COVER SHEET

FEDERAL ENERGY REGULATORY COMMISSION

DRAFT ENVIRONMENTAL IMPACT STATEMENT
FOR THE HELLS CANYON PROJECT
Docket No. P-1971-079

Section 4
Developmental Analysis
Pages 525 through 532
DEIS

4.0 DEVELOPMENTAL ANALYSIS

In this section, we analyze the project's use of the available water resources to generate hydropower, estimate the economic benefits of the project, estimate the cost of various environmental enhancement measures and operational changes, and assess the effects of these measures on project operations. Idaho Power does not propose any modifications to the project generation facilities, but it does propose several environmental measures that would affect project costs.

4.1 BASIS FOR POWER, COSTS AND ECONOMIC BENEFITS OF THE PROJECT

The main purpose of the Hells Canyon Project is to provide power for Idaho Power's customers. Idaho Power has studied the existing project facilities, operation, and utilization of flows and concludes that the project, as proposed, would be developed to its optimal capacity.

Under its approach to evaluating the economics of hydropower projects, as articulated in Mead Corporation, Publishing Paper Division (72 FERC ¶61,027, July 13, 1995), the Commission employs an analysis that uses current costs to compare the costs of the project and likely alternative power with no consideration for potential future inflation, escalation, or deflation beyond the license issuance date. The Commission's economic analysis provides a general estimate of the potential power benefits and costs of a project and reasonable alternatives to project-generated power. The estimate helps to support an informed decision concerning what is in the public interest with respect to a proposed license.

To determine the value of project power benefits, we assumed the value of generation is similar to the cost of Mid-Columbia forward pricing values, which vary by month and time of day. We use Idaho Power's value of dependable capacity at $114,000 per MW per year (MW-yr). We use these values to provide: (1) a basis for measuring the economic benefits of continued project operation; and (2) a basis for estimating the cost of replacing power for any environmental enhancements that would reduce project generation.

The current-cost economic analysis is not entirely a first-year analysis in that certain costs, such as major capital investments, would not be expended in a single year. Also, some future expenses, such as taxes and depreciation, are known and measurable and are, therefore, incorporated in the cost analysis. Table 91 summarizes the values that we use for key parameters in our analysis; these values were either obtained from Idaho Power's final license application and AIR responses or developed by staff. Table 92 summarizes the annualized costs associated with the project under existing conditions (no-action), which total $37,057,900.

Table 91. Summary of key parameters for economic analysis of the Hells Canyon Hydroelectric Project. (Source: Idaho Power, 2004, as modified by staff)

Parameter	Value	Source
Period of analysis	30 years	Staff
Term of financing	20 years	Staff
Discount rate	7.13 percent	Idaho Power
Cost of money	8.48 percent	Idaho Power
General inflation and real growth rate	0 percent	Staff
Depreciation	MACRS	Staff
Taxes and Insurance (%)		
Federal income tax rate	39.1%	Idaho Power

Parameter	Value	Source
Property tax rate	0.5%	Idaho Power
Insurance	0.07%	Idaho Power[a]
Capacity Value ($/MW-year)	**$114,000**	
Energy Value ($/MWh) ($2006) from Idaho Power	**Heavy Load Period ($)**	**Light Load Period ($)**
January	70.09	60.00
February	64.25	55.00
March	58.41	50.00
April	44.03	35.12
May	39.81	31.76
June	45.90	36.62
July	53.59	43.70
August	62.04	50.59
September	59.12	48.21
October	58.18	48.81
November	56.54	47.44
December	62.28	52.25

Note: MACRS = Modified Accelerated Cost Recovery System

[a] Computed from Idaho Power data.

Table 92. Costs associated with the No-action Alternative for the Hells Canyon Project.

	No Inflation		
	Capital Cost	Annual Expense	Total Annualized Cost
Total original net investment[a]	$182,800,000		$19,966,000
Committed construction cost[b]	$2,477,100		$270,600
Total relicensing cost[c]	$80,700,000		$8,354,300
Ongoing environmental measures[a]	$11,600,000		$1,267,000
Total net investment			$29,857,900
Plant O&M [d]		$5,480,000	$5,480,000
O&M for current environmental measures		$5,542,500	$5,542,500
KWh Tax[e]		$903,300	$903,300
FERC fees[f]		$1,720,000	$1,720,000
Subtotal annual expenses			$7,200,000
Total annualized cost			$37,057,900

[a] We include property tax and insurance considerations in our annualized capital costs, while Idaho Power accounts for these costs separately.

