



Fw: Bypass Flow Plan

Jason Yencopal to: Heidi Martin, Jason Yencopal

02/17/2011 10:15 AM

From: Jason Yencopal/Baker County

To: Heidi Martin/Baker County@Baker County, Jason Yencopal/Baker County@Baker County

----- Forwarded by Jason Yencopal/Baker County on 02/17/2011 10:15 AM -----



Jason Yencopal

02/17/2011 10:11 AM

To: "Audie Huber" <Audiehuber@ctuir.com>, "Carolyn Templeton" <Carolyn.Templeton@ferc.gov>, "Carl Stiff" <cbstiff@wildblue.net>, "Colleen Fagan" <Colleen.E.Fagan@state.or.us>, "GRIFFIN Dennis" <Dennis.Griffin@state.or.us>, "Emily Carter" <Emily.Carter@ferc.gov>, "Fred Warner" <fwarner@bakercounty.org>, "Gary Miller" <Gary_Miller@fws.gov>, "Ken Anderson" <kenanderson@fs.fed.us>, "Kenneth Hogan" <Kenneth.Hogan@ferc.gov>, "GRAINEY Mary S" <Mary.S.GRAINEY@state.or.us>, "Mike Gerdes" <Mgerdes@FS.fed.us>, "Micheal Hall" <Mhall02@fs.fed.us>, "Randy Joseph" <millworks@StarBand.net>, "KIRK Steve" <Kirk.Steve@deq.state.or.us>, "Quentin Lawson" <Quentin.Lawson@ferc.gov>, "LUSK Rick M" <Rick.M.LUSK@state.or.us>, "Robert Ross" <rross@pn.usbr.gov>, "Shawn Steinmetz" <shawnsteinmetz@ctuir.com>, "Susan Rosebrough" <Susan_Rosebrough@nps.gov>, "Thomas Stahl" <Thomas.Stahl@state.or.us>, "Timothy Welch" <Timothy.Welch@ferc.gov>, "GRIFFIN Dennis" <Dennis.Griffin@state.or.us>, "Joseph Hassell" <Joseph.Hassell@ferc.gov>, "Carl Merkle" <CarlMerkle@ctuir.org>, lgecy@ecowest-inc.com, ted@tsorenson.net, gsense@cableone.net, "Ken Homolka" <ken.homolka@state.or.us>, "Jeff Tomac" <jtomac@fs.fed.us>

cc:

Subject: Bypass Flow Plan

Stakeholders,

Attached is the updated Bypass Flow plan for your review and comments .

If I may be of any help, please let me know.

Sincerely,
Jason Yencopal



Baker County Bypass Flow Plan Feb_17_2011 with attachment_p.pdf

Baker County

Mason Dam Hydroelectric Project
FERC No. P-12686

Bypass Flow Plan

See Appendix B for the rest of the plan and comments on the plan in the consultations record attached to it

February 2011

Baker County

Mason Dam Hydroelectric Project
FERC No. P-12686

Revegetation/Noxious Weed Management Plan

See Appendix E for the rest of the plan and comments on the plan in the consultations record attached to it.

February 2011

Baker County

Mason Dam Hydroelectric Project
FERC No. P-12686

Erosion and Sediment Control Plan

See Appendix D for the rest of the plan and comments on the plan in the consultations record attached to it

February 2011



Fish Entrainment and Mortality at Mason Dam Draft Final Report

Jason Yencopal to: Audie Huber, Carolyn Templeton, Carl Stiff, Colleen Fagan, GRIFFIN Dennis, Emily Carter, Fred Warner, Gary Miller, Ken
02/14/2011 09:59 AM
Cc: Heidi Martin, Jason Yencopal

From: Jason Yencopal/Baker County
To: "Audie Huber" <Audiehuber@ctuir.com>, "Carolyn Templeton" <Carolyn.Templeton@ferc.gov>, "Carl Stiff" <cbstiff@wildblue.net>, "Colleen Fagan" <Colleen.E.Fagan@state.or.us>, "GRIFFIN Dennis" <Dennis.Griffin@state.or.us>, "Emily
Cc: Heidi Martin/Baker County@Baker County, Jason Yencopal/Baker County@Baker County

Dear Stakeholders,

Attached is the paper study done for the Mason Dam Hydroelectric Project (P-12686) for fish entrainment and turbine mortality. Please review the report and provide comments no later than March 15, 2011.

If I may be of any help please let me know.

Sincerely,
Jason Yencopal



Mason Dam Entrainment and Mortality Draft Final Report Feb_14_2011.pdf

Draft Technical Report

Report on Fish Entrainment and Mortality at Mason Dam, OR

Mason Dam Hydroelectric Project (FERC No. 12686)

Prepared for:

*Baker County
Baker City, OR*

See Appendix G for the rest of the plan and comments
on the plan in the consultations record attached to it

Prepared by:

*GeoSense
Idaho Falls, ID*

February 2011



RE: DO Compliance Plan
Colleen Fagan to: jyencopal
Cc: "Ken Homolka"

02/03/2011 03:43 PM

From: "Colleen Fagan" <colleen.e.fagan@state.or.us>
To: <jyencopal@bakercounty.org>
Cc: "Ken Homolka" <ken.homolka@state.or.us>

Hi Jason:

Could you please add Ken Homolka to your distribution list? Ken is ODFW's Hydropower Program Leader.

Ken.homolka@state.or.us
(503) 947-6090

Thank You,
Colleen

-----Original Message-----

From: jyencopal@bakercounty.org [mailto:jyencopal@bakercounty.org]
Sent: Thursday, February 03, 2011 2:16 PM
To: Audie Huber; Carolyn Templeton; Carl Stiff; Colleen Fagan; GRIFFIN Dennis; Emily Carter; Fred Warner; Gary Miller; Ken Anderson; Kenneth Hogan; GRAINEY Mary S; Mike Gerdes; Micheal Hall; Randy Joseph; KIRK Steve; Quentin Lawson; LUSK Rick M; Robert Ross; Shawn Steinmetz; Susan Rosebrough; Thomas Stahl; Timothy Welch; GRIFFIN Dennis; Joseph Hassell; Carl Merkle; lgecy@ecowest-inc.com; ted@tsorenson.net; gsense@cableone.net
Cc: hmartin@bakercounty.org; jyencopal@bakercounty.org
Subject: DO Compliance Plan

Stakeholders,

Shortly after my last e-mail I actually had to move offices one more time. The best way to get a hold of me is through e-mail. I have a temporary office phone number of 541.524.9802. I am also able to retrieve messages from my permanent office phone number which is 541.523.9669. Attached it the updated DO Compliance Plan. The Noxious Weed, Bypass Flow, and Erosion and Sediment Control Plans will be sent out soon. If there are any additional comments on the Preliminary License Proposal, the Draft Biological Assessment, or these plans please let me know so we can address them.

Thank you for your cooperation,
Jason Yencopal

(See attached file: Baker County DO Compliance Plan Feb_2011.pdf)



DO Compliance Plan

Jason Yencopal to: Audie Huber, Carolyn Templeton, Carl Stiff, Colleen Fagan, GRIFFIN Dennis, Emily Carter, Fred Warner, Gary Miller, Ken
02/03/2011 02:16 PM
Cc: Heidi Martin, Jason Yencopal

From: Jason Yencopal/Baker County
To: "Audie Huber" <Audiehuber@ctuir.com>, "Carolyn Templeton" <Carolyn.Templeton@ferc.gov>, "Carl Stiff" <cbstiff@wildblue.net>, "Colleen Fagan" <Colleen.E.Fagan@state.or.us>, "GRIFFIN Dennis" <Dennis.Griffin@state.or.us>, "Emily
Cc: Heidi Martin/Baker County@Baker County, Jason Yencopal/Baker County@Baker County

Stakeholders,

Shortly after my last e-mail I actually had to move offices one more time. The best way to get a hold of me is through e-mail. I have a temporary office phone number of 541.524.9802. I am also able to retrieve messages from my permanent office phone number which is 541.523.9669. Attached is the updated DO Compliance Plan. The Noxious Weed, Bypass Flow, and Erosion and Sediment Control Plans will be sent out soon. If there are any additional comments on the Preliminary License Proposal, the Draft Biological Assessment, or these plans please let me know so we can address them.

Thank you for your cooperation,
Jason Yencopal



Baker County DO Compliance Plan Feb_2011.pdf

Baker County

Mason Dam Hydroelectric Project
FERC No. P-12686

DO Compliance Plan

See Appendix C for the rest of the plan and comments on the plan in the consultations record attached to it

February 2011



Re: Mason Dam Hydroelectric Project

Jeff Tomac to: jyencopal

01/10/2011 05:12 PM

From: Jeff Tomac <jtomac@fs.fed.us>
To: jyencopal@bakercounty.org

Jason, Thank you for the information you provided. I have been briefed by Mike Hall in my office on this project. I look forward to working with you in the future. If you let me know when the next meeting is, I will try to attend. Please let me know if we can help.

