 3 ___ 4 ___ 5 ___ 6 ___ 7 ___ 8 ___ 9 ___ 10 ___ 11 ___	
Phytoplankton <input type="checkbox"/>		R1 Filtered: ___ mL R2 Filtered: ___ mL
Algae <input type="checkbox"/>		PERI-1 OTHER:
Macroinvert. <input type="checkbox"/>		KICK HESS JAB OTHER:
Kick/Jab Length (ft):	Kick Duration/# Jabs:	# of Jars: Mesh Size: 1200 1000 500 OTHER:

Field Measurements:	Field Assessments:
Water Temp: <u>9.42</u> (°C) °F	Air Temp: _____ °C °F
pH: <u>8.6</u>	SC: <u>275</u> (umho/cm)
DO: <u>10.42</u> (mg/L)	Flow: _____ (cfs)
Flow Comments: Dry Bed <input type="checkbox"/> No Measurable Flow <input type="checkbox"/>	EMAP Assessment <input type="checkbox"/>
Flow Method: Meter <input type="checkbox"/> Float <input type="checkbox"/> Gage <input type="checkbox"/> Visual Est. <input type="checkbox"/>	Substrate: Pebble Count <input type="checkbox"/> Percent Fines <input type="checkbox"/> RSI <input type="checkbox"/>
Turbidity: Clear <input type="checkbox"/> Slight <input type="checkbox"/> Turbid <input type="checkbox"/> Opaque <input type="checkbox"/>	Channel Cross-Section <input type="checkbox"/>
	Photographs: Digital <input type="checkbox"/> Film <input type="checkbox"/>

Site Visit Comments:

Chemistry Lab Information:

Lab Samples Submitted to: State Lab Account #: T82169 Date Submitted: _____

Invoice Address: Steve Marmon-3633 Alderwood Ave. Bellingham, WA 98225

Contact Name & Phone: Rosie Sada/ (406) 444-5964

EDD Format: SIM Compatible Term Contract Number: _____

Relinquished By & Date/Time:	Shipped By & Date/Time:	Received By & Date/Time:
Relinquished By & Date/Time:	Shipped By & Date/Time:	Received By & Date/Time:
Relinquished By & Date/Time:	Shipped By & Date/Time:	Received By & Date/Time:

Lab Use Only - Delivery Temperature (°C): _____ D.O. SATURATION = 9.69 TURBID. Rev. 5/2007

APPENDIX B
Agency Consultation

October 27, 2008

Ms. Laura Conway
US Department of Agriculture,
Forest Service
lconway@fs.fed.us

Mr. Mike Philbin
Bureau of Land Management
mphilbin@blm.gov

Mr. Steve Davies
U.S. Bureau of Reclamation,
Great Plains Region
sdavies@gp.usbr.gov

Mr. Mark Wilson
U.S. Fish & Wildlife Service
mark_wilson@FWS.gov

Mr. Glenn Phillips
Montana Fish, Wildlife & Parks
gphillips@mt.gov

Dr. Michael Suplee, Ph.D.
MT Department of Environmental Quality
msuplee@mt.gov

REF: Gibson Dam Hydroelectric Project, FERC No. 12478-002
SUB: Electronic Distribution of Draft Post-Construction Water Quality Monitoring Plan, and Request for Comments.

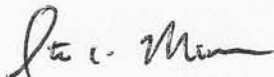
Dear Agency Lead:

Attached is a copy of the Draft Post-Construction Water Quality Monitoring Plan for the above referenced project. Please review the plan and provide written comments, if any, within 30 days of the date of this letter. Your comments should be faxed, mailed or emailed to:

Gibson Dam Hydroelectric Company, LLC
Attn. Steve Marmon, Project Manager
3633 Alderwood Ave.
Bellingham, WA 98225
(360)733-3056 FAX
smarmon@whitewatereng.com EMAIL

Please contact me at (360)738-9999 or smarmon@whitewatereng.com should you have any questions. Thank you for your continued participation in the licensing process.

