LWRF 2017 and 2018 Annual Reports and ERA 2017 and 2018 Filing

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December 10, 2019

Mr. Robert Laking, Chair
Yukon Utilities Board
Box 31728
Whitehorse, Yukon Y1A 6L3

Dear Mr. Laking:

Re: Low Water Reserve Fund ("LWRF") 2017 and 2018 Annual Reports, and 2017 and 2018 Energy Reconciliation Adjustment ("ERA") Filing

This correspondence provides Yukon Energy Corporation's ("Yukon Energy" or "YEC") Annual Report summarizing Low Water Reserve Fund ("LWRF") and Energy Reconciliation Adjustment ("ERA") activities up to December 31, 2017 and December 31, 2018 based on actual results. This material was prepared pursuant to Yukon Utilities Board ("YUB" or "the Board") directions as provided in Order 2018-10, 2019-04 and 2019-08, and is consistent with Yukon Energy's September 23, 2019 Compliance Filing regarding Order 2019-04.

The following information is attached with this correspondence:

- **Attachment 1 –** LWRF Calculations for 2017 and 2018 based on Board Order 2019-08 and Balance Updates.
- **Attachment 2 –** 2017 and 2018 ERA Filing.
- **Attachment 3 –** Update on 2019 Forecast Water Conditions.

In Order 2018-10, the Board directed that YEC create a deferral account, the LWRF, that "records the variance between actual thermal generation fuel costs (based on volume only) and the GRA forecast thermal generation fuel costs (based on volume only) that are due to changes in water conditions". The Board also directed (paragraph 323) that YEC amend the Diesel Contingency Fund ("DCF") term sheet to comply with the above directions, including a requirement for Board approval of any drawdown of the LWRF and for any rider to replenish the LWRF; and to transfer the balance in the DCF in its entirely to the LWRF (paragraphs 324-325). The following are noted with regard to the direction provided in Order 2018-10:

- The DCF fund amount was last approved for December 31, 2016. All funds in the DCF as of January 1, 2017 are transferred to the LWRF effective that date, as per the LWRF Term Sheet. The opening balance of LWRF for 2017 starts with 2016 DCF closing balance as reviewed in the tables below.

- Due to the Board Order 2018-10 direction that 2017 test year revenue requirement reflect actual grid loads, grid generation and fuel costs no payments into or out of the LWRF occurred in 2017 other than interest and Rider E rebates. Based on Board direction in Order 2018-10, the 2017 DCF Annual Report and the 2017 ERA Final Report provided to the Board on April 13, 2018, as revised in response to UCG-YEC-2-39 Revised – Attachment 1, are now no longer valid for 2017.[1]

In Board Order 2019-04 the Board noted that "incremental generation due to incremental load must be removed from the LWRF calculations because this is a risk borne by the utility", and directed that YEC follow a four step process with regard to the calculation of the LWRF (see Order 2019-04 pages 9- 10). Yukon Energy has addressed this direction in its December 10, 2019 Compliance Filing to Order 2019-04 and Board Order 2019-08 which includes an amended LWRF Term Sheet [Attachment 2.1-1].

A summary of each of the documents attached to this correspondence follows.

Attachment 1: LWRF Calculations and Balance as of December 31, 2017 and December 31, 2018

Attachment 1, Table 1 provides LWRF calculations and balance for 2017 and 2018 actuals, and Attachment 1, Table 2 provides a LWRF Continuity Schedule.

Board Order 2019-02 set Rider E to 0.00 cents/kW.h effective April 1, 2019. The LWRF balance is expected continue to be within +/- $8 million, and therefore no Rider E calculation is provided in this filing.

In summary, the tables in Attachment 1 indicate as follows regarding the annual LWRF calculations and balance for 2017 and 2018:

[1] YEC notes that 2017 DCF Annual report provided on April 13, 2018 as revised in UCG-YEC-2-39 Revised Attachment 1 [YEC's 2017/18 GRA] erroneously showed 2017 opening balance at $5.770 million. The accurate opening balance is $9.485 million as provided in Table 2 of 2016 DCF Annual report [filed with the Board on April 5, 2017], which provided final balances for 2012, 2013 and 2014 consistent with the Board's approval of these balances in Section 2.4 of Appendix A to Board Order 2015-06.

