

**IR1 submitted by R Bishop re: Application by BC Hydro to Permanently Cease Operation at the Salmon River Diversion Project:1598907**

**Reference: Exhibit B-1, Project Summary 1.1, p.1**

Subject to natural inflows and minimum fisheries flows retained in the Salmon River, this redirected flow supplements electricity generation at BC Hydro's Ladore and John Hart Generating Stations by approximately 4 per cent. BC Hydro has committed to working with First Nations to improve upstream fish passage at the Dam.

and...

The Campbell River Water Use Plan (included in Appendix B) and the associated Order by the Comptroller of Water Rights (Comptroller) require improvement of the fish screen's performance.

**1.1 What would be the cost of improvements to the fish screen to satisfy the Comptroller?**

**Reference: Exhibit B-1 Project Justification, 2(c), p.6**

**2(c)** The value of energy from the Diversion does not outweigh the environmental and social benefits of decommissioning the Diversion.

2.1 How does BC Hydro assign a cost value to the environmental and social benefits- please explain?

**Reference: Exhibit B-1 Project Justification, Background: Salmon River Diversion, 2.1 , p.7**

An improved natural channel leads from the pond to Brewster Lake. An embankment was built to the north of the pond as part of the original construction, which prevents the pond from draining back into the Salmon River.

2.1.1 Did BChydro investigate building a new fish friendlier diversion at this location, if not, why not- please explain?

**Reference: Exhibit B-1 Project Justification, Timber Crib Dam and Spillway, 2.2.1, p9**

Three timbers were observed missing in 2010 and an additional six or seven were lost during a November storm. The overall deterioration combined with a lack of maintenance has resulted in an acceleration of overall rate of deterioration of the dam and canal liner.

2.2.1.1 Please explain why BC Hydro has not done any/minimal maintenance during the last 7 (or maybe longer) years. Does BC Hydro make it a practice to defer maintenance until plant deteriorates to the point where repairs are funded under Capital- for example the Hugh Keenlyside upgrade project circa 2010?

**Reference: Exhibit B-1 Project Justification, Timber Crib Dam and Spillway, 2.2.1, p10**

It may be possible to continue to operate the facility for a number of years utilizing the incremental repair and maintenance approach. and ...

Reference: Exhibit B-1, Appendix E, Associated Report Table 4-1a, p.4-2

**Total Cost of Rehabilitation and Maintenance (Whole Life Cost)**

Average Annual Cost  
Average Annual Cost  
Total Cost  
Total Cost  
Period

**0% inflation**

**2% inflation**

5 year  
\$3,897,379  
\$779,000  
\$4,005,613  
\$801,000  
20 year  
\$14,539,758  
\$727,000  
\$17,104,267  
\$855,000  
50 year  
\$37,189,258  
\$744,000  
\$64,065,219  
\$1,281,000

and...

**Reference: Exhibit B-1, 2.5, Energy Contribution, p.23**

The levelized value of the Reference Price over the Diversion's 20-year design life starting in fiscal 2018 is \$72.5/MWh, corresponding to a gross energy value of \$41.9 million in Present Value terms. Another lower price comparator to test the sensitivity to energy value was established based on a longer period of energy surplus to fiscal 2033 (based on existing and committed resources together with planned resource additions) and the Long Run Marginal Cost thereafter: the levelized value for this comparator over the same 20-year design life is \$46.1/MWh, corresponding to a gross energy value of \$26.6 million, also in Present Value terms.

**2.2.1.2 From table 4-1(a) above the average annual cost (assuming 2% inflation) for a 50 year Life extension is \$1.281M and \$0.855 for a 20 year Life extension. Compared to the lost energy costs of \$41.0- \$26.6 over 20 years- the Project preferred abandonment based on AE's economics is not justified- please confirm. For greater clarity, please discuss BC Hydro's accounting treatment where-in costs are typically 2.5 to 3 times higher than actual costs due to Corporate costs of COH, IDC etc.**

**Even with the costs 'Hydro-ised' AE's estimate still comes out to ~ \$4M (3X \$1.281M) compared to BC Hydro's estimate of \$14.2M (B-1, 3.2.1.2, p. 27) for removal costs - please help us understand.**

**Reference: Exhibit B-1, 2.2.1, Timber Crib Dam and Spillway, pp.10-11**

Ongoing remedial works to repair lost timbers as they become evident is being performed to maintain the Spillway until a planned refurbishment program is implemented. The QP [Qualified Professional] considers that this is an acceptable short term approach. The Spillway meets deterministic standards for stability under all loading conditions and can pass a flood event in excess of the IDF [Inflow Design Flood]. However, given the current condition of the structure, it is likely that at least some damage would occur requiring immediate attention following such an event.

