IDAHO POWER
An IDACORP Company

Responses to FERC Additional Information Request OP-1(b) (Operational Scenarios)

Flood Control Storage

Final Report

Jon Bowling
Engineering Leader

Hells Canyon Project
FERC No. P-1971-079

February 2005

TABLE OF CONTENTS

LIST OF FIGURES

SCHEDULE A: ADDITIONAL INFORMATION REQUEST OP-1 OPERATIONAL SCENARIOS—FLOOD CONTROL STORAGE

Time Required: 9 months

(b) Flood control storage

For each operational scenario, please confirm, that there is no effect on flood control storage, or describe any effects that you identify.

1. INTRODUCTION

Agency review of Idaho Power Company's (IPC) final license application for the Hells Canyon Complex (IPC 2003) resulted in requests to the Federal Energy Regulatory Commission (FERC) for additional studies. FERC evaluated these study requests and formulated a list of additional information requests (AIRs) to help in determining potential project-related impacts resulting from the three hydroelectric projects comprising the Hells Canyon Complex. This document addresses AIR OP-1(b), quoted above.

2. RESPONSE TO (B)—FLOOD CONTROL STORAGE

CHEOPS model assumptions for the alternative scenarios requested are described in detail in the response to OP-1 (a) (Parkinson and Bowling 2005). All 11 scenarios were modeled with the latest 1998 rule curve formulas to calculate the target elevations for Brownlee Reservoir based on observed flows at Brownlee and The Dalles projects, with two exceptions. These exceptions are Operational Scenarios 5 and 6. Scenario 5 is described as a run-of-river condition with Brownlee Reservoir held at minimum pool or an elevation of 1,976 feet mean sea level. Due to this constraint, the reservoir is incapable of providing flood control storage. The rule curve for Operational Scenario 6 was modified to meet the objectives of the scenario. The modified rule curve provided for a more aggressive drawdown of Brownlee Reservoir in addition to more storage than the 1998 rule curve from the U.S. Army Corps of Engineers did. With the two exceptions described, operational scenarios requested by FERC were modeled with no effect or change to the current flood control storage routine. Figures 1 and 2 illustrate the current 1998 rule curve formulas. Figure 3 illustrates the modified rule curve used in Operational Scenario 6. Again, Operational Scenario 5 had no flood control routine due to the inherent constraints imposed on it.

3. LITERATURE CITED

Idaho Power Company (IPC). 2003. New license application: Hells Canyon hydroelectric project (FERC Project No. 1971). 6 CD-ROM set. IPC, Boise, ID.

Parkinson, S., and J. Bowling. February 2005. Responses to additional information request OP-1(a) operational scenarios: power economics. Idaho Power Company, Boise, ID.

Procedure for Determining Flood Control Draft at Brownlee Reservoir, November 1998

Tabular Format

	Volume Forecast (MAF)			
	TDA < 75			
Space Required (KAF)	Brn ≤ 3	Brn = 4	Brn = 5	Brn ≥ 6
28 Feb	0	200	300	400
31 Mar	0	100	200	350
15 Apr	0	50	150	250
30 Apr	0	0	50	150
	TDA = 85			
Space Required (KAF)	Brn ≤ 3	Brn = 4	Brn = 5	Brn ≥ 6
28 Feb	150	300	350	400
31 Mar	100	300	400	450
15 Apr	50	250	400	500
30 Apr	0	250	400	500
	TDA = 95			
Space Required (KAF)	Brn ≤ 3	Brn = 4	Brn = 5	Brn ≥ 6
28 Feb	200	300	350	400
31 Mar	150	300	400	500
15 Apr	100	300	425	550
30 Apr	50	300	450	600
	TDA = 105			
Space Required (KAF)	Brn ≤ 3	Brn = 4	Brn = 5	Brn ≥ 6
28 Feb	300	400	400	400
31 Mar	200	425	475	500
15 Apr	150	450	525	600
30 Apr	100	450	550	700
	TDA ≥ 115			
Space Required (KAF)	Brn ≤ 3	Brn = 4	Brn = 5	Brn ≥ 6
28 Feb	300	400	500	500
31 Mar	250	450	600	750
15 Apr	200	500	650	850
30 Apr	150	550	750	980

CENWD-NP-ET-WH

Figure 1. Brownlee Reservoir flood control requirements, in tabular format.

Notes. The procedure for determining flood control draft at Brownlee is applicable from January 31–April 30 to facilitate regulation of the spring flood season on the lower Snake and lower Columbia Rivers. Forecasts from both The Dalles and Brownlee are used to specify draft volumes at designated time periods throughout the spring runoff season. Interpolation may be necessary at both The Dalles and Brownlee with respect to their forecasts. If a forecast at The Dalles is less than 75 MAF, equal to 85, 95, or 105 MAF, or greater than 115 MAF, then interpolation necessary only at Brownlee. If Brownlee's forecast is less than 3 MAF, equal to 4 or 5 MAF, or greater than 6 MAF, then interpolation is necessary only at The Dalles. If the forecast does not lie at either of the volumes specified above, then interpolation is necessary at both projects. The following is an example of the interpolation process when necessary at both projects:

1. Determine the 4 lines of interpolation from the forecasts of The Dalles and Brownlee at a specified date. For example, a 30 April forecast of 88 MAF at The Dalles and 4.2 MAF at Brownlee would produce the four following interpolation lines:

   a. TDA = 85, BRN = 4, FC = 250
   b. TDA = 85, BRN = 5, FC = 400
   c. TDA = 95, BRN = 4, FC = 300
   d. TDA = 95, BRN = 5, FC = 450

2. Interpolate between the two different The Dalles runoff volumes for the same Brownlee runoff volume. For example, interpolate between TDA = 85, BRN = 4 and TDA = 95, BRN = 4:

   ((88-85)/(95-85))*(300-250)+250=265 kaf

3. Interpolate between the same two runoff volume values at The Dalles in step 2, but use the higher Brownlee runoff volume than in step 2. For example, interpolate between TDA = 85, BRN = 5 and TDA = 95, BRN = 5:

   ((88-85)/(95-85))*(450-400)+400=415 kaf

4. Interpolate between the values obtained from step 2 and step 3 to determine the space required at Brownlee. For example:

   ((4.2-4.0)/(5.0-4.0))*(415-265)+265=295 kaf

CENWD-NP-ET-WH

Figure 2. Brownlee Reservoir flood control requirements, procedural information excerpted from the U.S. Army Corps of Engineers website. (www.nwd-wc.usace.army.mil/cafe/forecast/SRD/BRN1998table.pdf)

Procedure for Determining Flood Control Draft at Brownlee Reservoir,

Developed for OP-1 Scenario 6 by IPC

Tabular Format

Space Required (KAF)	Volume Forecast (MAF)			
	Brn ≤ 3	Brn = 4	Brn = 5	Brn ≥ 6
TDA = for all volumes				
28 Feb	0	450	600	850
31 Mar	0	500	650	980
15 Apr	0	550	750	980
30 Apr	0	550	750	980

Straight interpolation is performed for available storage at Brownlee Reservoir based on the observed volume through the complex for each year.

Figure 3. Brownlee Reservoir flood control requirements modified for OP-1 Scenario 6 objectives.

This page is left blank intentionally.