- 2017 actuals:
    - Due to Board Order 2018-10 direction that the 2017 test year revenue requirement reflect actual grid loads, grid generation and fuel costs, no payments into or out of the LWRF occurred in 2017 other than interest and Rider E rebates.
- 2018 actuals:
    - Based on actual annual load for 2018, and the LWRF Term Sheet in the December 10, 2019 Compliance Filing to Order 2019-04 and Order 2019-08, the LTA thermal actual requirement for 2018 at forecast load is 18.733 GW.h with 15.511 GW.h LNG (Table 1, L17)[2].
    - The forecast LTA thermal generation requirement for 2018 was 16.355 GW.h, including 1.636 GW.h diesel and 14.720 GW.h LNG[3] (Table 1, L18).
    - The resulting overall gap between forecast and estimated actual thermal generation for the 2018 GRA forecast load equals 2.378 GW.h (Table 1, L19), including 1.586 GW.h diesel and 0.792 GW.h LNG. The resulting payment required from LWRF to YEC for 2018 is $0.534 million (Table 1, L20).[4]
- LWRF balances:
    - 2017
        - Based on YUB 2018-10 direction, the DCF balance at December 31 2016 is transferred to the LWRF [$9.485 million as provided in Table 2 of 2016 DCF Annual report filed with the Board on April 5, 2017].
        - No incremental thermal generation charges into or out of the LWRF [revenue requirement for the 2017 test year is based on actuals].
        - Less Rider E rebates for 2017 at $2.861 million.
        - Add interest charged to the balance at $0.086 million.
        - Closing balance of $6.710 million.
    - 2018
        - Opening balance of $6.710 million.
        - Incremental thermal generation charge at $0.534 million [YEC withdraws from LWRF, as per Attachment 1 Table 1].
        - Less Rider E rebates for 2018 at $2.874 million.
        - Add interest charged to the balance at $0.076 million.
        - Closing balance of $3.379 million.

[2] In this Compliance Filing, LNG is assumed to displace 90% of the 2018 expected long-term average thermal requirements, subject to not exceeding total thermal less estimated diesel at forecast load.
[3] The diesel and LNG mix in the GRA forecast was based on 10% diesel and 90% LNG.
[4] Based on 2017/18 GRA average fuel costs at $0.1467 per kW.h for LNG and $0.2633 per kW.h for diesel as approved by YUB in Order 2018-10.

- Jan-April of 2019
  - The Rider E rebates for January 1 through March 31 of 2019 at $0.853 million resulting in balance of $2.526 million at April 1, 2019.

Attachment 2: 2017 and 2018 ERA Filing

Attachment 2, Table 1 provides the 2017 and 2018 actual ERA Filing and notes as follows:

- 2017 actuals:
  - No ERA is applicable for 2017 due to Order 2018-10 direction that 2017 test year revenue requirement reflect actual grid loads, grid generation and fuel costs.
- 2018 actuals:
  - Based on preliminary actuals, 2018 wholesales over GRA forecast results in added YEC costs of $1.464 million and added YEC revenues from increase in wholesale of $1.844 million. As a result, the change in revenues exceeds the change in costs, and no ERA amount is payable to YEC.

Attachment 3: Update on Forecast Water Conditions for 2019

Attachment 3 provides an update on forecast water conditions for 2019 as at mid-September and notes as follows:

- Aishihik Lake water level as of September 19, 2019 was 0.33 m below the historic median level largely due to lower snowpack over the winter of 2018/19. However, Aishihik watershed has experienced higher than average inflows in August and September 2019. If the average inflows continue in 2020 it is expected that Aishihik Lake will refill to just above the 25th percentile line by the end of the summer of 2020.

- Marsh Lake has experienced lower than average inflows over the summer of 2019. However, even with lower than average inflows, Marsh Lake has reached the Full Supply Level. Assuming average inflows into the Marsh Lake during reminder of the year, it is expected that Marsh Lake will draw down to just above the Low Supply Level by May 2020 and with average inflows in 2020 it is expected that Marsh Lake will refill to above the Full Supply Line by the summer of 2020.

- The elevation of Mayo Lake, as of September 17, 2019, was 663.49m which is only 0.24m above Low Supply Level. This is the lowest lake elevation observed on record for this time of year, largely due to low snowpack in the Mayo Lake watershed over the winter of 2018/19. In addition, Mayo Lake has experienced very low inflows

over the summer of 2019. Therefore, Yukon Energy submitted and was approved an emergency water licence amendment to reduce summer flows to 6 m^3/s which stopped the decent of Mayo Lake. Assuming low inflows into Mayo lake continue for the remainder of 2019, it is expected that Mayo Lake draw-down below the original Low Supply level of 663.25m but stay above the emergency water licence Low Supply level of 662.90m by May 2020.