2.2.1.3 If the DDS considers that the SDR has remaining life (with the replacement of some timbers), please explain why the facility cannot remain in service (at its current restricted discharge) until if and when an IDF event occurs. Note- it is understood that some immediate improvements to the SRD are required, which may include a fish passageway and improved fish screen (reference 2.2.2 Headworks (Intake Structure), p.11, line 18).

**Reference: Exhibit B-1, 2.2.5, Diversion Canal, pp.12-13**

The 3.1 km long lined diversion canal...that a plan be put in place to repair the panels rated as "Fair-Poor" in coming years.  
and...

This growing vegetation has stressed the concrete in the areas of root concentration, resulting in concrete cracking and spalling.  
and...

The Diversion was completely taken out of service after the inspection in 2011, until December 2013, when it was returned to service on a limited basis. The Diversion was operated under conditions of limited flow of approximately 5 m3/s under enhanced dam safety surveillance. In March and April 2014 repairs were undertaken to address concrete condition

2.2.5.1 Please explain why repairs were not implemented until some 3 years later and the canal was allowed to deteriorate further and

meanwhile BC Hydro would have lost energy substantial revenue? Are these further examples of insufficient maintenance funding (perhaps in response to pressures by the BCUC) or a policy decision by BC Hydro to delay until the repairs could be included in the Capital program- please discuss?

2.2.5.2 Please explain if any (Energy Purchase Agreements) EPA's were awarded or renewed during these 3 years and indicate the value of energy these contracts included in rates over the same period. For greater clarity, did rate payers pay for the inaction of BC Hydro to make timely repairs and return the SRD to service- if so what were the costs?

2.2.5.2.1 if no EPA contracts were awarded, please discuss the minimum value of the lost energy that could have been exported had SRD remained in service during this 3 year period.

**Reference: Exhibit B-1, 2.4.2, Downstream Fish Screen, p.17**

When clean, and at flow rates of 15 m<sup>3</sup>/s or less, the screen operates as intended, but the efficiency declines sharply with higher flows, or when debris has accumulated on the screen.

2.4.2.1 Please explain if the option limiting the discharge to 15m<sup>3</sup>/s for some additional 10-20 years would satisfy the DFO concerns with the downstream passage for anadromous salmonids at the site for this period. Note-It is understood that some repairs may be required or modifications to the DFO design.

2.4.2.2 Please discuss if the option of installing an opening in the bottom of the Patterson Creek flume with a screen just downstream- such that fish would be discharged into Pattison Creek (which flows into the Salmon River) was ever considered. If not, why not- if yes, would this be a cost effective solution? For greater clarity, the 'discharge slot' could be high enough above Patterson Creek and a small enough opening that it would be a barrier for upstream fish migration (note- a tipping device could be installed to flush debris downstream similar in concept, but less elaborate than the Puntledge facility's screen).

**Reference: Exhibit B-1, 2.5, Energy Contribution, pp.21-23**

Under the current operating canal constraints, with diversion flows limited to 15 m<sup>3</sup>/s, an average of approximately 4.3 m<sup>3</sup>/s are diverted from the Salmon River to the Campbell River system annually, allowing additional generation of approximately 46 GWh ... and...

The anticipated energy lost by the Project is substantially offset by efficiency improvements being implemented at the John Hart Generating Station. BC Hydro has obtained higher efficiency at the redeveloped John Hart Generating Station than anticipated at the time of the Application for a Certificate of Public Convenience and Necessity for the John Hart Generating Station Replacement Project. and...

The levelized value of the Reference Price over the Diversion's 20-year design life starting in fiscal 2018 is \$72.5/MWh, corresponding to a gross energy value of \$41.9 million in Present Value terms. Another lower price comparator to test the sensitivity to energy value was established based on a longer period of energy surplus to fiscal 2033 (based on existing and committed resources together with planned resource additions) and the Long Run Marginal Cost thereafter: the levelized value for this comparator over the same 20-year design life is \$46.1/MWh, corresponding to a gross energy value of \$26.6 million, also in Present Value terms.

2.5.1 Please clarify the basis of the calculations- were they based on a reduction to the 46 GWh/yr due to the 15m<sup>3</sup>/s flow or the licensed 42.5 m<sup>3</sup>/s flow (reference B1, 2.2.5, p.13)? From Exhibit B-1, Appendix B, 4.2, **General Water Use and Power Generation, Table 4-1, p.19 of 81- the combined output of JHT and LDR is some 1000 GWh/yr and if SDR contributes ~ 4% (Exhibit B-1, Project Summary 1.1, p.1) this should indicate that the 46 GWh/yr comes with no SRD restrictions? Please update the figures as required to the Energy Contribution section.**

2.5.2 "The anticipated energy lost by the Project is substantially offset " is a leaky argument- one that's analogous to a farmer having a bumper crop such that he can dispose of the surplus instead of storing it for a future market? Does BC Hydro spill water when it has a surplus to its domestic energy requirements? Please discuss as BC Hydro may want to withdraw this argument as it is not in the ratepayers best interests- particularly considering the decommissioning of the Heber Diversion which also subtracted from the output of the Campbell system.