[b] We estimated the committed construction cost by applying the ratio of the cash flow for a known cost to Idaho Power's cost of capital in table 1 of Final Report AIR DR-4.

[c] We do not include property tax and insurance in annualizing the relicensing costs.

[d] We computed the plant O&M cost by dividing the 30-year total cost of $164.4 million by 30, based on Idaho Power's response to AIR DR-4.

[e] Based on Idaho Power's response to AIR DR-4 and computed by dividing $27.1 million by 30 years.

[f] Based on Idaho Power's response to AIR DR-4 and computed by dividing $51.6 million by 30 years. A higher figure was published in exhibit D of the final license application (Idaho Power, 2003a).

4.2 COST OF ENVIRONMENTAL MEASURES

Certain measures proposed by Idaho Power, recommended by agencies and other parties and/or considered by staff for inclusion in a staff alternative could affect project economics through costs (capital, O&M, plan development, etc.) or effects on power generation. Since several hundred measures have been put forward in this proceeding, we have placed the cost information for the developmental analysis in a set of two cost appendices. Appendix E provides detailed costs for measures included in Idaho Power's Proposal, while appendix F addresses other measures included in the Staff Alternative.

4.2.1 Reduced Benefits Associated with Operational Changes

In this draft EIS we evaluate alternative operations, which include changes to ramping rates, re-regulation of the reservoirs for flow augmentation, and flow management changes to provide minimum navigational flows downstream of Hells Canyon dam. These operational changes, if implemented, would affect both energy generation and dependable capacity, as well as the ancillary benefits of the project. Additional effects could include a loss in generation flexibility and transmission system modifications. We base our estimates of energy impacts on data provided by Idaho Power's CHEOPS model, a hydropower operations computer optimization model.[73]

We determine dependable capacity impacts by estimating project capacity during a critical hydrologic period, which is defined by Idaho Power as July 1994 (a below-normal flow year). Table 93, which is based on Idaho Power's response to AIR OP-1(a) (Bowling and Whittaker, 2005), summarizes the effects on power benefits of the environmental measures that would affect generation.

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[73] The CHEOPS model and input files are proprietary tools of Idaho Power. Staff reviewed the model during earlier project proceedings. In response to our AIR OP-1(a), Idaho Power made a number of model runs to simulate certain flow scenarios (see section 3.3.2). Other operational measures, submitted in response to the Commission's Notice of Ready for Environmental Analysis, have not been modeled at this time. Where non-modeled flow recommendations were included in the Staff Alternative, the values presented in this section represent estimates based on interpolation and/or combination of the AIR OP-1(a) model runs. A more precise estimate of the effects of the Staff Alternative on power benefits will be available after Idaho Power models the staff alternative using CHEOPS.

Table 93. Annualized lost benefits associated with supplemental operational measures included in the staff alternative.

Measure	Decrease in Heavy Load Period Energy Generation (MWh)	Decrease in Light Load Period Energy Generation (MWh)[a]	Lost Energy Benefits[a]	Reduction in dependable capacity (MW)	Lost Capacity Benefits	Lost Ancillary, Transmission and Flexibility Benefits	Annualized Reduction in Power Benefits
Implement a 4-inch-per-hour ramping rate measured at Johnsons Bar from March 15 through June 15, to be adjusted if warranted based on monitoring studies	24,933	–38,429	–$262,700	50.8	$5,785,800	$1,248,000	$6,771,100
Operate the project in the interest of navigation to maintain a flow of 8,500 cfs above the mouth of the Salmon River[b]	6,442	–6,324	$179,800	100.3	$11,437,600	$931,500	$12,548,900
For flow augmentation, refill Brownlee reservoir to full pool by June 20, release 237 kaf of stored water from Brownlee reservoir between June 21 and July 31 (release at least 150 kaf of this water by July 15) and not refill until after August 31[c]	32,920	-5,992	$2,542,400	7.9	$903,700	$ 3,087,800	$6,534,000
Total[d]	57,853	-44,421	$2,279,700	58.7	$6,689,500	$4,335,800	$13,305,100

[a] A negative value indicates a gain or increase.

