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## United States Department of the Interior

### BUREAU OF RECLAMATION

Upper Colorado Regional Office  
125 South State Street, Room 6107  
Salt Lake City, Utah 84138-1147



MAR 30 2007

Mr. Don Ostler  
Executive Director  
Upper Colorado River Commission  
355 South 400 East  
Salt Lake City, UT 84111

Subject: Water Marketing From Flaming Gorge Reservoir

Dear Mr. Ostler:

The Bureau of Reclamation has been approached with a request to market water from Flaming Gorge Reservoir. We understand the project proponent has contacted the Upper Colorado River Commission and intends to provide a briefing on the details of the project. Reclamation has completed an analysis of the amount of water that may be available for diversion and contracting from Flaming Gorge Reservoir. The analysis presumes that Wyoming, Colorado, and Utah will continue to develop their water supplies, continued compliance with the flow recommendations adopted in the 2006 Flaming Gorge Environmental Impact Statement and Record of Decision, and continued use of the active storage pool, which protects the power pool.

A certain degree of uncertainty always surrounds yield studies. This analysis used an unusually long and accurate historic record. The modeling was also at a relatively high level of detail. The water supply may be further reduced or impacted by the outcomes of the future National Environmental Policy Act and Endangered Species Act processes associated with this project, and all water supply numbers should be considered preliminary until that process is completed. As one would expect, there is a degree of uncertainty beyond the original 40-year term of the water service contract. The potential contract for this water would reflect this uncertainty and the need for reevaluation at the time of contract renewal.

Our total estimated amount of water available from Flaming Gorge for the next 40 years is relatively small at 165,000 acre-feet per year. Please find enclosed our draft analysis for your review and comment. Mr. Dave Trueman, Manager of the Resources Management Division, is available at 801-524-3759, if you have questions or would prefer a briefing.

Sincerely,

Rick L. Gold  
Regional Director

Enclosure

cc: See next page.

cc: Mr Rick Clayton  
Bureau of Reclamation  
125 South State Street, Room 6107  
Salt Lake City, UT 84138-1147

Mr. Jeff Fassett, P.E.  
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(w/encl to each)

Draft  
Flaming Gorge  
Water Availability Analysis  
March 19, 2007

## Background

A private party has approached the Bureau of Reclamation with a request to purchase water from Flaming Gorge Reservoir. The project proponent would like to know how much water might be available for contracting and the potential terms of a contract (costs). The proponent plans on privately funding a pipeline from Flaming Gorge to the front range of Colorado. Reclamation would potentially enter into negotiations on the terms of a contract and then later execute a water service contract after environmental compliance is completed.

It is expected that the Upper Basin States, acting through the Upper Colorado River Commission, would approve charging the water to the state in which it is beneficially used, as provided in the Upper Colorado River Basin Compact. Each state has the responsibility to assure that their cumulative use does not exceed their individual compact allocation. Historically each state has used the Basin yield from the Hydrologic Determination to calculate their respective allocations. Such tabulations are maintained by the Upper Colorado River Commission and used by Reclamation in its modeling studies. There is sufficient unused allocation that the proposed use would be well within each state's allocation.

In order for Reclamation to have a better understanding of what volume of water might be available in the future for such a diversion, a RiverWare computer model was developed to study a range of parameters. This report describes the result of this modeling. Because of the nature of future National Environmental Policy Act (NEPA) compliance, all conclusions about the potential bounds of water supply are preliminary and subject to environmental compliance.

Water available for potential contracting is a mass balance of supply, reservoir storage, and demands (both upstream and downstream). Water supplies originate primarily in Wyoming, and future upstream uses in Wyoming are expected to reduce inflows and supply as development continues under their compact allocation. Demands from storage include Record of Decision (ROD) flow requirements recently adopted in the Flaming Gorge Environmental Impact Statement (EIS). ROD flows and particularly the ROD baseflows make a significant demand on storage and dramatically reduce the potential amount of water available for marketing from the reservoir. Storage is impacted by sedimentation and limited to the active pool in this analysis. While it is not required to protect the minimum power pool, it is assumed that Reclamation will continue that operational practice in this modeling work.

## Water Availability

This model run evaluates the potential water available for the initial term of a 40-year water service contract.

## Assumptions

As of December of 2006, modeling of the proposed diversion had evolved to the following general modeling assumptions:

- **Study Period (42 years)** – The study period was for 42 years from January 2008 to December 2049 using historic natural inflow hydrology for the period from 1922 to 2005 as input. Eighty-three independent inflow traces were created using Index Sequential Method and routed through the model. This period represents the initial term of a potential water service contract. Past inflows are only an indicator of what might happen in the future. The water supply may vary from the historic record.
- **Future Depletions** - Future Depletion schedules in Wyoming, Colorado, and Utah all match current Colorado River Simulation System schedules. It should be noted that Wyoming's future water development directly impacts the water supply of Flaming Gorge.
- **ROD Flows** - All ROD spring and base flow objectives are met at the specified long-term frequencies described in the ROD. ROD flows significantly reduce the availability of water that might be contracted from the reservoir.
- **Release Capacities** - Release limitations due to reservoir elevation constraints were assumed as follows:

Elevation Range	Maximum Release Capacity
6015' and above	12,600 to 28,600 cfs
6000' to 6015	8,600 cfs
5925' to 6000	7,900 cfs
5908' to 5925	6,900 cfs
5908' and below <sup>1</sup>	3,700 cfs (no powerplant)

- **Continuous Diversion** - A continuous (steady) diversion was modeled beginning in January of 2008 and ending at the termination of the run in December of 2049. No phase in period for this diversion was modeled.

## Results

The model output indicated that a continuous diversion of 165,000 acre-feet per year could physically be diverted from Flaming Gorge Reservoir during the period from 2008 to 2049 without imposing a significant risk that the powerplant would have to go off line due to insufficient water in the reservoir during this period. All 83 traces of inflow hydrology maintained reservoir elevations above 5908 feet above sea level for the duration of the model run with one minor exception in the critical trace where a single monthly elevation fell to 5907.3 feet for a single month. The minimum power pool elevation of 5908 feet above sea level includes 40 feet of water cover over the midpoint of the lowest penstock intake. It was assumed that some operational adjustments would allow the powerplant to operate slightly below the 5908 foot elevation and, therefore, no adjustment to the diversion was studied beyond this point. All ESA and other ROD flows were maintained.

<sup>1</sup> This elevation was considered the allowable limit of operation of the powerplant. This elevation is 40 feet above the midline of the lowest penstock intake of the selective withdrawal device. It may be possible to operate somewhat below this level with some modification to powerplant operation. For the modeling, it was assumed that the elevation should not fall below this elevation to be acceptable; however, this was not considered to be a hard and fast rule.