2.5.2.1 Please comment if BC Hydro, in the next 20 years, will be applying for or renewing EPA contracts and at what is the expected level/value of this energy.

2.5.3 Please explain why the costs of rehabilitating the SRD estimated at (\$41.1 million to \$37.4 million - reference B1, 3.2.2.2, p.29) did not consider the licensed 42.5m<sup>3</sup>/s flow (reference B1, 2.2.5, p.13) in calculating the benefit/cost ratio in B1, 4.1, p.31-34. For greater clarity the SRD asset is worth \$41.9M to \$26.6M based on a 15 m<sup>3</sup>/s flow, so what is the value of the asset based on the licensed 42.5m<sup>3</sup>/s flow?

**Reference: Exhibit B-1, Project Development and Alternatives ,Cease Operations and Removal, 3.2.1, p.25**

BC Hydro would continue to manage access to the site and provide a means for wildlife movement.

### 3.2.1.1 What is the plan to protect elk from being injured or perishing in the canal?

**Reference: Exhibit B-1, Appendix E, Associated Report, Executive Summary, pp.1-2**

We estimate that \$2.38M is immediately required to upgrade assets with poor ratings (Condition Rating 2 or CR2) to a satisfactory ratings of CR3, and operated for another 20 years. Failure to repair these assets could impact the operation, structural stability or limit the longevity of the SAR facility.

The dam's timber cribbing was found to be in fair to poor condition, and will continue to deteriorate incrementally. Following a more detailed Dam Safety Review, we anticipate that significant rehabilitation or dam replacement may be required. We have estimated the complete dam replacement at \$6M.

and...

An asset renewal plan, maintenance budget and implementation schedule were calculated to maintain the 20-year and longer operable condition. The suggested cost scenario assumes all suggested upgrading, maintenance, rehabilitation and/or replacements are conducted as per the recommendations of this condition assessment. This plan (assuming no inflation factor applied) would require an average annual expenditure of \$750,000 over the 50 year life.

and...

Upon completion of the recommended repairs/upgrades and associated maintenance, the structure should have the stated operational longevity of at least 20 years. That being said, the facility can only operate if the interconnecting assets are in fair to good condition (CR3 or better), and that the components continue to meet environmental and functional standards.

E Summary 1. Does BC Hydro and in particular the DDS agree with AE's assessment? Please discuss AE's estimate once all BC Hydro's loadings are added.

**Reference: Exhibit B-1, Appendix E, 3.2.1, Condition Assessment, Dam Facing Replacement, p.3-1**

Further analysis is required to confirm the stability of the existing dam facility in its current condition.

### 3.2.1 Was a further condition assessment performed1- if not, why not? Please explain.

**Reference: Exhibit B-1, 9.0, First Nations Consultation, p.42**

Completion of the decommissioning project will fulfil BC Hydro's commitments to First Nations related to the improvement of upstream fish passage at the site that were made as part of the agreements for the John Hart Replacement Project.

9.0.1 Has BC Hydro made any other commitments to FN's regarding the other water diversions in the Campbell system watershed, such as the Crest, Quinsam and Menzies Creek (and here may be others)? If so please discuss these commitments and please provide copies of any correspondence regarding these commitments to First Nations either in the form of meeting minutes or formal letters. Note- if this correspondence is considered confidential, please submit same in confidence to the Commission for the Panel's review. This question is relevant to the Application as further cessation of diversions will have a significant impact on the economics of generation in the Campbell system- particularly for the newly redeveloped John Hart facility.

**Reference: Exhibit B-1, Appendix E, 5, Discussion on Future Status of the Facility p.5-1**

A regular maintenance and replacement schedule and budget (Table 3-2) is required to maintain the system to a reasonable expectation.

5.1 It would appear that BC Hydro has not allocated sufficient funds over past years to maintain the facility and as such significant repairs are now required. Please comment if underfunded maintenance is a problem system wide and BC Hydro relies on Capital funding to bring it's asset back to operating condition- case in point Hugh Keenlyside assets required Capital replacement due, in part, to lack of maintenance.