Jeff Tomac
District Ranger
Whitman RD
Wallowa-Whitman NF
(541) 523-1901 - desk
(541) 519-4829 - cell
email: jtomac@fs.fed.us

jyencopal@bakercounty.org

01/07/2011 10:40 AM

To jtomac@fs.fed.us
cc
Subject Mason Dam Hydroelectric Project

Mr. Tomac,

Welcome to Baker City and the Whitman Ranger District. I would like to introduce myself. I am Jason Yencopal, Project Manager for Baker County. We have been working on the Mason Dam Hydroelectric project for a couple of years. Yesterday I sent out an update but did not have your e-mail address to also include you. Other documents and information on this project can be found on the Baker County website (www.bakercounty.org) under the green "Mason Dam" tab on the left side of the page.

If I may be of any more help or answer and questions please let me know.
Jason Yencopal
Baker County
541.523.9669



(See attached file: Stakeholder Updates of January 6 2011b.pdf) Stakeholder Updates of January 6 2011b.pdf



Stakeholder Update Mason Dam Hydroelectric Project

Jason Yencopal to: Audie Huber, Carolyn Templeton, Carl Stiff,
Colleen Fagan, GRIFFIN Dennis, Emily
Carter, Fred Warner, Gary Miller, Kenneth
Cc: Heidi Martin, Jason Yencopal

01/06/2011 05:03 PM

From: Jason Yencopal/Baker County
To: "Audie Huber" <Audiehuber@ctuir.com>, "Carolyn Templeton"
<Carolyn.Templeton@ferc.gov>, "Carl Stiff" <cbstiff@wildblue.net>, "Colleen Fagan"
<Colleen.E.Fagan@state.or.us>, "GRIFFIN Dennis" <Dennis.Griffin@state.or.us>, "Emily
Cc: Heidi Martin/Baker County@Baker County, Jason Yencopal/Baker County@Baker County

Stakeholders,

Attached is an update with where we are at and where we are heading. If I may be of any help please let me know.

Sincerely,
Jason



Stakeholder Updates of January 6 2011b.pdf

January 6, 2011

Subject: Mason Dam Hydroelectric Project Update

Dear Stakeholders:

I appreciate your understanding as I have had to set up a temporary office. The County Courthouse had a flood in November in which most of the Courthouse Departments had to be relocated. I am now able to get back to some sort of normalcy.

Since our May 20th meeting, there has been some agency contact changes. Colleen Fagan with Oregon Department of Fish and Wildlife (ODF&W) has accepted a new position. Ken Homolk, ODF&W's hydropower program leader in Salem will be the new contact. The Forest Service has a new Whitman District Ranger, Jeff Tomac. I also wanted to remind everyone that Paul DeVito with the Oregon Department of Environmental Quality accepted a new position (midyear 2010) and Steve Kirk is now the main contact.

For the main update I will be summarizing the August 18, 2010 update that focused on the three following issues and add to it:

1. Transmission line route
2. Dissolved oxygen in the Powder River below Mason Dam
3. Fish entrainment and mortality through Mason Dam

Transmission Line Route

The preferred transmission line route is a 0.83 mile long, 12.47 kV over head line with 40 ft tall poles that would follow Black Mountain Road. This route would consist of the following segments:

Segment 1: 150 ft long, across open space at the base of the dam

Required Tree Clearance: None

Segment 2: 500 ft long, through sparse trees to Black Mountain Road

Required Tree Clearance: 40 ft wide by 500 ft long corridor through sparse trees

Segment 3: 1900 ft long, along Black Mountain Road, crossing the road as necessary to minimize tree clearance.

Required Tree Clearance: A few trees

Segment 4: 1300 ft long, on the west side of Black Mountain Road to the Idaho Power Corridor

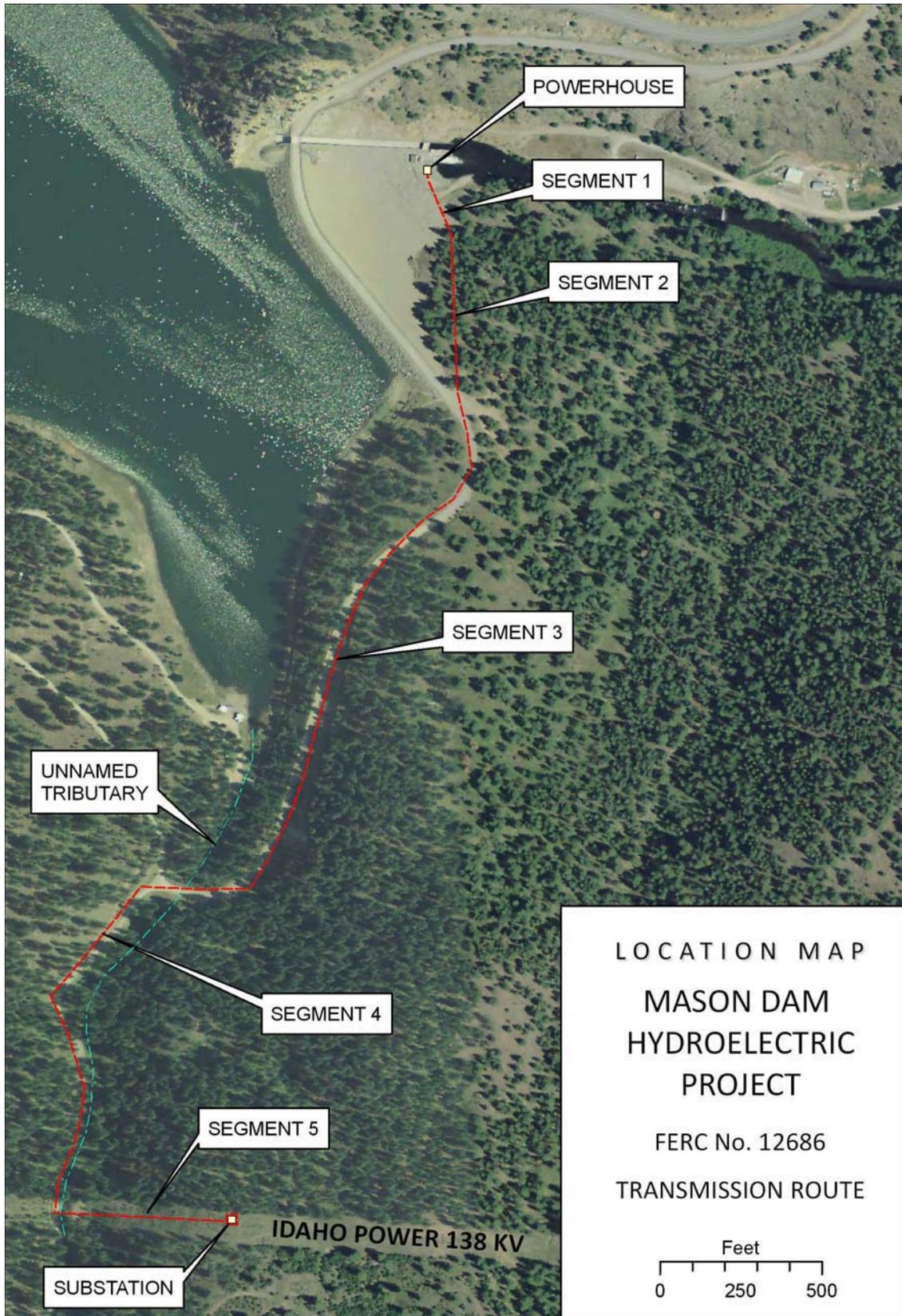
Required Tree Clearance: A few trees on the northern end of the segment and a 20 ft wide by 900 ft long corridor on the southern end of segment

See Figure 1 for a map.

Dissolved Oxygen

Baker County developed a DO Compliance Plan in October and submitted for stakeholders to comment on.

Figure 1.



Fish Entrainment and Turbine Mortality

Baker County originally proposed to screen the intake in lieu of conducting an entrainment study. Our understanding after the May 20th 2010 meeting was that the entrainment would not change from the addition of the hydroelectric project but the mortality would. Thus a turbine and valve mortality analysis would be done to satisfy the entrainment requirement that was waived by the agencies. We understand that the agencies have some existing projects that would benefit the resources of upper Powder River basin habitat and we would encourage these projects be submitted to the County to be discussed and incorporated in future plans.

Recent Progress

Baker County developed four plans for stakeholder review and comments. These plans include:

- Erosion and Sediment Control Plan
- Revegetation/Noxious Weed Management Plan
- Bypass Flow Plan
- DO Compliance Plan

We have received comments back on these plans from the Oregon Department of Environmental Quality and Oregon Department of Fish and Wildlife. We will continue to modify these plans based on the comments received.

Baker County is also working on the License Application to continue to develop this valuable energy resource.

A tentative timeline is to provide updates to the plans mentioned above in the next couple of weeks and at the latest have a license application by March.

We hope to dry out here at the Courthouse and continue to work together with all of you on the Mason Dam Hydroelectric Project.



DO plan ODEQ comments

KIRK Steve to: jyencopal

11/24/2010 10:39 AM

From: "KIRK Steve" <KIRK.Steve@deq.state.or.us>
To: <jyencopal@bakercounty.org>

Jason – Please see the attached comment letter from DEQ .