[b] Additionally, an instantaneous minimum of 11,500 cfs below the mouth of the Salmon River as measured at the Snake River below McDuff Rapids gaging station is required. The measure also requires that the instantaneous minimum release from Hells Canyon dam for the current day to be equal to the previous 3-day moving average for Brownlee reservoir inflow when the three-day moving average for Brownlee reservoir inflow is less than 8,500 cfs.

[c] We estimated the cost of flow augmentation as 237/350ths of the figure estimated by Idaho Power for Scenario 2, submitted in response AIR OP-1a. This is the ratio of the augmentation flow provided in the Staff Alternative (237 kcfs) to the augmentation flow modeled by Idaho Power in Scenario 2 (350 kcfs). We recognize that there are other operational effects such as head changes, efficiency changes, and operational release patterns that can only be accurately captured by Idaho Power's CHEOPS model.

[d] The entries in each row represent the cost of each measure on its own – not in combination with the other flow measures. The total equals the sum of rows 1 (Ramping Rate) and 3 (Flow Augmentation). The incremental cost of row 2 (Navigation) would be negligible when the measure is incorporated into an operational scenario that includes flow augmentation. The reason for this is that the primary potential impact on power benefits from the navigation flow

targets is the loss of dependable capacity. Dependable capacity is estimated based on typical July flows during the second driest year type (1994). Under the flow augmentation scenario, simulated July 1994 releases from Hells Canyon dam never fall below the 8,500-cfs navigation target level, because water is being released from storage during this month to augment downstream fish flows. Therefore, no additional releases or constraints on operation that might affect dependable capacity would be imposed by the navigation target flow in combination with flow augmentation, and there would be no incremental cost. Accurately capturing the effect of all staff measures in combination would require Idaho Power to run the CHEOPS model for this scenario and recompute the values submitted in response to AIR OP-1a.

4.2.2 Cost of Environmental Measures under the Applicants' Proposal and Staff Alternative

Idaho Power provided the cash flows for capital and O&M costs associated with their environmental measures in their response to AIR DR-4 (Bowling and Whittaker, 2005) or in subsequent filings.[74] Based on our review, we largely adopted these costs and applied the parameters summarized in table 91 to compute annualized costs. The annualized cost of the new environmental measures included in Idaho Power's Proposal is $ 9,741,700. The distribution of these costs by resource area is summarized in table 94, including capital costs, annualized O&M costs, and total annualized costs.

We created the cash flows for capital and O&M costs for environmental measures that were recommended by agencies and other parties or that we developed. In some cases, we estimated costs by extrapolating costs provided by Idaho Power in its application or response to AIR DR-4. The total annualized cost of the new environmental measures included in the Staff Alternative is $12,393,800 (table 94).

4.3 COMPARISON OF ALTERNATIVES

Based on Idaho Power's computer model and hydrologic data for the project, the estimated average annual output of the project under the no-action alternative (current conditions) is 6,562,244 MWh. This would provide annual power benefits of $351,546,600. Subtracting current costs of $37,057,900 (see table 92) yields an annual net benefit of $314,488,700. This serves as the basis for the analysis of project economic benefits under Idaho Power's Proposal and the Staff Alternative. The project's output is sold to Idaho Power's ratepayers or to other utilities in the northwest region. Idaho Power is an Idaho corporation and is a publicly regulated investor owned utility. Its rates and charges are set by the Idaho Public Utilities Commission in a manner to cover its operating expenses, debt service, and other costs and to provide appropriate operating, capital and other reserves, as well as a regulated return on investment to shareholders.

Table 95 compares the power value, annualized costs, and net benefits of the No-action Alternative, Idaho Power's Proposal, and the Staff Alternative. In section 5.0, *Staff's Conclusions*, we discuss our reasons for developing the Staff Alternative and explain why we conclude the environmental benefits may be worth these cost increases and benefit reductions. Net benefits would decrease from 47.92 mills/kWh under the No-action Alternative to 46.44 mills/kWh under Idaho Power's Proposal, a drop of 3.10 percent. The decrease in net benefits from 46.44 mills/kWh under Idaho Power's Proposal to 44.10 mills/kWh under the Staff Alternative represents an additional drop of 8.24 percent. Compared to Idaho Power's Proposal, the Staff Alternative causes a greater reduction in net benefits because of measures that would reduce generation and annual power values as well as measures that would increase project costs.

