APPLICATION TO THE YUKON UTILITIES BOARD ("YUB") REGARDING THE POWER PURCHASE AGREEMENT ("PPA") BETWEEN YUKON ENERGY CORPORATION ("YEC") AND VICTORIA GOLD CORP. AND STRATAGOLD CORPORATION (COLLECTIVELY "VGC GROUP")

November 10, 2017

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1.0 INTRODUCTION

Yukon Energy Corporation ("Yukon Energy" or "YEC") is seeking an Order from the Yukon Utilities Board ("YUB" or "the Board") for required approvals related to the implementation of the Power Purchase Agreement ("PPA") that Yukon Energy has recently concluded with Victoria Gold Corp ("VGC") and StrataGold Corporation ("StrataGold") (VGC and StrataGold are collectively the "VGC Group"). The PPA is provided as Attachment A to this Application.

VGC Group has successfully completed environmental and Yukon Water Board reviews and permitting for the Eagle Gold Project (the "Mine") to be located on the Dublin Gulch property approximately 40 km north from Mayo (the "Mine Site"). Permitting for the Mine assumed electricity supply from the Yukon Energy grid, with diesel generation of less than 5 MW on site for emergency and other use as required. VGC Group is securing financing, as required, to proceed with the development of the Mine within a two-year time period. VGC Group completed $40 million of site civil works in 2017, and site construction is currently targeted to resume by Q2 2018 with earliest potential operation of the Mine in Q2 2019. Mine operation based on existing reserves is forecast for ten years. When Mine operations end, rinsing the Heap Leach Pad will occur for one to two years followed by active closure activities for approximately three years.

The PPA provides for sale by YEC to the VGC Group of Grid Electricity required to operate the Mine. Commencement of Delivery of Grid Electricity to VGC Group is presently estimated in March 2019, during commissioning activities for the Mine. VGC Group is expected to start service as a Major Industrial Customer[1] shortly after Commencement of Delivery, and prior to full operation of the Mine.

Yukon Energy's Application to the Board for the approval of the PPA addresses the following matters:

- Overview of the PPA;
- Requested Approvals;
- Context for the Current Filing;
- PPA Agreement; and
- Impacts on Grid and Ratepayers.

2.0 OVERVIEW OF THE PPA

The PPA sets out the rights and obligations of VGC Group and YEC with respect to the sale and purchase of Grid Electricity for the Mine, subject to the fulfilment of the Conditions in Section 3.1. The PPA provisions are generally consistent with similar agreements approved by the Board between YEC and Minto Explorations Ltd. ("Minto"), and between YEC and Alexco Resources Corp. ("Alexco").

[1] OIC 1995/90 defines a major industrial customer as "a customer engaged in manufacturing, processing or mining, whose demand for electricity exceeds 1 MW, but it does not include an isolated industrial customer." Rate Schedule 39 applies to service provided by YEC to any Major Industrial Customer.

VGC Group's environmental permitting for the Mine includes provision for a 69 kV transmission line (the "Mine Facilities Spur") that, pursuant to the PPA, VGC Group will develop and own to connect the Mine Facilities to a substation (the "McQuesten Substation") to be located along YEC's existing 69 kV transmission line between Mayo and Keno City at approximately the junction of the South McQuesten Road and the Silver Trail Highway. Due to the Mine Facilities Spur being owned and operated by VGC Group, the PPA does not require any provisions for decommissioning costs related to any YEC facilities.

The McQuesten Substation is to be developed by VGC Group and YEC, but owned and operated by YEC, in accordance with the provisions of Schedule B of the PPA. YEC has completed environmental review and permitting for the McQuesten Substation, as an element of the successfully completed Stewart Keno City Transmission Line Project ("SKTP") environmental review and permitting. Except as otherwise specified in the PPA,[2] VGC Group is responsible for all capital costs related to the McQuesten Substation development.

Prior to Commencement of Delivery, the PPA requires completion of the McQuesten Substation, confirmation that the Mine Facilities and the Mine Facilities Spur are available to receive Grid Electricity from YEC, and completion of the following additional provisions:

- YEC to complete Initial YEC System Improvements on YEC's existing power system to accommodate the sale of Grid Electricity for the Mine as provided for in Schedule C;
- VGC Group to install VGC Group Power Facilities at the Mine Facilities, and to operate these facilities as specified, as provided for in Schedule D in order to manage impacts on the YEC power system from the sale of Grid Electricity for the Mine; and
- YEC and VGC Group to finalize an Operating Agreement, a draft of which is provided in Schedule E.

The PPA specifies standards for usage of Grid Electricity by VGC Group, including regulation of its electrical load in accordance with the Power Quality Requirements of YEC as set out in Schedule F.