Steve Kirk <<DO_plan_comments_ODEQ112210.pdf>> DO_plan_comments_ODEQ112210.pdf



Oregon

Theodore R. Kulongoski, Governor

Department of Environmental Quality

Eastern Region Bend Office
475 NE Bellevue Drive, Suite 110
Bend, OR 97701-7415
(541) 388-6146
FAX (541) 388-8283

November 23, 2010

Jason Yencopal
Baker County
1995 Third Street
Baker City, OR 97814

RE: ODEQ Comments to the DO Compliance Plan (October 2010)
Mason Dam Hydroelectric Project (FERC No. P-12686)

Dear Mr. Yencopal:

The Oregon Department of Environmental Quality is submitting comments on the October 2010 Dissolved Oxygen (DO) Compliance Plan for the Mason Dam proposed hydroelectric project, FERC No. P-12686. These comments have been prepared to assist Baker County in refining the DO compliance plan prior to the License Application.

General Comments

The draft DO compliance plan lacks the detail necessary to insure that the applicant will comply with state water quality standards. In general, there is a lack of detail regarding system design and the procedures to implement the tiered approach. The following comments address specific issues.

Specific Comments:

I. Introduction: Add the following sentence: "The ODEQ may require modifications to the DO Compliance Plan as it deems appropriate to assess and confirm water quality compliance."

1.0 Purpose and Scope: Please provide reference to the Oregon Administrative Rules that specify the DO criteria applicable to the Powder River. Also include a description of the designated fish use for the stilling basin and downstream of the stilling basin with the applicable DO criteria. Oregon Department of Fish and Wildlife has designated the still basin as "redband trout rearing" and the Powder River immediately downstream of the stilling basin as "redband trout spawning" (personal communication with Colleen Fagan, ODFW)

Provide a summary description of the proposed seasonal operations relative to the seasonal DO criteria.

4.0 Responsibilities: Provide assurance that the approved Quality Assurance Project Plan (QAPP) for collection of the DO data will be followed and any changes in monitoring activities that do not conform to the QAPP will be reported to DEQ.

5.0 Procedures: Provide a more complete description of the tiered approach for DO compliance including; 1) decision process for changing compliance actions, 2) schedule of decision process for taking corrective actions to comply with DO, and 3) consideration of adaptive management to revise tiered approach based on DO compliance monitoring data.



5.1: Include a detailed description of the Draft Tube Aeration system with design specifications.

5.1.1 Draft Tube Aeration: the text states: "... that once it is open will allow air to enter the system through the venture effect..." Do you mean venturi effect?

5.1.2 Rock Weirs: Include an analysis of potential impacts to sediment erosion and sediment geomorphology that supports the designated fish use and associated water quality criteria.

5.1.3.1 Bypass Flow: Provide a description of the corrective action procedures and reporting schedules.

5.2 Monitoring: Provide additional information regarding the locations selected for monitoring DO. Since the proposed project is required to meet the DO criteria for trout rearing in the stilling basin, DEQ recommends monitoring DO at the downstream boundary of the stilling basin and at one location downstream of the stilling basin and within the area of proposed rock weirs to monitor DO relative to the DO criteria associated with redband trout spawning.

6.0 Summary of Mitigation Measures: Provide a more complete summary of mitigation measures and adaptive management used to implement the mitigation measures. For instance, the text states: "... adjustments will be made to operation criteria if DO levels fall below the state water DO standard." What is the schedule for reporting the DO levels? What is the decision process and schedule for taking corrective action?

7.0 Attachments: DEQ recommends deleting Section 7.0. Details regarding the weir locations, weir design specifications and Draft Tube Aeration System should be included in Section 5.1.1 Draft Tube Aeration and Section 5.1.2 Rock Weirs.

If you have any questions or need any additional information regarding these comments, please contact me at (541) 633-2023 or by email at kirk.steve@deq.state.or.us.

Sincerely,



Steve Kirk
Eastern Region Hydroelectric Specialist
Oregon Department of Environmental Quality



ODFW Comments Draft Mason Dam Plans

Colleen Fagan to: Alan Ritchey, Audie Huber, Carl Merkle,
Carolyn Templeton, Carl Stiff, GRIFFIN
Dennis, Emily Carter, Fred Warner,
Cc: "Colleen Fagan"

11/23/2010 02:32 PM

From: "Colleen Fagan" <colleen.e.fagan@state.or.us>
To: "Alan Ritchey" <alan.d.ritche@state.or.us>, "Audie Huber" <audiehuber@ctuir.org>, "Carl Merkle" <carlmerkle@ctuir.org>, "Carolyn Templeton" <carolyn.templeton@ferc.gov>, "Carl Stiff" <cbstiff@wildblue.net>, "GRIFFIN Dennis" <dennis.griffin@state.or.us>, "Emily Carter"
Cc: "Colleen Fagan" <colleen.e.fagan@state.or.us>

Hi All:

Attached are ODFW comments on the four draft plans distributed by Jason. Please call if you have questions.

Colleen

Colleen Fagan
NE Region Hydropower Coordinator
Oregon Department of Fish and Wildlife
107 20th Street
La Grande, OR 97850
(541) 962-1835



ODFW comments Mason Dam draft plans 11-22-10.pdf



Oregon

Theodore R. Kulongoski, Governor

Department of Fish and Wildlife

Northeast Region
107 20th Street
La Grande, OR 97850
(541) 963-2138



November 22, 2010

Jason Yencopal
Mason Dam Project Manager
1995 Third Street
Baker City, Oregon 97814

Subject: ODFW's Comments on Baker County's draft plans for the proposed Mason Dam Hydroelectric Project (FERC No. 12686).

Dear Mr. Yencopal:

Baker County has requested comments on draft plans associated with its efforts to install hydroelectric power at the existing Bureau of Reclamation's Mason Dam. Enclosed are ODFW's comments on Baker County's DO Compliance Plan, Bypass Flow Plan, Erosion and Sediment Control Plan, and Revegetation/Noxious Weed Management Plan.

DO Compliance Plan

3.0 - Baker County defines spawning as "the time that fish are spawning and fry are emerging and rearing". Baker County's definition includes spawning, incubation, emergence, and rearing. All four of these life history stages should be defined separately, particularly since the Oregon Department of Environmental Quality (DEQ) has separate dissolved oxygen (DO) standards for salmonid spawning use and salmonid rearing and migration use.

5.1.1.1 - Baker County indicates that a pipe will be attached to the draft tube with a valve that once it is open will allow air to enter the system through the venture effect and aerate the water. ODFW requests clarification on whether Baker County is referring to the Venturi effect.

5.1.2.2 - Baker County indicates that it will build rock weirs, as needed, across the Powder River in the 0.16 mile stretch downstream of the stilling basin, if agreed upon. Additional information is needed on the potential effects of these weirs on stream flows, fish passage, entrapment and stranding, and erosion. Upstream and downstream passage of all life stages of native migratory fish species, which include redband trout, needs to be provided throughout this stretch of the Powder River.

5.1.2.3 – According to Baker County, rock weirs would only be constructed if post-project monitoring reveals that DO concentrations drop below 95% saturation during spawning times at the DO monitoring station. Baker County, however, has not identified the proposed location of the DO monitoring station. Redband trout rearing occurs in the stilling basin with redband trout spawning likely occurring immediately downstream of the stilling basin. Therefore, ODFW believes DO monitoring for rearing should occur in the stilling basin at the first location where accurate readings can be taken, and monitoring for spawning should occur immediately downstream of the stilling basin.

5.1.2.4 – As proposed, weirs would be constructed one at a time until their number is sufficient to achieve the standard at the monitoring station. Additional information is needed on monitoring that will occur and how the project will be operated during weir construction to ensure water quality standards are met.

5.1.2.5 – ODFW believes that state water quality standard for DO will need to be met at the downstream end of the stilling basin. According to Attachment 7.1, however, three rock weirs would be placed within the 0.16 mile section of the Powder River downstream of the stilling basin. Therefore, the state standard for DO would not be met at the downstream end of the stilling basin. If DO standards cannot be met at the downstream end of the stilling basin with installation of rock weirs, ODFW recommends that other alternatives be investigated that would provide a reasonable assurance of compliance with state water quality standards. Further, how were locations and numbers of weirs determined?

5.1.2.8 – Baker County indicates upstream passage for small fish will be provided through large interstitial passages between boulders. Oregon's fish passage law (ORS 509.580 - 509.645) requires upstream and downstream passage at all artificial obstructions in those Oregon waters in which migratory native fish are currently or have historically been present. Additional information needs to be provided to demonstrate that upstream and downstream passage will be provided throughout the year for all life stages of native migratory fish. This should include a discussion of how interstitial spaces will be maintained. Rock weir designs should be provided to ODFW for review and approval. No construction should occur until ODFW approves rock weir designs.

5.1.2.9 – Construction is proposed for minimum flow periods. Construction will need to occur during ODFW's instream work window, unless a variance is requested and approved by ODFW.

5.2 – Insufficient information is provided to determine if monitoring will be sufficient to determine if the Project is in compliance with DEQ's water quality standards. A water quality monitoring plan should be developed in consultation with ODFW and ODEQ and included in this plan or the license application. The monitoring plan should include DO, TDG, and temperature monitoring.