If you have any questions regarding the above please contact the undersigned.

Yours truly,



Ed Mollard, CPA, CGA
Chief Financial Officer
Yukon Energy Corporation

ATTACHMENT 1: LWRF CALCULATIONS AND BALANCE UPDATES FOR 2017 AND 2018

Table 1: LWRF Calculations for 2017 and 2018

Table 1: LWRF calculations for 2017 and 2018

Line No		2017	2018		Notes
L1a	Diesel Fuel Cost per kW.h	26.743	26.333	cents/kW.h	GRA Application Average Fuel cost (2017/18 GRA Application)
L1b	LNG Fuel Cost per kW.h	17.790	14.668	cents/kW.h	
L1c	GRA YIS firm Load forecast	446,458	420,265	MW.h	
L1d	GRA LTA Thermal Generation forecast	13,261	16,355	MW.h	
Calculation of Thermal Cost to Charge (Refund) LWRF					
	Assumptions				
L2	YEC Grid load	446,458	450,086	MW.h	Actual
L3	Fish Lake	7,103	5,458	MW.h	Actual
L4=L2+L3	Total Grid load	453,561	455,544	MW.h	
	Assumed Actual Generation Sources				
L5	YECL Fish Lake	7,103	5,458	MW.h	Actual
L6	YEC Hydro	431,951	412,771	MW.h	assumed actual (L2-L7-L8)
L7	YEC Thermal	14,474	37,316	MW.h	Actual
	Diesel	4,618	7,186	MW.h	Actual
	LNG	9,856	30,130	MW.h	Actual
L7a	*YEC Diesel/LNG charged to capital, RFID and maintenance*	1,213	1,361	MW.h	Actual
L7a1	*Diesel*	995	1,003	MW.h	Actual
L7a2	*LNG*	218	358	MW.h	Actual
L7b=L7-L7a	*YEC Net Diesel/LNG*	13,261	35,955	MW.h	Actual
L7b1	*Diesel*	3,623	6,183	MW.h	Actual
L7b2	*LNG*	9,638	29,772	MW.h	Actual
L7b3=L7b1/L7b	*Diesel % of total net thermal*	*27%*	*17%*		
L8	YEC Wind	33	-	MW.h	Actual
L9	Total Grid load	453,561	455,544	MW.h	
	LTA Expected Generation Sources				
L10	YECL Fish Lake (expected)	7,103	8,391	MW.h	Based on YEC forecast in 2017/18 GRA [2017 is based on actuals].
L11	YEC Wind (expected)	33	-	MW.h	
L12=L9-L10-L11	YEC Grid load net of expected Fish Lake and Wind	446,425	447,153	MW.h	
L13=L12-L1c+L11	Load Variance	0	26,889	MW.h	
L14	LTA Thermal Generation at Actual Load	13,261	31,391	MW.h	Estimated based on LWRF Term Sheet
L15=L17/L14	Actual Thermal Generation as % of LTA Thermal Generation at Actual Load	100%	115%		
*L16=L1d*L15*	Estimated Actual Thermal Generation at Forecast Load	13,261	18,733		
L17=L16	Estimated Actual Thermal Generation at Forecast Load	13,261	18,733	MW.h	
L17a	Diesel	*3,623*	*3,221*	MW.h	Total thermal less LNG below.
L17b	LNG	*9,638*	*15,511*	MW.h	90% of total thermal, subject to not exceeding total thermal less estimated diesel forecast load.
L18=L1d	Forecast YEC Net Thermal Generation	13,261	16,355	MW.h	
L18a	Diesel	*3,623*	*1,636*	MW.h	
L18b	LNG	*9,638*	*14,720*	MW.h	
L19=L17-L18	YEC Thermal Generation to be included in LWRF	- 0	2,378	MW.h	
L19a	YEC Diesel Generation to be included in LWRF	-	1,586	MW.h	
L19b	YEC LNG Generation to be included in LWRF	-	792	MW.h	
L20=L1axL19a+L1bxL19b	Incremental YEC Thermal Generation Cost to Charge (Refund) LWRF ($000s)	$0	$534		