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[74] Idaho Power provided costs associated with certain water quality measures in its response to AIRs for WQ-1 and WQ-2 (Idaho Power, 2005e,g,h, 2005).

Table 94. Summary by resource area of capital and one-time costs, annual operation and maintenance costs, and total annualized costs of additional environmental measures included in Idaho Power's Proposal and the Staff Alternative.

	Idaho Power's Proposal[a]			Staff Alternative[a,b]		
Resource Area	**Capital Cost**	**Annualized O&M Cost**	**Total Annualized Cost**	**Capital Cost**	**Annualized O&M Cost**	**Total Annualized Cost**
Sediment transport	$0	$0	$0	$745,400	$75,100	$156,500
Water quality	$5,817,400	$291,500	$855,400	$14,893,000	$1,399,400	$2,745,800
Aquatic resources	$17,000,000	$954,900	$2,811,700	$19,808,000	$920,700	$2,604,200
Hatcheries	$17,006,000	$469,200	$2,326,700	$17,176,000	$546,200	$2,421,100
Operational measures	$0	$0	$0	$1,600,000	$68,000	$242,800
Terrestrial resources	$9,547,000	$890,100	$1,902,400	$9,990,000	$941,100	$2,000,900
Cultural resources	$77,000	$499,800	$508,200	$77,000	$532,300	$540,700
Recreation	$9,779,800	$345,900	$1,178,600	$10,669,800	$523,000	$1,443,000
Land use and aesthetics	$775,000	$82,000	$158,700	$950,000	$144,000	$238,800
Total	$60,002,200	$3,533,400	$9,741,700	$75,909,200	$5,149,800	$12,393,800

[a] Source: Idaho Power, 2005-DR-4 and staff estimates.

[b] Sum of all measures included in the Staff Alternative, including those proposed by Idaho Power (see appendix E) and those recommended by agencies or developed by staff (see appendix F).

Table 95. Summary of the annual cost, power benefits, and net benefits for the No-action Alternative, Idaho Power's Proposal, and the Staff Alternative.[a]

Hells Canyon	No Action	Idaho Power's Proposal	Staff Alternative
Capacity			
Dependable capacity (MW)	1,277.8	1,277.8	1,219.1
Generation			
Effect on heavy load generation (MWh)			57,853
Effect on light load generation (MWh)			–44,421
Total Generation (MWh)	6,562,244	6,562,244	6,548,812
Changes in Capacity and Power Values			
Dependable capacity effects			–$6,689,500
Generation effects			–$2,279,700
Ancillary benefits effects			–$798,800
Transmission effects			–$2,047,200
Flexibility effects			–$1,489,714
Total Costs and Benefits			
Annual power value	$351,546,600	$351,546,600	$338,241,700
($/MWh and mills/kWh)	53.57	$53.57	$51.65
Annual cost	$37,057,900	$46,799,600	$49,451,700
($/MWh and mills/kWh)	5.65	$7.13	$7.55
Annual net benefit	$314,488,700	$304,747,000	$288,836,200
($/MWh and mills/kWh)	47.92	$46.44	$44.10

[a] Small round-off differences of $100 to $200 may carry forward from earlier tables as values are recombined.

The measures that Idaho Power proposes, as summarized in table 95, would increase annualized costs from $37,057,900 to $46,799,600 relative to the No-action Alternative. Idaho Power does not propose any significant operational changes and annual generation would remain unchanged at 6,562,244 MWh. This would provide annual power benefits of $351,546,600 and an annual net benefit of $304,747,000. This equals an overall reduction in annual net benefits of $9,741,700 relative to the No-action Alternative.

The measures included in the Staff Alternative, as summarized in table 95, would increase annualized costs from $37,057,900 to $49,451,700 relative to the No-action Alternative. Operational changes would reduce annual generation, which would decrease by 13,432 MWh to 6,548,812 MWh. The Staff Alternative would provide annual power benefits of $338,241,700 and an annual net benefit of $288,790,000. This represents an overall reduction in annual net benefits of $25,652,500 relative to the No-action Alternative.