7.3 – ODFW recommends that the Draft Tube Aeration System article be removed from the plan. Instead, Baker County should summarize it and other relevant literature on draft tube aeration within the DO Compliance Plan.

Bypass Flow Plan

This plan should include the minimum flows that this plan is intended to ensure will be maintained during construction and operation of the Project.

2.0 - More information on these references is needed including date and author so that they can be accessed by ODFW.

4.1 - Baker County indicates it will work with BOR and Baker Valley Irrigation District, but it fails to identify what they will be working on.

5.3.1 – Additional operations information is needed in this plan including emergency backup and notification components. ODFW should be notified of any emergencies as soon as possible.

5.4.1 – Additional information is needed on maintenance including procedures and timing.

6.2 – Additional information is needed to ensure identified minimum flows will be maintained below the project, including how and where they will be measured.

6.3 and 6.4 – These sections do not appear relevant to this plan. ODFW recommends they be removed.

Erosion and Sediment Control Plan

2.0 – Unclear what reference Baker County has identified. Additional information such as author, agency, and date should be provided.

3.3 – ODFW should also be consulted regarding revegetation of disturbed areas.

3.4 – Insufficient information is provided to determine adequacy of implementation schedule.

5.0 – Insufficient information is provided by Baker County for ODFW to determine what construction activities are planned for the Project, when these construction activities will occur, which BMPs will be implemented for each to control and manage erosion, dust, and soil movement, and how activities will be monitored. ODFW requests that Baker County elaborate on procedures.

5.2 – Who will be contracted to conduct weekly inspections and what information will they be collecting?

6.4 - When is tailrace construction proposed to occur?

6.5 – ODFW should be consulted on appropriate seed mixes to ensure no impacts to wildlife.

7.0 – These attachments should be removed from the plan. Instead, Baker County should summarize relevant sections and measures that will be implemented at this project.

Revegetation/Noxious Weed Management Plan

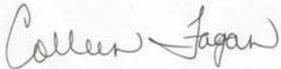
Baker County identifies the purpose of this plan is for the control and prevention of noxious weeds at the Mason Dam Hydroelectric Project. ODFW requests that the boundary for the plan be more clearly identified.

5.0 – Insufficient information is presented for ODFW to determine if implementation of this plan will result in control and prevention of noxious weeds. Proposed methods and monitoring for control and prevention of noxious weeds need to be included in the plan.

7.0 – ODFW recommends that the attachments be deleted from the plan. Instead, Baker County should clearly describe the efforts it will undertake to prevent the introduction and spread of noxious weeds as well as treatments that will be applied to decrease or eliminate noxious weed infestations. The majority of information included in these attachments is not relevant to this project.

Thank you for the opportunity to review these draft plans. If you have any questions on these comments or need additional information, please contact me at (541) 962-1835 or colleen.e.fagan@state.or.us.

Sincerely,



Colleen Fagan
NE Region Hydropower Coordinator



RE: Mason Dam Plan Review

Mary Graine to: jyencopal@bakercounty.org

11/22/2010 03:47 PM

From: Mary Graine <grainems@wrд.state.or.us>
To: "jyencopal@bakercounty.org" <jyencopal@bakercounty.org>

Jason, I noticed on the last line on page 4 of the DO compliance plan that you intended to refer to the venturi effect to aerate the water (not venture).

I have no other comments at this time.

Thank you for the opportunity to comment. -- Mary

Mary S. Graine, P.E., C.W.R.E.
Hydroelectric Coordinator
Oregon Water Resources Department
725 Summer St. NE Suite A
Salem, OR 97301
503-986-0833

-----Original Message-----

From: jyencopal@bakercounty.org [mailto:jyencopal@bakercounty.org]
Sent: Wednesday, October 20, 2010 2:03 PM
To: Audie Huber; Carolyn Templeton; Carl Stiff; FAGAN Colleen E; GRIFFIN Dennis; Emily Carter; Warner Jr, Fred; Gary Miller; Ken Anderson; Kenneth Hogan; GRAINEY Mary S; Mike Gerdes; Micheal Hall; Randy Joseph; KIRK Steve; Quentin Lawson; LUSK Rick M; Robert Ross; Shawn Steinmetz; Susan Rosebrough; STAHL Thomas; Timothy Welch; GRIFFIN Dennis; Joseph Hassell; Carl Merkle; lgecy@ecowest-inc.com; ted@tsorenson.net; gsense@cableone.net
Cc: hmartin@bakercounty.org; jyencopal@bakercounty.org
Subject: Mason Dam Plan Review

Dear Stakeholders,

Based on the PLP comments received and with FERC's recommendation, Baker County has developed plans that cover: Erosion and Sediment control, Bypass flow, DO compliance, and Noxious Weed management. Baker County would like to provide the agencies the following plans at this time. Attached are the Erosion and Sediment Control Plan, Bypass Flow Plan, and DO Compliance Plan. Comments on these plans will be due November 22nd, 2010. The Noxious Weed Management Plan is being reviewed by the Baker County Weed Department and will be distributed after their review, with comments from stakeholders due at a later date.

Thank you for your time and consideration. If I may be of any help please let me know.

Sincerely,
Jason

(See attached file: Baker County Bypass Flow Plan
Oct_20_2010_plusattachments_ap.pdf)(See attached file: Baker County DO
Compliance Plan Oct_20_2010_plusattachments_ap.pdf)(See attached file:
Baker County Erosion and Sedi...t_20_2010_plusattachments_ap.pdf)



RE: License Application

Kenneth Hogan to: jyencopal
Cc: "Joseph Hassell"

11/22/2010 06:44 AM

From: "Kenneth Hogan" <Kenneth.Hogan@ferc.gov>
To: <jyencopal@bakercounty.org>
Cc: "Joseph Hassell" <Joseph.Hassell@ferc.gov>

Jason,

You will need to prepare your license application pursuant to 4.61. Please note that you will need to include a supporting design report with your application.

Please let me know if you have any other questions.

Ken

Kenneth J. Hogan
Fishery Biologist
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, D.C. 20426
(202) 502-8434

-----Original Message-----

From: jyencopal@bakercounty.org [mailto:jyencopal@bakercounty.org]
Sent: Tuesday, November 16, 2010 4:42 PM
To: Kenneth Hogan
Subject: License Application

Ken,

I just wanted to clarify the requirements of the License Application. I have been going through 5.18 Application Content. Then when we get to the information and documents needed which one do we follow:

(5) (i) License for a minor water power project and a major water power project 5 MW or less 4.61 (General instruction, initial statement, and Exhibits A, F, and G (and E under section 4.61)

(ii) License for a major unconstructed project and a major modified project 4.41 of this chapter (General instructions, initial statement, and Exhibits A, B, C, D, F, and G (and E under section 4.41)

(iii) License for a major project - existing dam; 4.51 of this chapter (General instructions, initial statement, and Exhibits A, B, C, D, F, and G (and E under section 4.51)

(iv) License for a project located at a new dam or diversion where the applicant seeks PURPA benefits: 292.208 of this chapter.

My original thought was to use (5) (i) but maybe we need to use (5) (iii).

Thank you,

Jason



RE: Mason Dam Plan Review follow up e-mail
KIRK Steve to: jyencopal

11/09/2010 09:02 AM

From: "KIRK Steve" <KIRK.Steve@deq.state.or.us>
To: <jyencopal@bakercounty.org>

Jason - I received your phone message. I am in Klamath Falls today. Is the Nov 22nd deadline absolute or will Nov 23rd work for you?
Thanks

Steve Kirk

-----Original Message-----

From: jyencopal@bakercounty.org [mailto:jyencopal@bakercounty.org]
Sent: Wed 10/27/2010 4:19 PM
To: Audie Huber; Carolyn Templeton; Carl Stiff; FAGAN Colleen E; GRIFFIN Dennis; Emily Carter; Fred Warner; Gary Miller; Ken Anderson; Kenneth Hogan; GRAINEY Mary S; Mike Gerdes; Micheal Hall; Randy Joseph; KIRK Steve; Quentin Lawson; LUSK Rick M; Robert Ross; Shawn Steinmetz; Susan Rosebrough; STAHL Thomas; Timothy Welch; GRIFFIN Dennis; Joseph Hassell; Carl Merkle; lgecy@ecowest-inc.com; ted@tsorenson.net; gsense@cableone.net; hmartin@bakercounty.org; jyencopal@bakercounty.org
Subject: Mason Dam Plan Review follow up e-mail

Dear Stakeholders,

It has come to my attention that maybe not all of you received an e-mail from me on October 20th, 2010, that contained three attached plans (Erosion and Sediment Control Plan, Bypass Flow Plan, and DO Compliance Plan). If I received a response from the e-mail server saying the e-mail was too large I kept resending until the e-mail went through. If you did not receive an e-mail with the plans please let me know and I will work on getting it to you.

