NEWFOUNDLAND POWER
A FORTIS COMPANY

PUB 3.1
Attachment A
(1st Revision)

November 6, 2002

Memorandum From: **Tony Chislett**

To: **Gary Humby**

Subject: **Lockston Rehabilitation Projects – Feasibility Analysis**

File: **401.01.03.30.00**

We have completed a feasibility analysis on the continued operation of the Lockston hydroelectric development. Several major components of the development are in need of replacement or refurbishment, including the woodstave penstock, governor, runner, and breakers. With substantial investment required in the near-term to permit the continued operation of this plant, an economic analysis of this development over a 25-year horizon was warranted. A summary of the costs and benefits associated with this analysis follows.

Capital Costs

All significant capital expenditures foreseen for the hydroelectric development over the next 25 years have been identified. The majority of these expenditures are currently planned for 2003-2005. The expenditures required to maintain the safe and reliable operation of the facilities are summarized below. A complete breakdown of capital costs and operating costs are provided in Schedule "A".

Description	Cost (2003 $)	Year	Cost (Escal.) + GEC (5%)
Penstock replacement	$1,520,000	2003	$1,596,000
Canal Rehab	$80,000	2003	$84,000
Fish Habitat Compensation	$50,000	2003	$52,500
Foundation Reconstruction	$100,000	2004	$107,100
Powerhouse Roof rehab	$50,000	2013	$64,000
Canal/Spillway Reconstruction	$150,000	2018	$212,100
Cooling Water Filter	$8,000	2003	$8,400
Main Valve G1	$100,000	2004	$107,100
Main Valve G2	$100,000	2004	$107,100
Governor Replacement & Controls	$300,000	2004	$321,300
Unit 1 Runner replacement	$323,000	2005	$352,800
Breaker Replacements	$200,000	2005	$218,500
Forebay Cable	$34,000	2005	$37,150
Powerhouse Cables	$50,000	2009	$59,150
Generator Rewind	$250,000	2013	$320,000
Unit 2 Runner upgrade	$100,000	2013	$128,000
Transformer Replacement	$250,000	2013	$320,000
TOTAL	**$3,665,000**		**$4,095,200**

The total capital expenditure of all of the projects listed above is $3,665,000 (in 2003 dollar values). All estimates are also shown as escalated values using an assumed escalation rate of 2.0% and including a 5% allowance for General Expenses - Capital (GEC).

Operating Costs

Operating costs for this hydroelectric system were based primarily upon recent years' operating experience. These costs represent both direct charges for operations and maintenance at this plant as well as indirect costs related to activities associated with managing the environment, safety, dam safety inspections, staff training, etc.

In addition to inflationary adjustments, operating costs are also increased by $0.80 per MWh for water usage charges. The Provincial Department of Environment (Water Resources Division) is currently in the process of implementing an annual water use fee based on yearly hydroplant generation/output. Such a charge is not reflected in the historical annual operating costs for the Lockston development. Therefore, an adjustment is applied to account for the associated increased operating expenses.

Penstock maintenance has accounted for a significant portion of the operating costs of this plant over the past 5-10 years. Future operating cost has been estimated based on actual from 1989 onward, with a reduction of $5,000 per year to reflect the penstock replacement.

Benefits

The estimated long-term normal production at this plant under present operating conditions is 8.8 GWh/yr. This estimate is based on the results of the Water Management Study completed by Acres International in December 2000. With an assumed station service adjustment of 0.1 GWh/yr, the normal plant output is estimated at 8.7 GWh/yr.

Some of the capital improvement projects will result in decreased energy losses, and subsequent increases in capacity and generation. The magnitude of these increases is difficult to estimate, but are not significant, so no allowance has been made for any increase in the forecasted generation at Lockston.

The downtime associated with the 2003 capital works at this plant will result in a higher amount of spill at the forebay compared to a normal operating year. It is anticipated that the potential lost generation may be in the order of 1 GWh/yr. Therefore, the analysis assumed production at Lockston of 7.7 GWh in 2003, and 8.7 GWh/yr thereafter.

Alternative to Rehabilitation

NP's continued operation of Lockston plant is dependent on completion of the significant capital improvements previously noted. Without the associated capital investment, decommissioning of the plant would become necessary at some future point in time.

Decommissioning of this facility would require a significant expenditure to remove and retire the various assets. As there have been no precedents for this type of action in Newfoundland Power, it is difficult to predict what measures would be required by provincial regulatory bodies. However, the total cost of decommissioning/retirement is estimated in the order of $500,000. This includes the costs of dismantling, demolition (powerhouse, penstock and storage dams), site restoration, disposal of contaminated soil/woodstaves, disposal of other waste materials, and environmental studies/monitoring.

