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April 21, 2022

Mr. Richard Buchan, Chair
Yukon Utilities Board
Box 31728
Whitehorse, Yukon Y1A 6L3

Dear Mr. Buchan:

Re: Yukon Energy Corporation (Yukon Energy or YEC) Submission for the referral of the Electricity Purchase Agreement (EPA) with Tlingit Homeland Energy LP (THELP) to the Yukon Utilities Board (Board) for review under s. 18(1) of the *Public Utilities Act* – Amended and Restated EPA

On January 20, 2022 Yukon Energy provided to the Board a Submission regarding the Electricity Purchase Agreement (EPA) with Tlingit Homeland Energy LP (THELP) that the Minister of Justice and Attorney General (the Minister) referred to the Board for public review by way of letter dated May 18, 2021. The EPA is for the sale to YEC of energy and capacity from THELP's proposed Atlin Hydro Expansion Project (the Project).

Board Order 2022-01 established a process that included provision for interrogatories (IRs) as well as an oral hearing.

On April 8, 2022, Yukon Energy sent a letter to the Board noting that "as a result of recent changes to the design of the Atlin Project arising from an early contractor involvement process initiated by THELP, the EPA signed on January 14, 2022 needs to be amended. Although the amended EPA will not change the basic impacts on YEC and ratepayers beyond improving the expected ratepayer benefits, the Board and intervenors will need time to review the changes to the project and the amended EPA."

On April 14, 2022, the Board acknowledged receipt of the April 8 correspondence, and directed YEC to provide along with its filing of the revised EPA: a black-lined version of the amended EPA; a black-lined version of the application reflecting changes resulting from the revised EPA; and a black-lined consolidated version of all IRs that are impacted by the amended EPA.

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The amended and restated EPA dated April 12, 2022 (the Amended EPA) has now been finalized and signed. The following related documents are provided with this letter as required by the Board's April 14, 2022 letter:

- A clean version of the Amended EPA, which is provided as Attachment A to an amended April Submission reflecting changes from the Submission filed with the Board on January 20, 2022 (the Original Submission).
- A black-lined version of the Submission including in Attachment A a black-lined version of the Amended EPA reflecting changes from the January 14, 2022 EPA (the Original EPA) filed with the Board on January 20, 2022.
- A black-line consolidated version of all IRs that are impacted by the Amended EPA (the Amended IRs). Where relevant, the IR Preamble "Quote" and/or question has been amended (with black-line) to reflect the Amended Submission and Amended EPA.
- A clean consolidated version of all IRs impacted by the Amended EPA.

A summary is provided below of the Amended EPA's key changes to the Original EPA.

Summary of Key Changes to EPA

THELP advised Yukon Energy in March 2022 that revised cost estimates prepared by the general contractor engaged under an early contractor involvement (ECI) showed material cost escalations in the Project as originally proposed, and that the selected contractor Dent Construction had provided an improved design for the Project at the same increased cost as for the original design ($240 million).

Plant Design Changes

Key changes proposed by Dent to the Project configuration included one versus two powerhouses supplied by a penstock versus a power canal; and a single target commercial operation date (Target COD) at December 1, 2024 rather than Phase One and Phase Two Target CODs during October 2024. THELP advised Yukon Energy that the change to a penstock to replace the power canal was also desired to address environmental review concerns with the power canal raised by regulators in BC.

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THELP and Yukon Energy have accordingly agreed to changes to the hydro generation components of the Project as descripted in Schedule B of the Amended EPA and shown in Figure 1 below. Specific hydro generation plant design changes include:

- **One Powerhouse vs Two** – The new powerhouse is located at the previous Lower Powerhouse site, as shown in Figure 1. The following changes in related capacity and long-term average (LTA) Delivered Energy at Jakes Corner Point of Interconnection (POI) are noted:
    - Installed generation capacity at Atlin is increased to 9.3 MW vs 8.7 MW combined for the two powerhouses in the original design;
    - Delivered capacity at Jakes Corner POI is increased to 8.75 MW vs 8.0 MW in the original design; and
    - LTA Winter Delivered Energy at POI is increased to 34.0 GWh/yr vs 30.8 GWh/yr with the original design.
- **Penstock from Surprise Lake to Powerhouse - no power canal** – Figure 1 shows in the blue line the 18.8 km penstock to connect the new Surprise Lake Intake Structure to the new Powerhouse. The original design proposed an approximately 7.8 km power canal in a redeveloped abandoned placer mining ditch to connect a new control structure in Pine Creek with a 4.7 km penstock to the Upper Powerhouse located adjacent to the 2.1 MW Existing Plant.
- **Tap to Existing Plant** – A tap from the new Penstock to the Existing Plant will enable the Existing Plant to use this source for its water from Surprise Lake rather than continue to rely upon Pine Creek as the conduit of its water supply. Section 7.3 of the Amended EPA has new provisions to reflect this change in the Project as regards the Existing Plant tap and potential future changes when the current EPA with BC Hydro is renewed.