Thank you,
Jason



Noxious Weed Management Plan

Jason Yencopal to: Audie Huber, Carolyn Templeton, Carl Stiff, Colleen Fagan, GRIFFIN Dennis, Emily Carter, Fred Warner, Gary Miller, Ken
11/04/2010 10:57 AM
Cc: Heidi Martin, Jason Yencopal

From: Jason Yencopal/Baker County
To: "Audie Huber" <Audiehuber@ctuir.com>, "Carolyn Templeton" <Carolyn.Templeton@ferc.gov>, "Carl Stiff" <cbstiff@wildblue.net>, "Colleen Fagan" <Colleen.E.Fagan@state.or.us>, "GRIFFIN Dennis" <Dennis.Griffin@state.or.us>, "Emily
Cc: Heidi Martin/Baker County@Baker County, Jason Yencopal/Baker County@Baker County

Stakeholders.

The Baker County Weed Department has finished their review of the Noxious Weed Management Plan and now is ready for your review. I am going to send it in a second e-mail to ensure that all of you know it is coming and if you do not receive it please let me know. Comments on the plan will be due December 6th, 2010.

Thank you for your time and consideration. If I may be of any help please let me know.

Sincerely,
Jason



RE: Mason Dam Plan Review

KIRK Steve to: jyencopal

11/04/2010 09:51 AM

From: "KIRK Steve" <KIRK.Steve@deq.state.or.us>
To: <jyencopal@bakercounty.org>

Jason - I had a couple of questions about the DO compliance plan. Can you call me at (541) 633-2023.

Thanks

Steve Kirk

-----Original Message-----

From: jyencopal@bakercounty.org [mailto:jyencopal@bakercounty.org]
Sent: Thursday, October 21, 2010 10:34 AM
To: Susan_Rosebrough@nps.gov; kenanderson@fs.fed.us;
Gary_Miller@fws.gov; KIRK Steve
Subject: Mason Dam Plan Review

Dear Stakeholders,

The Erosion and Sediment Control Plan with the attachments is a large PDF.

I will send just the plan and if you would like the attachments, I could then break them out separately.

Thank you,
Jason

(See attached file: Baker County Erosion and Sediment Control Plan Oct_20_2010.pdf)



Mason Dam Plan Review follow up e -mail

Jason Yencopal to: Audie Huber, Carolyn Templeton, Carl Stiff,
Colleen Fagan, GRIFFIN Dennis, Emily
Carter, Fred Warner, Gary Miller, Ken 10/27/2010 04:20 PM

From: Jason Yencopal/Baker County
To: "Audie Huber" <Audiehuber@ctuir.com>, "Carolyn Templeton"
<Carolyn.Templeton@ferc.gov>, "Carl Stiff" <cbstiff@wildblue.net>, "Colleen Fagan"
<Colleen.E.Fagan@state.or.us>, "GRIFFIN Dennis" <Dennis.Griffin@state.or.us>, "Emily

Dear Stakeholders,

It has come to my attention that maybe not all of you received an e-mail from me on October 20th, 2010, that contained three attached plans (Erosion and Sediment Control Plan, Bypass Flow Plan, and DO Compliance Plan). If I received a response from the e-mail server saying the e-mail was too large I kept resending until the e-mail went through. If you did not receive an e-mail with the plans please let me know and I will work on getting it to you.

Thank you,
Jason



Mason Dam Plan Review

Jason Yencopal to: Audie Huber, Carolyn Templeton, Carl Stiff, Colleen Fagan, GRIFFIN Dennis, Emily Carter, Fred Warner, Gary Miller, Ken
10/20/2010 02:03 PM
Cc: Heidi Martin, Jason Yencopal

From: Jason Yencopal/Baker County
To: "Audie Huber" <Audiehuber@ctuir.com>, "Carolyn Templeton" <Carolyn.Templeton@ferc.gov>, "Carl Stiff" <cbstiff@wildblue.net>, "Colleen Fagan" <Colleen.E.Fagan@state.or.us>, "GRIFFIN Dennis" <Dennis.Griffin@state.or.us>, "Emily
Cc: Heidi Martin/Baker County@Baker County, Jason Yencopal/Baker County@Baker County

Dear Stakeholders,

Based on the PLP comments received and with FERC's recommendation, Baker County has developed plans that cover: Erosion and Sediment control, Bypass flow, DO compliance, and Noxious Weed management. Baker County would like to provide the agencies the following plans at this time. Attached are the Erosion and Sediment Control Plan, Bypass Flow Plan, and DO Compliance Plan. Comments on these plans will be due November 22nd, 2010. The Noxious Weed Management Plan is being reviewed by the Baker County Weed Department and will be distributed after their review, with comments from stakeholders due at a later date.

Thank you for your time and consideration. If I may be of any help please let me know.

Sincerely,
Jason



Baker County Bypass Flow Plan Oct_20_2010_plusattachments_ap.pdf



Baker County DO Compliance Plan Oct_20_2010_plusattachments_ap.pdf



Baker County Erosion and Sedi...t_20_2010_plusattachments_ap.pdf

Baker County

Mason Dam Hydroelectric Project
FERC No. P-12686

Bypass Flow Plan

October 2010

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I	Introduction
1.0	Purpose and Scope
2.0	References
3.0	Definitions
4.0	Responsibilities
5.0	Procedure
6.0	Summary of Mitigation Measures
7.0	Attachments

I. Introduction

Baker County has applied to the Federal Energy Regulatory Commission (FERC) to develop hydroelectric energy at the existing Mason Dam. Mason Dam is located along the Powder River in Baker County, Oregon approximately 15 miles southwest of Baker City off of State Highway 7 and in the Wallowa-Whitman national Forest.

Mason Dam was built by the US Bureau of Reclamation (BOR) on the Powder River for irrigation, water delivery, and flood control. Mason Dam is 173 feet high, 895 feet long and 875 feet wide from toe to toe. Phillips Reservoir is formed from Mason Dam and covers 2,235 acres, has a total of 95,500 acre-feet, with 90,500 acre-feet being active. Water is stored behind Mason Dam in Phillips Reservoir, and is released during the irrigation season by Baker Valley Irrigation District (BVID). Water is generally stored between October and March and released April through September.

The intake of Mason Dam is located within a 17 x 17 x 13.3 foot high barrier with large bars, spaced 6 inches apart that act as a trash rack. There are two pipes that can be used to release water. One is a 56 inch diameter pipe and the other is a 12 inch diameter pipe. The 56 inch pipe is split into two 33 inch, high pressure gates, that are located in the valve house to control the release into the stilling basin via the tail race. The 12 inch pipe uses a sleeve/weir type valve to release water into the stilling basin. The outlet works consists of a tunnel controlled by the two high pressure gates with hydraulic hoists that have a capacity of 875 cfs at a reservoir elevation of 4070.5 feet. The spillway has an uncontrolled crest and is concrete lined with a maximum capacity of 1,210 cfs at a reservoir elevation of 4077.25 feet. The spillway and outlet works share a common stilling basin.

The proposed hydroelectric plant will contain a single horizontal shaft Francis turbine connected to a 3.4 MW 60 hertz, 12,640 volt generator with a brushless exciter. It will operate efficiently over a head range of 10 to 150 feet, and flows from 120 to 300 cfs. An extended downward tilted draft tube will discharge into the tailrace. The draft tube will be fitted with aeration fittings to provide aspiration of air to increase dissolved oxygen in the river. Plant controls will include a synchronous bypass to initiate the operation of the Reclamation slide gates during turbine shut down. A new hydraulic power unit (HPU) will be provided to increase the rate of the slide gates opening to more closely match the rate of flow lost when the turbine shuts down. Power generated will sent to the substation .8 miles away from the powerhouse. The current plan is for the line to be overhead following the Black Mountain Road.

1.0 Purpose and Scope

The purpose of this Bypass flow plan is to ensure that through the construction and operation of the Mason Dam Hydroelectric project that downstream flow will be maintained.

2.0 References

2.1 BOR Designers' Operating Criteria

2.2 BOR Standing Operating Procedures

3.0 Definitions

3.1 Main Pipe: (Large diameter pipe) 56" diameter pipe that is around 300' long

3.2 Auxiliary Pipe: (Small diameter pipe) 12" diameter pipe that is around 300' long

3.3 High Pressure Gate Valves: Used to control the flow of the Main pipe

3.4 Cistern Valve: Used to control the flow of the Auxiliary pipe

3.5 Main Shut off: Valve used to shut off the flow at the start of the main pipe

3.6 Intake: Where the water is diverted from Phillips Reservoir into the Mason Dam hydraulic works.

3.7 Hydraulic Pressure Unit (HPU): Provides power to the hydraulic cylinders that control the two high pressure valves

4.0 Responsibilities

4.1 Baker County will work with BOR and Baker Valley Irrigation District.

4.2 Baker County Project Manager will ensure that the construction manager has read and understood the plan prior to the commencement of construction.

4.3 Baker County will ensure that the Operation personal have read and understand the plan prior to the commencement of turbine operation.

4.4 Baker County will ensure that the Maintenance personal have read and understand the plan prior to any maintenance work performed.