Table 2: LWRF Continuity Schedule

Line	Activity	2017 ($000s)	2018 ($000s)
A	**Opening Balance[1]**	**$9,485**	**$6,710**
B	Incremental Diesel Generation Cost to Charge/(Refund)[2] to LWRF	$0	$534
C=B	Total LWRF operation for YEC		
	YEC pays to LWRF	$0	$0
	YEC withdraws from LWRF	$0	($534)
D=A+C	**LWRF Balance after Annual Operation**	**$9,485**	**$6,176**
E	**Interest on LWRF Balance[3]**	**$86**	**$76**
F=D+E	**LWRF Balance after Interest charge**	**$9,571**	**$6,253**
G	**Rider E (Rebate)/Collections [January - December]**	**($2,861)**	**($2,874)**
H=F+G	**LWRF Ending Balance**	**$6,710**	**$3,379**
I	**LWRF (Rebate)/Collections January - March 31, 2019**		**($853)**
J=H+I	**LWRF Balance, After (Rebate)/Collections to March 31**		**$2,526**
K	**LWRF Cap [4]**		**`+/-8000**
L=J-K	**LWRF Rebate/(Collections) Required**		**$0**

Notes:
1. Opening Balance is based on 2016 DCF ending balance as provided in DCF 2016 Annual Filing.
2. Based on calculations in Table 1.

3. Per the March 11, 1996 letter recording the settlements [provided as Exhibit B-16 in the 2008/2009 GRA] the DCF fund is to attract interest based upon the short/intermediate term bond rates in which the Companies may invest the fund and any negative balances would only attract interest at the lowest short-term borrowing rate available to the Companies through a line of credit.

4. LWRF cap based on LWRF Term Sheet, YEC 2017-18 GRA Compliance Filing, Appendix 2.1, Attachment 2.1-1.

ATTACHMENT 2: 2017 and 2018 ERA FILING

Table 1: ERA Determination for 2017 and 2018

		2017	2018	
A	**Wholesales Variance for AEY (MW.h)**			
	Actual wholesales	328,426	332,270	A1
	GRA approved wholesales assuming Fish Lake LTA generation	328,426	314,700	A2 [See note 1]
	Fish Lake generation adjustment (expected LTA less actual)	0	2,933	A3 [See note 2]
	Change in wholesales for ERA	**0**	**14,637**	A4=A1-A2-A3
B	**YEC Cost Impact per kW.h change in Wholesales**			
	Losses (%)	8.06%	9.34%	B1 [Actuals]
	Total YEC's actual generation net of secondary (MWh)	446,493	450,086	B2 [See note 2]
	GRA approved firm load forecast (MWh)	446,493	420,265	B3 [See note 1]
	YEC incremental generation relative to GRA approved (MW.h)	0	29,821	B4=B2-B3
	YEC's actual Thermal Generation not funded by LWRF (MWh)	13,261	33,577	B5 [See note 2]
	GRA LTA Thermal Generation (MWh)	13,261	16,355	B6 [See note 1]
	YEC Incremental thermal generation relative to GRA approved (MWh)	0	17,222	B7=B5-B6
	Incremental thermal generation for incremental total generation (%)	0.00%	57.75%	B8=B7/B4
	Thermal Generation cost per GRA ($/kW.h)	0.2024	0.1583	B9 [See note 2]
	YEC thermal cost change ($/kWh wholesales)	**0.0000**	**0.1000**	B10=B9*B8*(1+B1)
C	**YEC Revenue Impact per kW.h change in Wholesales**			
	Rate Schedule 42 Energy Charge ($/kW.h wholesales)	**0.08298**	**0.08298**	C1
	Average YEC rider applicable to AEY retails ($/kWh wholesales)	**0.01975**	**0.02636**	C2 [See note 3]
D	**Net thermal cost impact on YEC ($000)**			
	Wholesale Change: Cost Impact (YEC thermal generation costs)	**0**	**1,464**	D1=A4*B10
	Wholesale Change: Revenue Impact (YEC revenues)	**0**	**1,844**	D2=A4*(C1+C2)+A3*C1
	Cost change>revenue change ("Yes"=1, "No"=0)	**1**	**0**	D3=is D1>D2 (absolute)
	ERA Charge (rebate) to AEY [Net added cost (cost saving) for YEC]	**0**	**0**	D4=D3*(D1-D2)

