

## APPENDIX B

# Baker County

Mason Dam Hydroelectric Project  
FERC No. P-12686

## Bypass Flow Plan

February 2011

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## 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. The flow is set by the Bureau of Reclamation and controlled by the Baker Valley Irrigation District. Through the procedures as discussed in section 5 of this plan, Baker County plans to meet the flow requirements set by the Bureau of Reclamation. Minimum flow required is 10 (cfs) cubic feet per second.

## 2.0 References

2.1 BOR Designers' Operating Criteria  
Prepared by Reclamation in 1968

2.2 BOR Standing Operating Procedures  
Prepared by Snake River Area Office Pacific Northwest Region Boise, Idaho

The information contained in the above documents is considered to be "sensitive." Approval must be given by the Bureau of Reclamation.

## 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: 33 inch valves used to control the flow of the Main pipe

3.4 Sleeve 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 with construction and operation flow releases.

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. Maintenance procedures are discussed below in section 5.4.

## 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 to deliver the flow of water is determined by the cubic feet per second of water needed downstream. The flow through the auxiliary pipe is approximately 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, the pipe is divided into two 33 inch high pressure gate valves in the valve house.

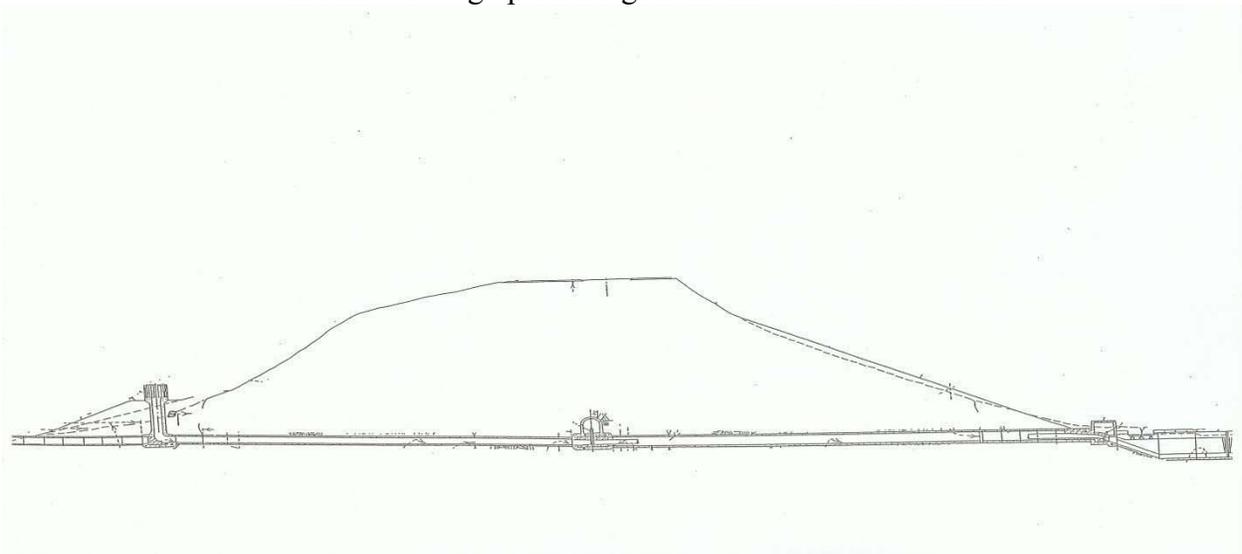


Figure 1 Cross Section drawing of Mason Dam (from Reclamation)

## 5.2 Construction

- 5.2.1 Bifurcation of the main line will be done during the off irrigation season (October 1 – April 15). 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 auxiliary 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 high pressure gate valves. This system will be checked during the yearly maintenance and during routine testing procedures.

An Emergency Action Plan has been developed for Mason Dam by the BOR. The Baker Valley Irrigation District and Snake River Area Office-West have the overall authority for response operations directed toward operation of Mason Dam during emergency situations, with assistance from the PN Regional Office. Baker County will work with BVID and BOR to include hydro operations and add ODF & W as a contact for turbine shut down.

## 5.4 Maintenance

- 5.4.1 Maintenance will be performed in the off irrigation season when the flow of water is through the auxiliary pipe with the flow controlled by the sleeve valve. Maintenance procedures can be found in the maintenance manuals that will be developed based on the final construction plans approved by BOR.

## 6.0 Summary of Mitigation Measures

- 6.1 This plan is being developed and reviewed by all stakeholders to ensure that all required water would be delivered downstream during construction work on 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. Flows will be released from Mason Dam using the existing 12 inch bypass pipe during construction. This pipe is used for flow releases during the non-irrigation season or when maintenance is performed on the main outlet conduits. The outlet of the pipe will be extended to release flows into the Powder River downstream of the construction area. Release flows through the bypass pipe will be measured using the discharge rating chart for the bypass pipe.

Once the project is operating, discharge through Mason Dam will be through the powerhouse or, when release flows exceed the hydraulic capacity of the turbine, through both the powerhouse and the existing gate valves. The flow through the

powerhouse will be measured from the setting of the turbine wicket gates. Flow through the gate valves will be measured based on the discharge rating chart for these valves. The total flow release from Mason Dam will be equal to the sum of these two measurements.

## 7.0 Attachments

### 7.1 Sorenson Drawings of bifurcation

DATE	DESCRIPTION
OCTOBER 2009	REVISED
REVISIONS	

BAKER VALLEY IRRIGATION PROJECT  
 BAKER HYDROELECTRIC PROJECT  
 PROPOSED SITE PLAN

SORENSEN ENGINEERING  
 CONSULTING ENGINEERS  
 IDAHO FALLS, IDAHO

SCALE: 1" = 10'  
 DRAWING NO. **D09-1021**  
 SHEET NO. **SK-1**

THIS DRAWING SHEET HAS BEEN REDUCED TO ONE-HALF SIZE--REDUCE SCALES ACCORDINGLY

# Attachment 7.1