5.0 Procedures

5.1 Current Release

5.1.1 Current Hydraulics

Water flows through Mason Dam in one of two pipes. The main pipe is a 56" diameter pipe. Water from Phillips Reservoir flows through Mason Dam into the Powder River through pipes and valves contained in the dam. Water enters these pipes through an intake located near the bottom of Phillips Reservoir and at the eastern base of Mason Dam. The water travels through a four foot concrete pipe to the middle of the dam where the main shut off for the main pipe is located. The auxiliary pipe has its intake in the cement pipe and the main shut off does not affect flow through this pipe. The pipe that is used is determined by the cubic feet per second of water needed downstream. The flow through the small pipe is 0-25 cfs and is used mainly in the off irrigation season of October through April. To control the flow of the small pipe a sleeve valve is used with the water being released into the stilling basin. The large pipe is used for flows higher than 25 cfs to a max release of 875 cfs and is used during the irrigation season. To control the release of the large pipe it is divided into two high pressure gate valves.

5.2 Construction

5.2.1 Bifurcation of the main line will be done during the off season for irrigation. The main shut off in the middle of the dam will isolate the large pipe and the flow of water will be ran through the small pipe ensuring continuous water flow into the Powder River.

5.3 Operation

5.3.1 During hydroelectric operations, if the turbine or system goes off line the HPU (which will be upgraded) will automatically open the existing valves. This system will be checked during the yearly maintenance and during routine procedure testing.

5.4 Maintenance

5.4.1 Maintenance will be performed in the off irrigation season when the flow of water is through the small pipe.

6.0 Summary of Mitigation Measures

6.1 This plan being developed and reviewed by all stakeholders and approved by Reclamation, and it will ensure that all required water would be delivered downstream during construction work n the main discharge pipe from Mason Dam

6.2 To assure that downstream water requirements are always met, the plant controls will include a synchronous bypass signal to initiate operation of the Reclamation slide gates during turbine shut down.

6.3 Construction will be scheduled to avoid loud construction activities between January and March to minimize disturbance to bald eagles

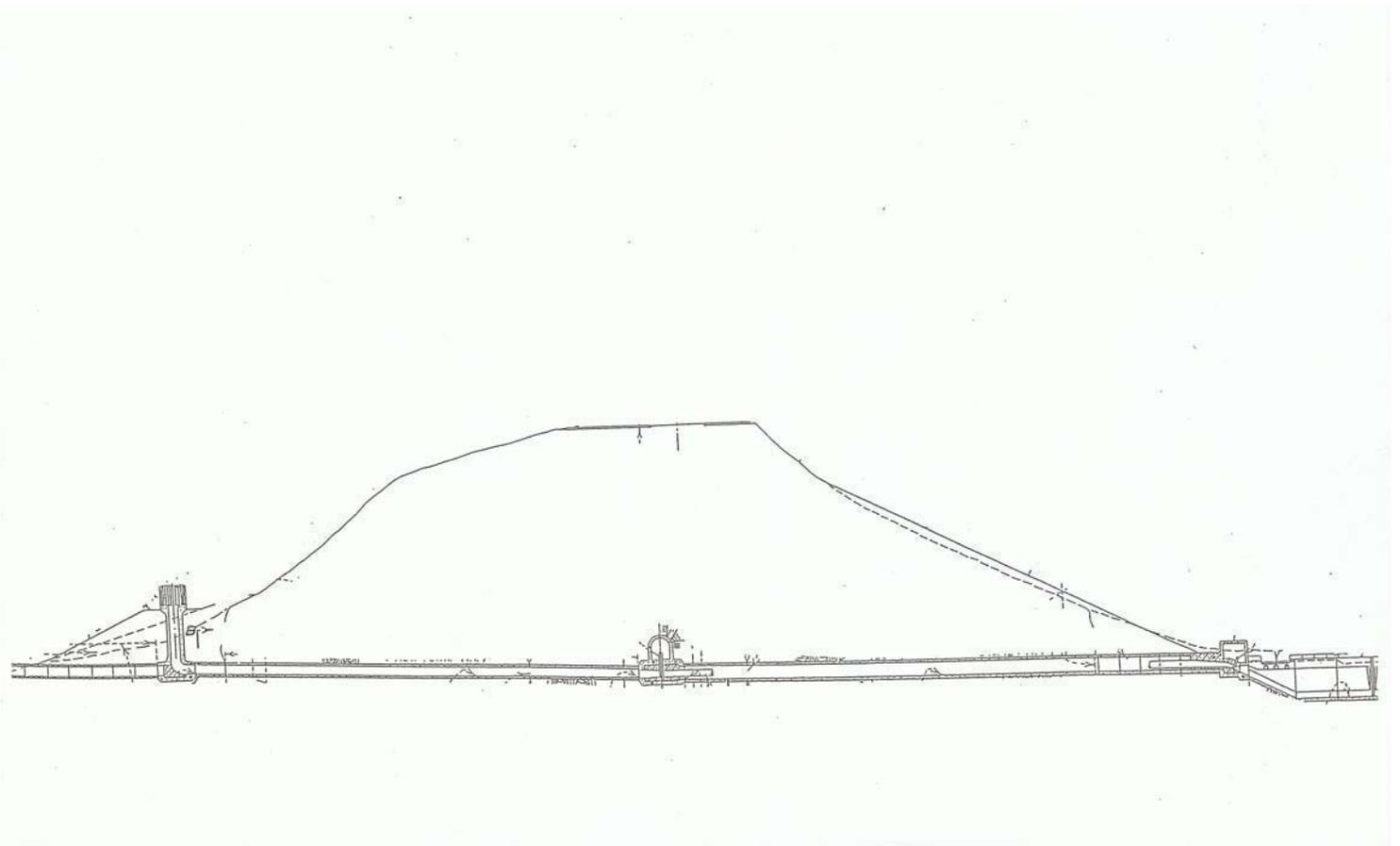
6.4 The Forest Service and Baker County will use recreation data to identify construction timelines that will have the least impact on recreation access and use.

7.0 Attachments

7.1 BOR Drawings

7.2 Sorenson Drawings of bifurcation

Attachment 7.1



Baker County

Mason Dam Hydroelectric Project
FERC No. P-12686

DO Compliance Plan

October 2010

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1.0 Purpose and Scope

The purpose of this DO compliance plan is to ensure that the state water quality standards of 6.5 mg/L for May 15th through December 31 and 11.0mg/L or 95% for January 1st through May 14th are met during hydroelectric operational periods.

2.0 References

2.1 Study Plan 1

2.2 Preliminary Licensing Proposal (October 2009)

3.0 Definitions

3.1 DO: Dissolved oxygen

3.2 DO %: The amount of dissolved oxygen in the water as a percentage of saturation.

3.3 Aeration: Adding oxygen to the water through natural and mechanical means.

3.4 Salminoid spawning: The time that fish are spawning and fry are emerging and rearing.

3.5 CFS: Is a measurement of water flow that stands for Cubic Feet per Second

4.0 Responsibilities

Baker County will ensure that monitoring will be completed that checks the DO and DO % for water quality purposes.

5.0 Procedures

It is conceivable, though not probable, that reduction of the jetted discharge may allow DO to drop below desirable levels. If DO drops below state standards some or all of the turbine flow will be diverted back through the jet valves as necessary. In order to mitigate for this possibility, a tiered approach will be used.

5.1 Use a tiered plan and phased approach of draft tube aeration, rock weirs, and bypass flows.

5.1.1 Draft Tube Aeration

5.1.1.1 Turbine will have a horizontal shaft so that a pipe can/will be attached to the draft tube with a valve that once it is open will allow air to enter the system through the venture effect and aerate the water

5.1.1.2 Poor DO water will be raised ie. 2mg/L can be raised to 6 or 7mg/L. (Attachment 7.3)

5.1.2 Rock Weirs

5.1.2.1 These weirs would be used to naturally increase the DO of the water

5.1.2.2 The proposed project will build, as needed, rock weirs across the Powder River in the .16 mile stretch downstream of the stilling basin, if agreed upon(Attachment 7.1).

5.1.2.3 These weirs will only be constructed if post-project monitoring reveals that DO concentrations drop below 95% saturation during spawning times at the DO monitoring station.

5.1.2.4 Weirs would be constructed one at a time until their number is sufficient to achieve the standard at the monitoring station.

5.1.2.5 The location of these weirs can be found on the map in Attachments 7.1.

5.1.2.6 The weirs will be a combination of concrete core and rock rubble construction to balance the need for efficient aeration and fish passage.

5.1.2.7 Weirs would create a step under 2 feet high at all but minimum flows.

5.1.2.8 Concrete core sections would provide upstream passage for adult fish. Rock rubble sections will allow small fish to traverse the weir through large interstitial passages between boulders.

5.1.2.9 Construction will be performed in two stages during minimum flow periods. Cofferdams will be used to dewater half the stream channel during construction of concrete core sections.

5.1.2.10 All construction will be performed to Oregon State water quality standards

5.1.3 Bypass Flow

5.1.3.1 If at any time the DO standards are not met through the above means, the original valves will be opened until the standards are met.

5.1.3.2 The turbine will continue to run unless the diverted flow is so much that there is less than 100 cfs to the turbine at which point it will shut down and the full flow will be released as it has historically.

