COMMENTS ON DRAFT BIGHORN LAKE OPERATING CRITERIA

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The Western Area Power Administration (Western) appreciates the opportunity to comment on the Draft Bighorn Lake Operating Criteria (Draft Criteria). Western believes that the Bureau of Reclamation (Reclamation) is making a good faith effort to balance the multiple uses of the Yellowtail Unit of the Pick-Sloan Missouri Basin Program. Western has comments on the Draft Criteria as well as suggested additions to the Evaluation Study and Report (Report).

Comments on Draft Criteria

The Draft Criteria are principally implemented through Bighorn Lake water surface elevation targets with the intent of maintaining the Lake at higher elevations throughout the year compared to the existing operating criteria. The advantage to power production is that the Yellowtail Powerplant would operate at higher average heads (water pressure) and higher turbine efficiencies. There are, however, several disadvantages to energy generation. While the average annual Yellowtail Powerplant generation is modestly increased as shown by Reclamation's operational modeling, the increased generation would occur in months of historically lighter electrical loads and lower power prices. The modeling also shows that the generation would decrease in months of historically heavier electrical loads and higher power prices.

An impact to power that is not readily apparent from Reclamation's monthly time step operations modeling is the effect on the regulating capability of the Yellowtail Powerplant. The Yellowtail Powerplant is operated to follow changing electrical loads over the course of a day because the Yellowtail Afterbay elevation can fluctuate with changing generation levels and turbine flows while the release to the Bighorn River from the Yellowtail Afterbay Dam remains constant. This regulating capability is compromised when the Bighorn Lake release is either so low as to approach the minimum generating level of the Yellowtail Powerplant generating units or so high as to approach or exceed the capacity of the turbines. Western believes that the modified Bighorn Lake elevation targets of the Draft Criteria may more often compromise the regulating capability of the Yellowtail Powerplant. The operating rule curve called for in the Draft Criteria may mitigate any increased risk of turbine bypasses but may not mitigate the reduction of regulating capability.

Another impact to power is the loss of reserve capacity caused by the Draft Criteria. Reserve capacity is the amount of unloaded generating capacity that can be called for instantaneously (spinning reserves) or on short notice (operating reserves) in response to electrical system emergencies. Every

electrical utility is required to hold in reserve a minimum amount of generating capacity based on that utility's total installed generating capacity. Utilities must purchase reserves from other utilities to satisfy unmet reserve requirements in order to maintain electrical system reliability and to avoid substantial financial penalties. Higher releases from Bighorn Lake reduce the reserve capacity of the Yellowtail Powerplant much in the same way that regulating capability is compromised. Western believes the Draft Criteria may reduce the overall reserve capacity of the Yellowtail Powerplant.

To be more specific, the higher Bighorn Lake end of October elevation called for by the Draft Criteria reduces Bighorn Lake releases and associated Yellowtail Powerplant generation during the heaviest summer electrical loads in July and August. The higher end of March elevation reduces generation during the heaviest winter electrical loads in December and January. The higher March elevation may also increase the average spring and early summer Bighorn Lake release along with the related risk of compromised power plant regulating capability and reduced reserve capacity.

Western believes that, on balance, the modest increase to annual Yellowtail Powerplant generation attributable to the Draft Criteria will not offset the financial impact of shifting Yellowtail generation from higher electrical load months to months of lower electrical loads. With the possible compromise of Yellowtail regulating capability and the possible loss of Yellowtail reserve capacity, the overall impact to the firm electric power customers is likely to be negative. Continued experience operating Bighorn Lake under the draft criteria or reservoir operations modeling on a daily/hourly time step will be required to more conclusively determine the impact on Yellowtail Powerplant regulating capability and reserve capacity.

Suggested Additions to the Evaluation Study & Report

Western suggests adding a short paragraph to the Background section of the Report explaining the repayment obligations for the Yellowtail Unit with a table or pie charts breaking down reimbursable versus non-reimbursable costs and percentages of both construction and O&M costs allocated to the different authorized purposes.

Western also suggests adding the Yellowtail gross generation marketed by Western to the table in Figure 14 and adding the monthly marketed generation to the graph also in Figure 14. Western marketed the average Yellowtail generation from the Corps of Engineers (Corps) 1975 Yellowstone Level B Depletion Study. The monthly marketed Yellowtail gross generation in gigawatt-hours (GWh) is as follows…

November	78.6 GWh	May	70.0
December	77.7	June	93.2
January	72.8	July	96.1
February	71.7	August	66.2
March	70.9	September	64.0
April	72.8	October	63.8

The obvious discrepancy between the marketed Yellowtail generation and Reclamation's modeled generation is mostly due to Bighorn Lake inflows. The Corps 1975 study shows an average annual (1939-1975) Bighorn Lake inflow of 2,322.3 thousand acre-feet (KAF) after the estimated evaporation is subtracted while Reclamation's modeling indicates an average annual inflow of only 1,992.6 KAF for the period (1988-2008). The lower inflows of the period 1988-2008 are due to some combination of generally drier conditions and increased depletions in the Bighorn Basin upstream of Bighorn Lake since the Corps study was done in 1975. A smaller portion of the generation discrepancy is because the Corps study did not take into account the average 70 cubic foot per second of seepage from Bighorn Lake through the Yellowtail Dam.