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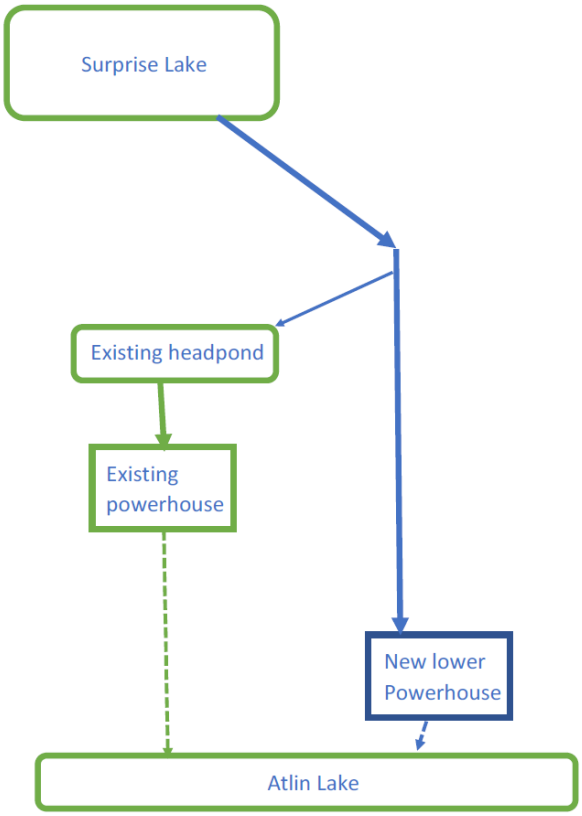
Figure 1: Amended EPA: Project Hydro Generation Components



Benefits from Plant Design Changes

The changes to the Project hydro generation plant in summary provide the following key benefits related to the replacement of the power canal with a penstock (reflected in material changes to Operating Rules set out in Schedule D of the Amended EPA):

- Enhanced Dispatchability for Delivered Energy:
    - 1 hour vs 3 days for YEC direction to change dispatch;
    - Ability in all seasons to change dispatch between 100% of capacity and 1 MW at the generation plant versus prior winter requirement for minimum water flow at 65% of capacity;
    - Ability for YEC to schedule 4 changes per day (2 up and 2 down);

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- Ability for YEC to change next day and following planned weekly dispatch in response to changes in forecast weather or YIS system conditions; and
- Ability to more efficiently use available water for thermal generation displacement.

- Remove need to form ice:
  - Avoid restrictions in water use and plant dispatch during ice formation (when assumed to run at maximum capacity regardless of YEC requirements to displace thermal); and
  - Reduced operating risks that planned dispatch be interrupted by ice conditions.
- Enhanced water use and generation overall from Surprise Lake reservoir:
  - Penstock reduces water leakage; and
  - Enhanced dispatchability improves water use for power generation.
- Reduced water losses during a Non-Permitted System Constraint, thereby minimizing ratepayer costs for such events.

The above benefits have impacted the updated assessment of Delivered Energy and the resulting expected Long Term Average (LTA) thermal generation displacement (see below).

Enhanced Delivered Energy Benefits

The above benefits from the plant design changes plus updated hydrologic assessments of water availability[1] have resulted in increased LTA Delivered Energy being estimated during the Winter Period (increase to 34.0 GWh/yr versus 30.8 GWh/yr in Original EPA).