5.2 Monitoring

5.2.1 DO sensors will be placed at compliance point.

6.0 Summary of Mitigation Measures

6.1 Through this tiered mitigation plan water quality will be monitored and adjustments made to operation criteria if DO levels fall below the state water DO standard.

7.0 Attachments

7.1 Location of potential weirs

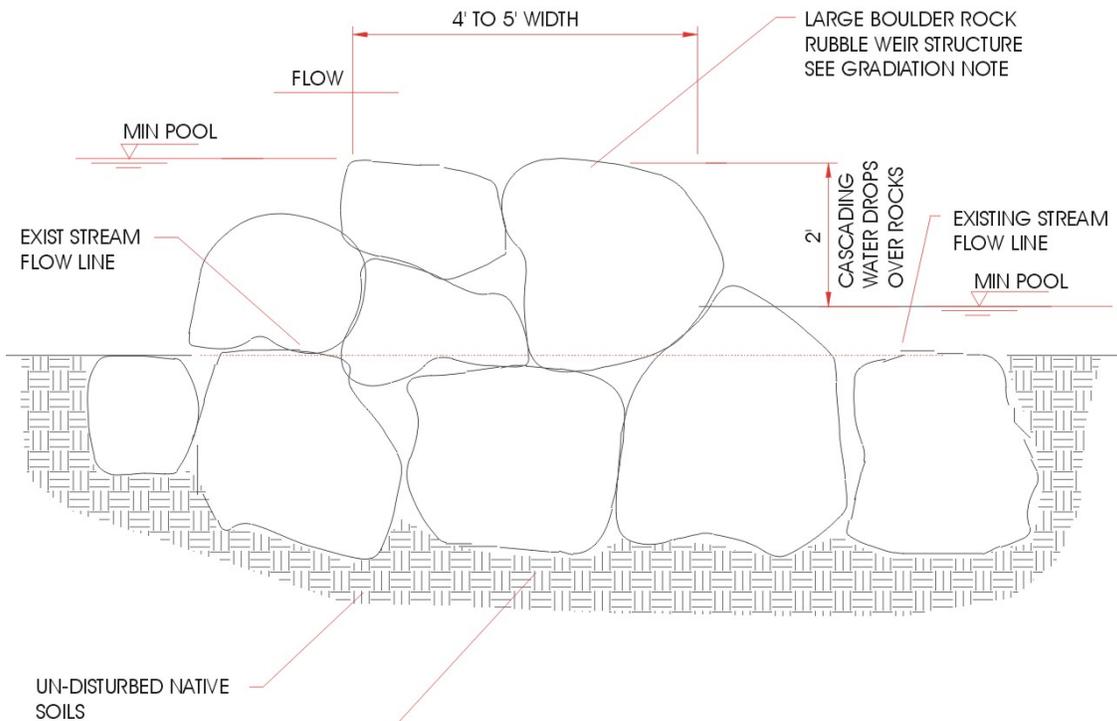
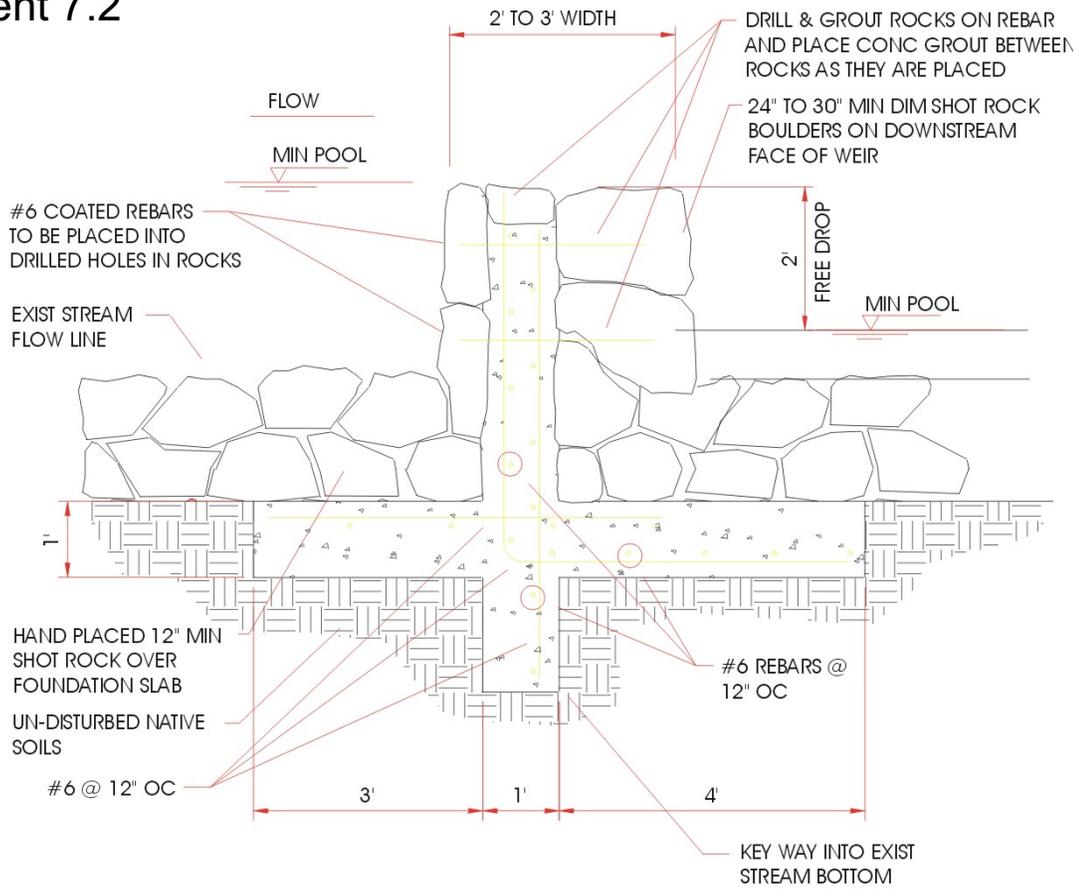
7.2 Specifications of weirs

7.3 Increasing Dissolved Oxygen with a Draft Tube Aeration System (Article)

Attachment 7.1



Attachment 7.2



NOTE:
 ROCK RUBBLE SHALL MEET THE FOLLOWING GRADIATION.

MIN 4' IN MAX DIM	50%
MIN 2' IN MAX DIM	25%
MIN 1' IN MAX DIM	25%

ROCKS SHALL BE PLACED TO ALLOW WATER & SMALL FISH PASSAGE THRU VOIDS BETWEEN ROCKS.

Attachment 7.3

Close

Increasing Dissolved Oxygen with a Draft Tube Aeration System

Draft tube aeration systems on three turbine-generating units at the 18-MW Lloyd Shoals plant allow Georgia Power Company to meet state dissolved oxygen requirements. With the aeration systems in place, the utility was able to remove a downstream aerating weir that was decreasing head at the plant.

By Lawrence B. Moore Jr.

Lake Jackson, the reservoir that supplies water for Georgia Power's 18-MW Lloyd Shoals hydro plant, becomes thermally stratified in early summer and remains so into September. In this situation, only the upper 5 feet of the lake contains dissolved oxygen (DO). The intakes for the six turbines at Lloyd Shoals, on the Ocmulgee River in Georgia, are about 20 feet below normal pool levels. Thus, the water used to generate electricity is drawn primarily from layers of the lake with no DO.

The Lloyd Shoals plant has two modes of operation. Normally, it either passes the required minimum flow of 400 cubic feet per second (cfs) through a single unit or is operating at full load for peaking operations. In both of these modes of operation, water discharged from the plant contains levels of DO that often are below state standards and sometimes approached zero. The state of Georgia requires DO in plant discharge of 4 milligrams per liter minimum and 5 milligrams per liter average.

Work performed to increase DO

In the early 1990s, Georgia Power underwent the Federal Energy Regulatory Commission (FERC) relicensing process for Lloyd Shoals. As a result of input from the Georgia Department of Natural Resources (DNR) during that process, Georgia Power has been working to improve DO levels downstream from Lloyd Shoals.

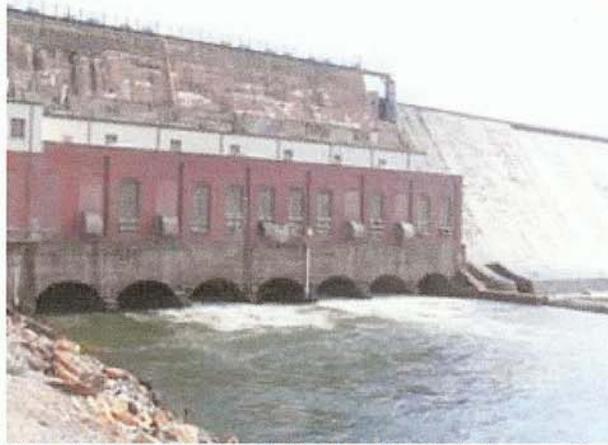
The first step taken was to design an aerating weir, to be located downstream from the powerhouse. The design of this labyrinth weir was based on work done by the Tennessee Valley Authority some years earlier, which was funded in part by EPRI.