**Reference: Exhibit B-1, Appendix E, 5, Discussion on Future Status of the Facility p.5-1**

Performing a complete removal and replacement of the dam may prove to be cost-prohibitive. There may be options to simply extend the dam on the downstream side of the existing structure or provide a new facing material such as concrete or steel plating anchored to the cribbing. A new chute spill and plunge pool would need to be constructed in concert with trimming weir and fish ladders.

5.2 Has BC Hydro explored these options- if not, why not- please explain?

**Reference: Exhibit B-1, Appendix E, 5, Summary, Section, 4.b, p.6-2**

The dam's timber cribbing will continue to deteriorate incrementally. This analysis suggests that significant rehabilitation, or even complete dam replacement, could be required in the next 10 to 20 years. The next Dam Safety Review, slated for 2017, will further identify the details required for rehabilitation. We have estimated the complete dam replacement at \$6M.

S 1. Please confirm that until the 2017 DDS report is finalized, BC Hydro cannot, at this time say with confidence, that the SRD Dam needs replacement within the next 10 years.

**Reference: Exhibit B-1, Appendix E, 5, Summary, Section, 4.b, p.6-2**

A list of maintenance items (See Table 3-2) was established to help achieve the 20-year and longer operable condition. An annual maintenance budget of \$120k is required. Every five years, an additional \$305k is required to perform more significant maintenance repairs while the canal is down. We also included additional maintenance tasks totalling \$385k for the 10 year cycle as well.

S 2. Please comment if this scenario was given adequate consideration and explain if not, why not.

**Reference: Exhibit B-1, Appendix E, Summary, Section 7.a, p.6-3**

In the first 5 years, we would anticipate the following expenditures for both capital and O&M.

S 3. Please comment on AE estimate for the 5 year period of \$3.9M and compared to the projected lost energy of approximately 46 GWh (reference Exit B-1, 2.5.1 Value of Diversion Energy, p.22)- project abandonment based on AE's economics is not justified.

**Reference: Exhibit B-1, Appendix H, DFO Letter, p.1**

Improvements to the fish screen became a commitment of the Campbell River Water Use Plan (WUP), and a condition of the resulting *Fisheries Act* Authorization for the Project. BC Hydro subsequently committed to improving both upstream and downstream passage at the facility through its Fish Passage Decision Framework process... and...

Unfortunately, delays in implementing these measures have occurred, and we understand that BC Hydro has since determined that for economic and other reasons, decommissioning of the diversion dam at SRD is now its preferred approach.

H 1. Please confirm that it is technically, environmentally and financially feasible/viable to mitigate DFO's concerns as well as the Comptroller's concerns such that the SRD can continue to be a valuable Heritage asset.

General questions (H2 and H3) about the Project

H 2. Please discuss if the Project's justification is heavily skewed towards the environmental benefits- primarily commitments made to First Nations and other fisheries stakeholders as there does not appear to be any discussion of the impact on rates due to the Project included in the Application nor does the Application discuss any negative impacts of the Project. Please describe and discuss any identified negative impacts.

H 3. What will be BC Hydro's future commitments to government agencies upon completion of the Project? For greater clarity, for instance, if a storm were to negatively impact the Salmon River habitat- would BC Hydro be expected to make repairs at its cost?

DFO believes that decommissioning of the Salmon River Diversion Dam, undertaken with the input and oversight of the regulatory agencies, First Nations, and stakeholders, has the potential to resolve long-standing fish passage issues at the site and provide substantial benefits to fish populations in the Salmon River.

H 4. Are there any natural barriers that BC Hydro would be expected to remove in conjunction with the Project and at BC Hydro's expense?

H 5. Please discuss the effects on fish in the Campbell River if the Project is approved. For greater clarity, less water will be available for salmon rearing in the Campbell River downstream of John Hart.

H 5.1. To BC Hydro's knowledge, has the DFO, the The Ministry of Forests, Lands and Natural Resource Operations, Fisheries Department and other fisheries stakeholders weighed this effect on one of the most productive fish rearing habitats in the province? If so, please provide any summary correspondence discussing same. If this was not considered, please explain why not?

**Reference: Exhibit B-1, Appendix I, CRSF Letter, p.1**

The CRFC commends BC Hydro in making the ultimate decision to remove the diversion due to the unacceptable cost of rebuilding the infrastructure as this is the best solution for fish.

I 1. Please explain if "this is the best solution for fish" is a quote from BC Hydro and if it is- is it the overlying factor in justifying the Project?

The existing fish passage structure is only effective at a narrow range of flows for upstream migration...the fish screen in the diversion canal is marginal at best.

I 2. Please explain if the existing fish passage structure and fish screen could be improved and at what cost.

Respectfully submitted April 19, 2017