This increased LTA Delivered Energy combined with YEC's assessment of optimum LTA winter Delivered Energy dispatch with the new dispatch capability and adjusted Operating Rules[2] has

[1] SNC and Knight Piesold (KP, working with Dent Construction) have developed updated modeled water flow assessments for a longer number of water years. See Appendix A of the amended Submission, Table A1 for updated Delivered Energy estimates by month and water year for more than 50 years through 2020 inclusive as provided by SNC for the redesigned Project using the updated modeled water flow assessments and assuming Delivered Energy during May is curtailed at mid-month (higher LTA winter generation occurs if winter deliveries assumed to be maximized to the end of May – but YEC expects minimal added thermal displacement benefits from freshet-based added Delivered Energy and sees greater benefit from assigning priority to refill of Surprise Lake reservoir).

[2] See Appendix A of the amended Submission, Table A2 and Figure A1 for comparison of YEC's assumed LTA Delivered Energy dispatch by month compared with the SNC LTA dispatch shown in Table A1 of the amended Submission.

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resulted in an increase in expected LTA thermal generation displacement benefits with the Amended EPA as summarized in Table 1 below.

- **2024 Load Forecast** – Increase in volume of LTA thermal displacement from 19.6 GWh/yr to 24.2 GWh/yr; LTA thermal displacement as a percent of LTA YEC energy purchases also increases from 62.5% to 71.2%. This load forecast continues to be used in the EPA for the years 2024 to 2034.
- **2035 Load Forecast –** Increase in volume of LTA thermal displacement from 15.0 GWh/yr to 17.3 GWh/yr; LTA thermal displacement as a percent of LTA YEC energy purchases also increases from 48.7% to 50.9%. This load forecast assumes disconnection of all industrial mine loads, and continues to be used in the EPA for2035 and all subsequent years during the 40 year EPA term. As shown in Table 1, the LTA thermal generation remaining on the YIS after the EPA energy purchases is expected to be very small (2.3 GWh/year).

Table 1: Amended EPA: LTA Thermal Displacement Benefits from LTA Delivered Energy

		2024 Load Forecast		2035 Load Forecast	
		Original EPA	Amended EPA	Original EPA	Amended EPA
		GW.h	GW.h	GW.h	GW.h
		A	B	C	D
Forecast 12-month Annual Grid Load (GWh Generation)					
Total Net Load before Atlin (GWh)		**477.7**	**477.7**	**432.9**	**432.9**
Atlin winter energy purchases (LTA) (GWh)	1	**30.8**	**34.0**	**30.8**	**34.0**
Atlin winter energy purchases net of AEY losses (GWh)	2	28.9	32.4	28.9	32.4
LTA Thermal With Atlin (GWh)	3	15.8	11.2	4.6	2.3
LTA Thermal Without Atlin(GWh)	4	35.3	35.3	19.6	19.6
Atlin LTA Thermal Displacement benefits (GWh)	5=4-3	***19.563***	***24.181***	***15.003***	***17.289***
LTA Thermal Displacement % of Atlin Energy Purchases	***7=5/1***	***63.483%***	***71.226%***	***48.687%***	***50.923%***

Notes: See Appendix A, Table A3 of the amended Submission for details and assumptions on YIS load and renewable generation which are unchanged from the Original EPA assessments.

Updated EPA Pricing

Energy pricing in the Amended EPA for the Winter Period continues to be based on thermal fuel costs saved, adjusted only for the changes in LTA thermal displacement as estimated in Table 1.

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The enhanced dispatchability has enabled removal of separate firm and non-firm energy tariffs – the Amended EPA therefore has one Winter Energy Price (2024$) for each of the two load forecast time periods, based on LTA Delivered Energy and related LTA thermal displacement for each time period and the forecast 2024 blend fuel price of $0.19/kWh.

As summarized in Table 2 below, the resulting Winter Energy Prices in the Amended EPA are higher than in the Original EPA, reflecting the increased benefits from the higher LTA thermal generation displacement percentage per kWh of LTA Delivered Energy as shown in Table 1. All prices are in 2024$, and reflect the fuel cost savings per kWh of LTA energy purchases.

- 2024 Load Forecast – adjusted price of $0.135/kWh, versus $0.121/kWh before.
- 2035 Load Forecast - adjusted price of $0.097/kWh, versus $0.093/kWh before.

The Amended EPA retains annual escalation of the Winter Energy Price at 50% of CPI. Potential Carbon Charge Saving Payment and Additional Payment after 2034 are updated as required to reflect the updated LTA thermal displacement – but are otherwise unchanged from the Original EPA.