The weir, built in 1991 about 200 feet downstream of the powerhouse, was 10 feet tall and made of steel sheet pile. The labyrinth design provided 1,440 feet of crest length over the 200-foot width of the discharge channel. During full operation of the plant, water falling over the weir created a zone of aeration, raising DO levels from almost zero to 5 milligrams per liter. During minimum flow releases from the plant, the weir was less effective. However, it still provided significant increases in DO levels, frequently raising it to 3 to 5 milligrams per liter.

In July 1994, a tropical storm flooded the Lloyd Shoals powerhouse to a depth of 5 feet. After this flood, plant operators noticed that flow over the weir was reduced from levels before the flood. Before the flood, flow over the weir was observable when the units were loaded. After the flood, the area behind the weir was not always full. Plant personnel also observed boils just downstream of the weir. An investigation performed in 1995 by divers with Southern Company (parent firm of Georgia Power) revealed that the boulders on which the weir was founded had shifted during the flood, resulting in significant flow beneath the weir. This water was not being aerated, so the weir was making virtually no contribution to DO.

In 1995, personnel attempted to repair the weir by using sandbag wall forms filled with concrete to seal the leaks. Although this work restored the function of the weir, it proved to be only a temporary repair. Each year after that for the next six years, Southern Company divers placed grout bags in the leaks and inflated them using a sand mix Portland cement grout. This cost about \$30,000 each year. Because of the expense of repairing the weir and the fact that it was never able to raise DO enough to be in compliance with state standards, Georgia Power began exploring alternatives to the aerating weir.

The turbines at Lloyd Shoals are 1920s style double runner horizontal-shaft Francis machines. The units have vacuum breaker valves that connect to the upper part of the draft tube. These valves normally operate only as the wicket gates close, but they can be manually opened during operation. Personnel determined that four of the units would naturally draw air through the vacuum breaker system during operation. Plant personnel decided to modify one of the units and determine the results in terms of increased DO.



Water discharged from the 18-MW Lloyd Shoals plant now meets the state minimum requirements for dissolved oxygen. Georgia Power accomplished this result by installing a draft tube aeration system on each of the three units in the powerhouse.

[Click here to enlarge image](#)

During a planned outage, plant maintenance staff installed a simple 45-degree baffle in the draft tube above the entrance of the vacuum breaker pipe. The goal of this work was to increase the pressure differential and the resulting air flow. Results were encouraging in that there was an increase of a couple of milligrams per liter, but the increase in DO was not sufficient to meet the state of Georgia's water quality standards.

Further work centered on a method Alabama Power Company developed in the late 1970s for draft tube aeration at several of its plants. (Alabama Power also is owned by Southern Company.) Personnel designed a system for Lloyd Shoals that would increase DO levels from almost zero to near saturation. The design of this system is typical of those Alabama Power has used for 20 years or more, but adapted to the very different physical layout of the Lloyd Shoals units. The Lloyd Shoals units are horizontal-shaft double runner units set well above the tailwater. The previous installations primarily were on vertical-shaft units with runners set below the tailwater.

This system consists of:

- A muffler to limit noise from the in-rush of air;
- A check valve to protect against flow back into the powerhouse in the event of a broken pipe;
- A gate valve to provide isolation of the system; and
- Baffles in the upper section of the draft tube to create a zone of low pressure to draw in air.

At Lloyd Shoals, the upstream bearing gallery provided a location near the turbines from which the air could be supplied. This avoids having to drill long distances through concrete to connect the turbine with an outside air source.

Installing the aeration system

In the fall of 2004, plant personnel added an aeration system to one unit, during an outage for other repairs. Personnel used a diamond core drill to make a penetration 8 inches in diameter and 8 feet long into the water casing, which is similar to the spiral case on a vertical unit. They then placed a 6-inch-diameter air supply pipe in the hole and sealed the annular space using a cementitious grout. This air supply pipe feeds two 4-inch-diameter lines routed to the upper portion of the draft tube. A penetration of the draft tube just above the water passage floor level takes air into the draft tube. Above each pipe penetration, a steel baffle was installed to create a low pressure zone and thus induce air flow.

The system began operating in the summer of 2005, with excellent results. The modified unit was shown to raise DO levels from almost zero to near saturation. It effectively aerated at minimum flow and full flow of the unit. However, with all the units running, the low DO of the water flowing through the unmodified turbines diluted the aerated flow to the point that state water quality standards were not always met. This led Georgia Power to conclude that an additional unit would require aeration to achieve the desired results. In the fall of 2006, personnel fitted a second unit with a similar aeration system.

In 2005, a flood caused severe damage to the aerating weir at Lloyd Shoals. One of the sheet pile walls was split, allowing water to flow through, rather than over, the weir. Georgia Power was concerned that the weir was not operating adequately as a result of this damage. In consultation with the Georgia DNR, in 2006 Georgia Power designed and installed a monitoring system to test both the effectiveness of the two new aeration systems and the weir.

The monitoring system consisted of four luminescent dissolved oxygen (LDO) probes and controllers, manufactured by Hach Environmental; data loggers manufactured by Campbell Scientific; and associated power supplies. The system collected DO levels at four locations: the intake, downstream of the powerhouse above the weir, just downstream of the weir, and at a municipal water intake about 0.5 mile down river. Readings were taken every 15 minutes from late May, when the DO levels historically start dropping, through the end of August when temperatures decrease and the lake water mixes.

Monitoring in 2006 indicated that the weir was not effective in its current state and that the new aeration systems could raise DO levels to near saturation. In addition, the annual stratification of the reservoir also was evident in the data. During long periods of time, DO in the water entering the intakes was almost zero, while levels measured downstream of the powerhouse but upstream of the weir were around 7 milligrams per liter. When non-aerating units operated, DO levels were depressed by their contribution to the mix of flows. Even in this case, the target levels were met or nearly met.

The data also indicated that DO levels dropped between manual cleaning intervals for the sensing tip of the probes and recovered as much as 2 milligrams per liter immediately upon cleaning. This appears to be a factor of biofouling on the probe lenses.



The air intake system and valves for the draft tube aeration system at the 18-MW Lloyd Shoals plant take air from the upstream bearing gallery and feed it to the draft tubes to increase dissolved oxygen in the water.

[Click here to enlarge image](#)

To provide more assurance that DO targets can be met and allow one aerated unit to be taken down for maintenance without affecting total DO, plant personnel added the aeration system to a third unit at Lloyd Shoals at the end of 2006. This made three units available for aeration during the summer of 2007.

In cooperation with the Georgia DNR, plant personnel established a monitoring plan to test the effectiveness of aeration using three units. This monitoring plan called for two intake probes and one downstream of the powerhouse. Probe cleaning intervals were shortened to one week, and the effect of cleaning was monitored. Each monitoring station collected both temperature and oxygen levels because of the strong correlation between the two. Warmer water from the top levels of the reservoir contains more oxygen than cold water from the bottom of the reservoir.

Monitoring showed that the three aerating units were capable of raising DO levels. However, it also showed some limitations of the monitoring system. For example, the LDO probe downstream of the powerhouse required weekly cleaning to provide accurate readings.

A telephone call from the operators of a water intake and treatment system about half a mile downstream of the dam revealed an additional benefit to the aeration system. Before the aeration system was installed, manganese levels in the river, measured at the water treatment plant during the treatment process, had spiked as high as 1 milligram per liter during the summer months. Water treatment plant personnel typically had to treat the water heavily during the summer months to reduce the manganese levels. However, the increased DO levels produced at Lloyd Shoals reduced the amount of dissolved manganese in the water. This meant less manganese needed to be removed during treatment, resulting in a significant cost savings for the water treatment plant. The highest manganese level recorded after the installation was 0.58 milligram per

liter, during testing in which the aeration system was cycled off and on.



The aerating weir installed at 18-MW Lloyd Shoals in 1991 increased downstream dissolved oxygen (DO). However, a 1994 flood damaged the weir and significantly reduced its effectiveness. Because the new draft tube aeration system installed at the plant raises DO levels to sufficient levels, Georgia Power removed the weir.

[Click here to enlarge image](#)

After the successful results in 2007, Georgia Power proposed to Georgia DNR that the draft tube aeration system be adopted as the only system for discharge aeration and that the damaged weir be removed. In January 2008, Georgia DNR agreed with the plan. Work is being planned to remove the weir.

Results

Installation of draft tube aeration at Lloyd Shoals has proven to be an economical and effective means of meeting DO standards. The total cost to install the system was just over \$200,000 for all three units. The annual cost to repair the weir and the loss of energy (1 to 5 percent) from the weir have been eliminated. The lost energy alone cost Georgia Power more than \$100,000 each year.

The only cost of operation is a slight reduction (about 2 to 3 percent measured at other plants with this aerating system) in efficiency of the aerated units, which only occurs when the aeration system is on. This reduced efficiency is more than offset by the increased head – 5 to 6 feet at minimum flow and 1 foot at full load – that results from removal of the weir. This equates to about 1,600 megawatt-hours of electricity each year.

Larry Moore, senior engineer with Southern Company (parent firm of Georgia Power), designed the physical layout of the draft tube aeration system and managed construction and installation.

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Attachment 7.4