Notes:

1. 2017 is based on actuals as per YUB Order 2018-10; 2018 forecast as directed by YUB in Order 2018-10 [both subject to 2017/18 GRA Compliance Filing approval].
2. Please see LWRF calculations in Table 1 for actual thermal generation numbers. B5 for 2018 equals actual 2018 thermal less LWRF funded water availability impacts at forecast load. 2017 thermal cost reflects actual weighted average costs.
3. YEC Rider J revenues include actual Rider J [pre-2017/18 GRA] plus increase in Rider J based on YEC's 2017/18 GRA Compliance Filing. Average Rider is estimated total Rider J revenues [including 2017/18 GRA increase] from AEY retail customers divided by wholesales net of Fish Lake adjustments.

yukon energy

MEMO

From: Kevin Maxwell
To: Andrew Hall
Date: 17 September, 2019
Pages: 6
Subject: 2019 Water Availability Forecast

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Whitehorse, YT Y1A 3A1

Phone: (867) 393-5300
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Dear Mr. Hall,

1.0 Reservoir Water Levels

The historic and forecast reservoir water levels for the three Yukon Energy reservoirs Aishihik, Marsh and Mayo are shown in Figures 1-3. In addition to the figures a description of the current elevations relative to historical elevations are discuss below. These figures show actual water elevation to Sept 16, 2019 and the expected forecasted elevation based on average historic inflows[1] for the balance of the year shown with the orange dotted line. Historic water levels for each reservoir are shown in grey:

- The solid grey line shows the median historic water level
- The light grey shaded area shows the Min-Max rage of water levels
- The medium grey shaded area shows the 25th-75th percentile water level

The following trends can be observed with the current water levels:

Aishihik Lake: The elevation of Aishihik Lake, as of September 17, 2019, was 914.477m or 0.683m below Full Supply Level. This water level is 0.33m below the historic median level (grey line in figure 1), largely due to low snowpack over the winter of 2018/19. However, the Aishihik watershed has experienced higher than average inflows in August and September 2019. This has allowed Aishihik to recover to just below the 25th percentile line. Assuming average inflows into the Aishihik Lake during reminder of the 2019, we expect that Aishihik will draw-down to 913.6m elevation in May 2020. If we continue to have average inflows in 2020 we expect that Aishihik Lake will refill to just above the 25th percentile line by the end of the summer of 2020.

[1] Mayo Lake inflows are based on P10 (low) inflows for the balance of 2019 because the extreme low inflows observed in the summer of 2019

Marsh Lake: The elevation of Marsh Lake, as of September 17, 2019, was 656.137m, which is just below Full Supply Level of 656.23m, as seen in Figure 2. Marsh has experienced lower than average inflows over the summer of 2019. However, even with lower than average inflows, Marsh Lake has reached the Full Supply Level. Yukon Energy will continue to operate Marsh Lake gates to maintain this lake elevation to the end of Oct 2019 when Marsh Lake will start to draft down. Assuming average inflows into the Marsh Lake during reminder of the year, we expect that Marsh Lake will draw down to just above the Low Supply Level of 653.80 by May 2020. If we continue to have average inflows in 2020 we expect that Marsh Lake will refill to above the Full Supply Line by the summer of 2020.

Mayo Lake: The elevation of Mayo Lake, as of September 17, 2019, was 663.49m which is only 0.24m above Low Supply Level. This is the lowest lake elevation observed on record for this time of year, largely due to low snowpack in the Mayo Lake watershed over the winter of 2018/19 (refer to Figure 3). In addition, Mayo has experienced very low inflows over the summer of 2019. Yukon Energy submitted and was approved an emergency water licence amendment to reduce summer flows to 6 m3/s which stopped the decent of Mayo lake. This has allowed Yukon Energy avoid reducing the lake level below the Low Supply during the salmon spawning period in the lower Mayo River prior to September 30th. Assuming low inflows into Mayo lake continue for the remainder of 2019, we expect to see Mayo lake draw-down below the original Low Supply level of 663.25m but stay above the emergency water licence Low Supply level of 662.90m by May 2020. If we receive average inflows in 2020, we expect to see Mayo Lake refill to 665.6m, 0.24m below the Full Supply Level by the summer of 2020.