Financial Analysis

An overall financial analysis of combined costs and benefits has been completed using the levelized cost of energy approach. The levelized cost of energy is representative of the revenue requirement required to support the combined capital and operating costs associated with the development.

The estimated levelized cost of energy from the Lockston plant over the next 25 years is 4.94 cents per kWh. This figure includes all projected capital and operating costs necessary to operate and maintain the facility. Energy from Lockston can be produced at a lower price than the cost of replacement energy, assumed to come from Hydro's Holyrood Generating Station. Using Hydro's short term price forecast and an assumed fuel price escalation rate of 2% in the longer term, incremental energy from the Holyrood Generating Station is estimated to cost 5.53 cents per kWh, levelized over the same 25 year period. Energy from Lockston plant also compares favourably with 5.86 cents per kWh (2002 dollars) for the Rose Blanche Brook development and with marginal energy values implied by recent contracts entered into by Hydro with non-utility generators.

The future capacity benefits of the continued availability of Lockston hydro plant have not been considered in this analysis. In addition, decommissioning costs would be associated with any decision to shut down this facility and the financial benefit associated with the deferral of these costs has not been factored into this analysis.

Conclusions

It is concluded that operation of the Lockston hydroelectric development is economically viable over the long term. It is recommended that the rehabilitation work proposed at Lockston for 2003 proceed as planned.

Schedule A
Summary of Capital Costs and Operating Costs

CAPITAL COSTS

Escalation Rate = 0.02

Description	Cost (2003 $)	Year	Cost (Escal.)	
Civil				
Penstock replacement	$1,520,000	2003	$1,596,000	30% CCA
Fish Habitat Compensation	$50,000	2003	$52,500	
Canal Rehab	$80,000	2003	$84,000	
Foundation Reconstruction	$100,000	2004	$107,100	
Powerhouse Roof rehab	$50,000	2013	$64,000	
Canal/Spillway Reconstruction	$150,000	2018	$212,100	
Subtotal - Civil	**$1,950,000**		**$2,115,700**	
Mech/Elec				
Cooling Water Filter	$8,000	2003	$8,400	
Main Valve G1	$100,000	2004	$107,100	
Main Valve G2	$100,000	2004	$107,100	
Governor Replacement & Controls	$300,000	2004	$321,300	
Unit 1 Runner replacement	$323,000	2005	$352,800	30% CCA
Breaker Replacements	$200,000	2005	$218,500	
Forebay Cable	$34,000	2005	$37,150	
Powerhouse Cables	$50,000	2009	$59,150	
Generator Rewind	$250,000	2013	$320,000	
Unit 2 Runner upgrade	$100,000	2013	$128,000	30% CCA
Transformer Replacement	$250,000	2013	$320,000	
Subtotal - M/E	**$1,715,000**		**$1,979,500**	
TOTAL	**$3,665,000**		**$4,095,200**	

		Hydro 4% CCA	Hydro 30% CCA	Hydro Total
0	2003	$144,900	$1,596,000	$1,740,900
1	2004	$642,600		$642,600
2	2005	$255,650	$352,800	$608,450
3	2006			
4	2007			
5	2008			
6	2009	$59,150		$59,150
7	2010			
8	2011			
9	2012			
10	2013	$704,000	$128,000	$832,000
11	2014			
12	2015			
13	2016			
14	2017			
15	2018	$212,100		$212,100
16	2019			
17	2020			
18	2021			
19	2022			
20	2023			
21	2024			
22	2025			
23	2026			
24	2027			
25	2028			
Total		**2,018,400**	**2,076,800**	**4,095,200**

OPERATING COSTS

1989	$135,362	
1990	$113,154	
1991	$75,640	
1992	$81,387	
1993	$74,502	
1994	$83,073	
1995	$108,997	
1996	$92,922	
1997	$107,600	$107,600
1998	$97,235	$97,235
1999	$130,702	$130,702
2000	$99,111	$99,111
2001	$119,903	$119,903
Average	$101,507	$110,910

* Note; The annual operating costs tabulated above for years prior to 1997 represent direct costs charged to the Plant operating function number.

However, the 1997-2001 values include both direct and indirect operating costs related to activities associated with environment, safety, dam safety, training, etc.

As a result, the 1997-2001 data is considered to be most representative of anticipated future operating costs.

1997 to 2001 Average Operating Cost =	**$110,910**
Water Use Charges =	**$6,960**
Reduced Future Penstock Maintenance =	**$5,000**
Total Annual Operating Cost =	**$112,870**