Sincerely,



Steven C. Marmon
Project Manager

GIBSON DAM HYDROELECTRIC COMPANY, LLC
3633 Alderwood Ave., Bellingham, WA 98225
(360)738-9999 ph (360)733-3056 fax
www.gibsonhvdro.com

Steve Marmon

From: Suplee, Mike [msuplee@mt.gov]
Sent: Thursday, October 30, 2008 10:38 AM
To: 'Steve Marmon'
Subject: RE: Gibson Dam Hydro Project, FERC No. 12478-002 Electronic Distribution of Draft Post-Construction Water Quality Monitoring Plan, and request for comments

Mr. Marmon;

I have reviewed the dissolved oxygen monitoring and reporting plan for the upper Sun River. DEQ is satisfied that it adequately addresses the dissolved oxygen concerns for the river.

DEQ) My only comment is that you add, on page 3, Field Sampling Methods, a last sentence to the first paragraph stating "the dissolved oxygen meter will be calibrated prior to measuring DO at each site per the manufacturer's instructions".

Thanks,

Michael Suplee
MT DEQ



IN REPLY REFER TO:

GP-2200
PRJ-18.00

United States Department of the Interior

BUREAU OF RECLAMATION

Great Plains Region
P.O. Box 36900
Billings, Montana 59107-6900



NOV 24 2008

RECEIVED
DEC 01 2008
SM

Gibson Dam Hydroelectric Company, LLC
Attention: Steven Marmon
3633 Alderwood Avenue
Bellingham, WA 98225

Subject: Review Comments, Construction and Post-Construction Water Quality Monitoring Plans, Gibson Dam Hydroelectric Project, FERC No. 12478-002, Montana

Dear Mr. Marmon:

BOB [The Bureau of Reclamation has received and reviewed the subject plans. We do not have any comments on either plan. If you have any questions, please contact me at 406-247-7651.

Sincerely,

George A. Gliko
Regional FERC Coordinator

cc: Mr. Bob Hardin, Manager
Greenfields Irrigation District
P.O. Box 157
Fairfield, MT 59436



United States
Department of
Agriculture

Forest
Service

Lewis and Clark
National Forest

1101 15th Street North
P.O. Box 869
Great Falls, MT 59403-0869
406 791-7700
FAX 406 731-5302

File Code: 2720

Date: November 26, 2008

Steve Marmon
Project Manager
Gibson Dam Hydroelectric Company, LLC
3633 Alderwood Avenue
Bellingham, WA 98225

RECEIVED
DEC 01 2008
pm

Dear Mr. Marmon:

This letter is in response to your request for comments on the Gibson Dam Hydroelectric Project, FERC No. 12478-002, 1) Draft Recreation Plan, 2) Special Status Plant and Noxious Weed Survey Report and Construction Plan Recommendations, 3) Draft Post-Construction Water Quality Monitoring Plan, 4) Draft Construction Water Quality Monitoring Plan, and 5) Draft Bear Safety Plan. Attached you will find two documents with specific comments related to the Draft Recreation Plan and the Draft Bear Safety Plan.

As for the Special Status Plant and Noxious Weed Survey Report and Construction Plan Recommendations, our sensitive plant coordinator Tanya Murphy noted that rattlesnake plantain did not leaf out or flower until well into August in 2008. This plant could have been missed during your surveys. At this time we are not requesting additional surveys, however we would like to be informed if this plant is located in the project area at a later date.

USFSZ USFSI
In the Water Quality Monitoring Plans, it would be helpful if the sampling location map showed more detail, such as roads and Diversion Dam. Also, the composite graph of Dissolved Oxygen levels for the three year period is difficult to tease out the important data. We request that the data be displayed graphically for both yearly and a three year period.

The project area maps in your reports indicate the area around Gibson Reservoir owned by the Bureau of Reclamation. This is inaccurate. Attached you will find a map with the correct designation for these lands. The area is U.S. Forest Service land, withdrawn for reclamation purposes. The Bureau of Reclamation manages the area for the water uses and the dam. The Forest Service maintains ownership and continues to manage the recreational uses in the area.

If you have any questions regarding these comments please contact Laura Conway at 406-791-7739.

Sincerely,

for *Robert Strathy*
LESLEY W. THOMPSON
Forest Supervisor
Enclosures