Figure 1: Aishihik Lake Elevations

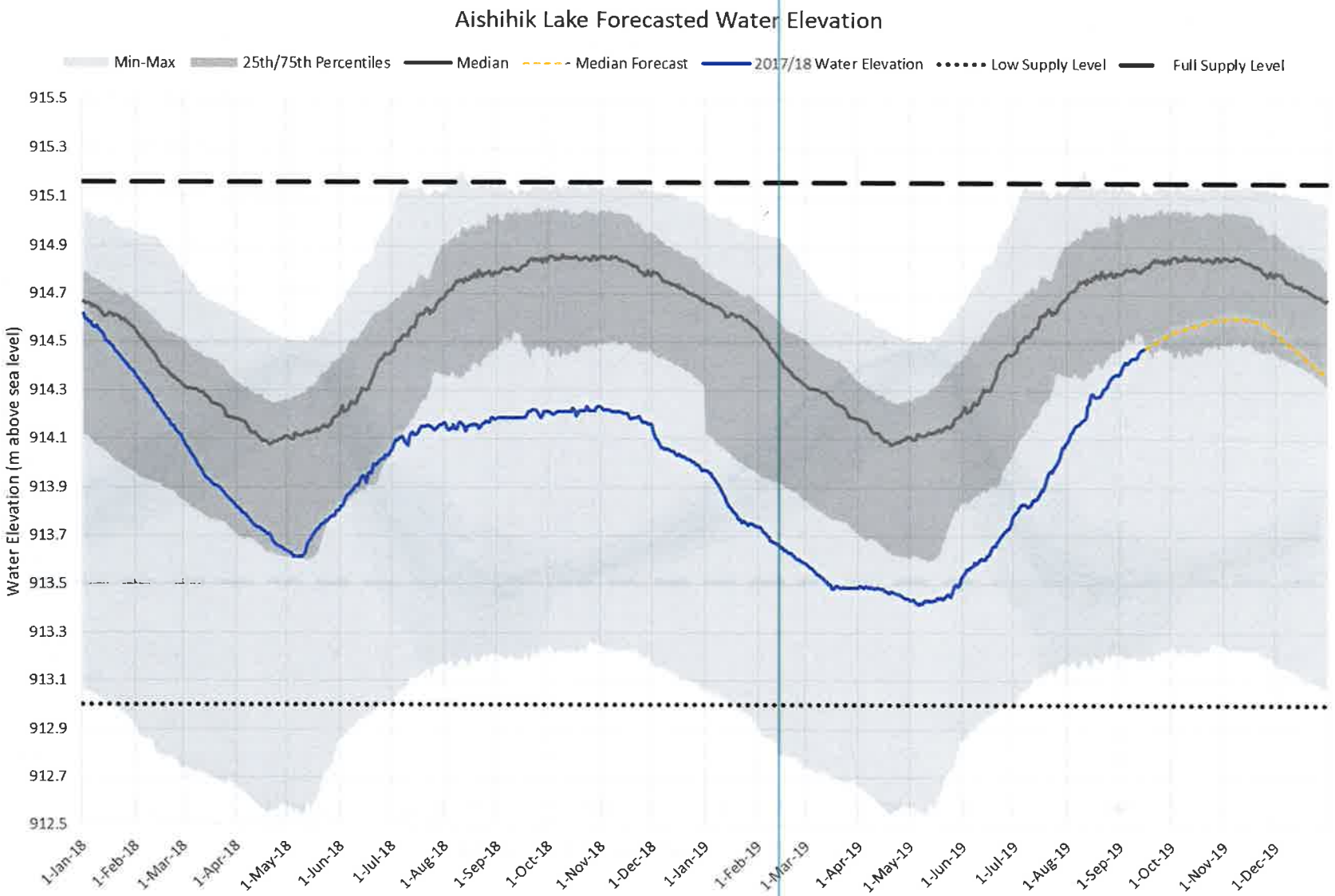


Figure 2: Marsh Lake