Table 2: Amended EPA: Updated Winter Energy Pricing

	2024 Load Forecast		2035 Load Forecast	
	Original EPA	Amended EPA	Original EPA	Amended EPA
	GW.h	GW.h	GW.h	GW.h
	A	B	C	D
Forecast 12-month Annual Grid Load (GWh Generation)				
Total Net Load before Atlin (GWh)	**477.7**	**477.7**	**432.9**	**432.9**
Atlin winter energy purchases (LTA) (GWh)	**30.8**	**34.0**	**30.8**	**34.0**
Atlin LTA Thermal Displacement benefits (GWh)	***19.563***	***24.181***	***15.003***	***17.289***
LTA Thermal Benefits (2024$million)				
Assumed Blended Fuel Cost (2024$/kWh)	0.190	0.190	0.190	0.190
Non-Summer rate revenue: 2024 blended thermal price forecast	$3.717	$4.594	$2.851	$3.285
EPA Price for non-summer energy delivered (2024$/kWh)	***$0.121***	***$0.135***	***$0.093***	***$0.097***

Notes: See Appendix A, Table A3 of the amended Submission for details and assumptions which are unchanged from the Original EPA assessments.

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The Summer energy price remains unchanged at 50% of the YUB approved blended fuel price. The one change is a limit to 2 weeks for any requested Summer Energy Delivered Energy in any Year with agreement to collaborate on getting approvals if more Summer Energy Delivered Energy is needed by YEC (see section 6.4 of the Amended EPA). As reviewed in YEC's earlier Submission, YEC has substantial surplus renewable generation forecast in the Summer period such that requests are not expected for Summer Delivered Energy from the Project.

Capacity pricing and related section 8.3 provisions (Dependable Capacity Excess Payment Recovery Account) remain unchanged in the Amended EPA from the Original EPA, subject to the adjusted maximum Dependable Plant Capacity Committed of 8.75 MW and simplifications in the definition of Dependable Capacity Provided and the related example provided in Schedule G (see Table A4 in Appendix A to the amended Submission for an update of Table A4 in the January 2022 YEC Submission). The plant design changes to enhance dispatchability materially reduce YEC's risks of being disrupted during Peak Winter Period and YEC's ability to respond effectively to weather and/or grid condition changes affecting dependable capacity requirements.

Table 3 provides a summary of the Amended EPA energy and capacity pricing. The Amended EPA continues to provide a materially lower cost impact on customer rates than equivalent SOP IPP renewable supplies (see page 26 of YEC's January 2022 Submission).

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Table 3: Amended EPA: Summary EPA Energy and Capacity Pricing (2024$)

Pricing	2024-2034	2035 & Beyond
Energy Delivered		
Blended Thermal Reference Price	$0.19/kWh in 2024 plus 1/2 CPI after	$0.19/kWh in 2024 plus 1/2 CPI after
Winter Energy Price (Jan-May,Sept-Dec)	$0.135/kWh in 2024 plus 1/2 CPI after	$0.097/kWh in 2024 plus 1/2 CPI after
Additional Payment on Winter Energy (if YIS generation load>388 GWh forecast)		(12.9% of Added Load x YUB
Carbon Charge Saving Payment (if YUB approves carbon charge in rates)	up to 50% of carbon tax cost per kWh of estimated thermal displacement	
Summer Energy Price (June-August) (only upon YEC request)	50% of last approved YUB blend fuel price	
Dependable Plant Capacity Committed		
LCOC Reference Price	$200/kW-yr in Dec. 2023 plus CPI after	
Excess Payment recovery (sec. 8.3 of EPA)	up to 100% of Additional Payment/ Carbon Charge Saving Payment and up to 50% of Summer Delivered Energy Payment	

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Other Changes in Amended EPA

The Amended EPA retains other provisions of the Original EPA, including conditions precedent requirements in section 2.1 with updated dates. Key changes have been highlighted above in this letter. All changes are highlighted in the blackline version in Attachment 2.

Notwithstanding the changes in the Project generation plant design, the Amended EPA does not change the basic impacts on YEC and ratepayers beyond improving the expected ratepayer benefit and reducing related YEC and ratepayer risks.

Yukon Energy has moved as quickly as possible to bring forward the Amended EPA for review by the Board and intervenors, and to summarize the key changes that have occurred. YEC will provide as soon as feasible a black-lined consolidated version of all IRs that are impacted by the amended EPA.

If you have any questions regarding the above, please call.

Yours truly,

Andrew Hall
President & CEO