Forecasted Elevations

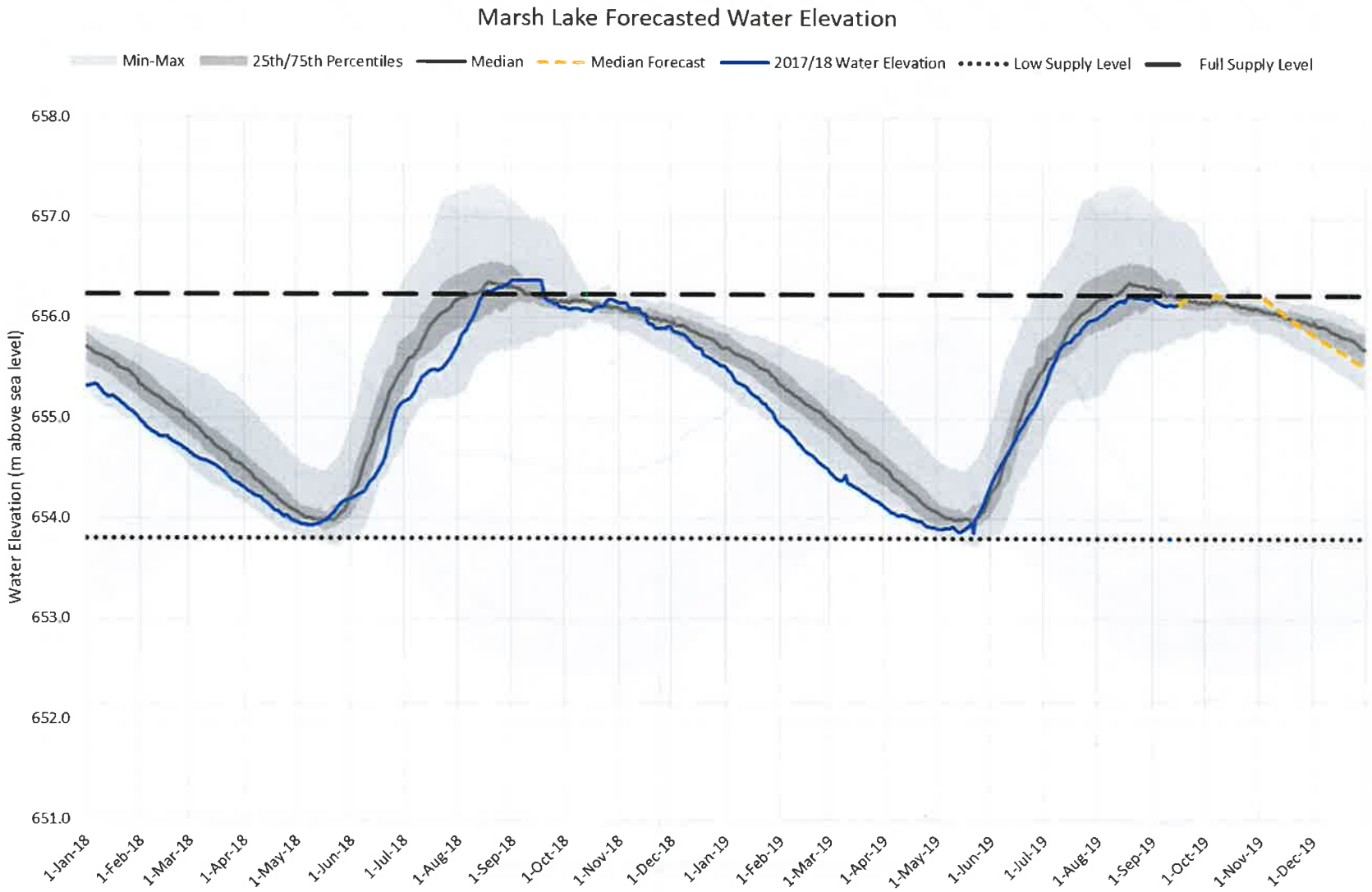
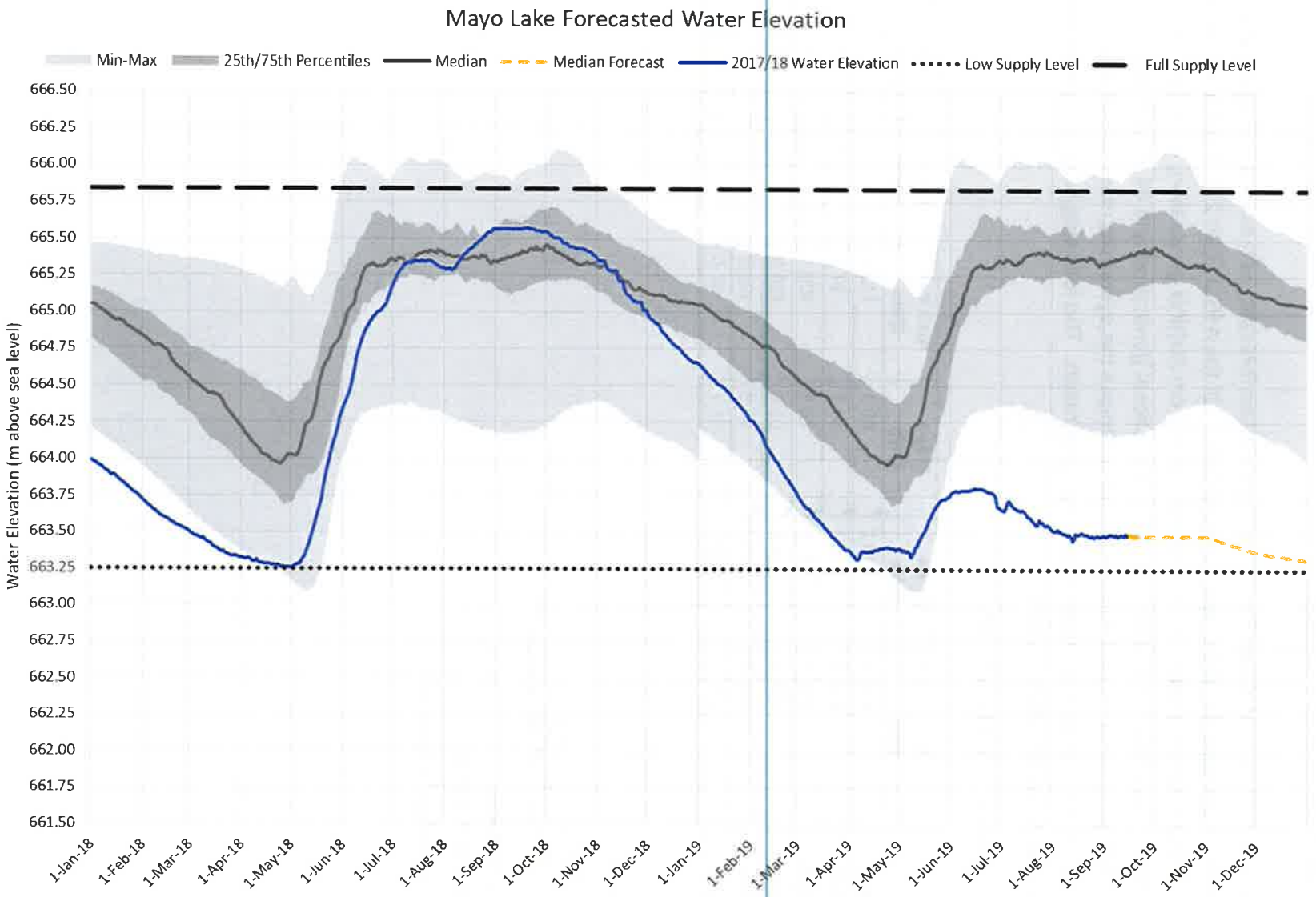


Figure 3: Mayo Lake Forecasted Elevations Mayo Lake Forecasted Elevations



2.0 **2019 Generation Forecast**

The present 2019 total Yukon Energy grid generation forecast, with actuals to August and forecast for the balance of the year is 446.0 GWh. Of the 446.0 GWh 239.5 GWh will come from Whitehorse generation, 97.5 GWh will come from Aishihik generation, 41.7 GWh will come from Mayo Generation, 3.0 GWh will come from Diesel generation and 64.3 GWh will come from LNG generation. Yukon Energy always optimizes the system to maximize Hydro generation with the goal to minimize thermal generation. The following table compares the 2019 year to the previous 5 years.

Table 1: 2014 to 2019 Yearly Generation

	Total Generation GWh	Whse GWh	Mayo GWh	Aishihik GWh	Wind GWh	LNG GWh	Diesel GWh
2014	402.3	219.2	69.1	112.1	0.3	-	1.6
2015	418.0	234.1	81.1	97.3	0.6	1.3	3.6
2016	418.1	232.8	78.5	100.1	0.5	3.3	2.9
2017	455.6	224.6	59.6	156.9	0.0	9.9	4.6
2018	450.4	228.7	57.6	126.7	-	30.1	7.2
2019	446.0	239.5	41.7	97.5	-	64.3	3.0

Regards,

Kevin Maxwell
Resource Planner
Yukon Energy Corporation