In order to accommodate VGC Group's timing for development, Grid Electricity will be supplied initially by YEC to the Mine from the existing Transmission Facilities located between Mayo and McQuesten Substation. The Parties recognize in the PPA that these existing Transmission Facilities are at, or near, their end of life and must be upgraded (the "Transmission Facilities Development") within approximately the next three years in order for YEC to reliably deliver Grid Electricity to the Mine Facilities. The PPA provides two options for securing the required Transmission Facilities Development (under both options, the SVC/Statcom will be installed at the Stewart Crossing Substation):[3]

1. Subject to federal and Yukon government funding being confirmed by September 30, 2018, YEC plans to proceed with the SKTP that would include Transmission Facilities Development to provide

[2] The PPA provides for VGC Group to recover from YEC the incremental fees, costs and expenses associated with the McQuesten Substation, as initially developed, being able to operate at 138 kV voltage ("YEC McQuesten Substation Costs" as specified in Schedule B of the PPA).
[3] Environmental review and permitting that has been completed for SKTP accommodates both options.

138 kV Transmission Facilities by March 31, 2021 connecting the McQuesten Substation with a substation at Stewart Crossing; or

2. If such external funding cannot be committed by September 30, 2018, YEC will seek approval for plans to provide the required Transmission Facilities Development by June 30, 2020 with new 138 kV Transmission Facilities connecting Mayo and the McQuesten Substation, to be operated at 69 kV until such time as 138 kV operation becomes feasible, i.e., a 138 kV line is developed to connect Mayo with Stewart Crossing.

The PPA sets out in Section 5.1 the Grid Electricity to be delivered by YEC to VGC Group, subject to the Maximum Electric Demand amounts specified before and after the Transmission Facilities Development, and a load Power Factor requirement of 96% leading.

The PPA provides in Section 6.1 for YEC to recover from VGC Group its reasonably incurred YEC Capital Costs for the following:

- YEC's costs to negotiate and conclude the PPA;
- YEC's capital costs for the McQuesten Substation development ("YEC's Owners Costs") as specified in Table B-1 of Schedule B to the PPA;
- The Initial YEC System Improvements capital costs of YEC as set out in Schedule C of the PPA; and
- YEC's costs for the Step Down Transformer to be located at the McQuesten Substation and designed to step down from 138 kV to 69 kV, if it is determined to be required.

The PPA provides for VGC Group to pay the Firm Mine Rate as approved by the Board from time to time, including a Fixed Charge that is adjusted on an ongoing basis to equal 85% of the Transmission Facilities Fixed Cost as approved by the Board from time to time to reflect changes in YEC rate base costs for the Transmission Facilities. Provision is included for the VGC Group Fixed Charge also to be adjusted when an Other Industrial Customer utilizes the Transmission Facilities.

3.0 REQUESTED APPROVALS

The PPA specifies that the obligations of the Parties are subject to the fulfillment of Conditions set out in Section 3.1 of the PPA, including YUB approval by February 28, 2018 of the following PPA provisions:

1. The customer contribution payments by VGC Group to YEC under Section 6.1 of the PPA for YEC Capital Costs, including payments for:
    - Actual YEC Capital Costs for negotiation and conclusion of the PPA Agreement, estimated at $200,000;
    - Actual YEC Capital Costs for the Initial YEC System Improvements, currently estimated at $1,677,883;
    - Actual YEC Owner's Costs for the McQuesten Substation, currently estimated at $483,240; and

- Actual YEC costs reasonably required for design, engineering, procurement, construction and commissioning of the Step Down Transformer at the McQuesten Substation, should one be determined to be required.

2. The Fixed Charge provisions as set out in Section 7.7 of the PPA, including the initial Transmission Facilities Fixed Cost of $118,621 per year, as documented in Attachment B to this Application, for use in determining the Fixed Charge under Section 7.7, and provisions to amend the Transmission Facilities Fixed Cost after the Transmission Facilities Development Operation Date based on YEC's adjusted annual costs as approved by the Board for depreciation and return on rate base related to the Transmission Facilities (which includes the Transmission Facilities Development) plus the SVC/Statcom and YEC's McQuesten Substation Costs ($930,563 as per section 6.1(d) and Schedule B of the PPA).[4]
3. Any related amendments to the Rate Schedule 39 Firm Mine Rate as required to conform with Attachment A to this Application and to accommodate the PPA.

4.0 CONTEXT FOR CURRENT FILING

The existing regulatory and grid context for the current proceeding includes well-established and accepted principles for connecting industrial loads to the Yukon Integrated System (the "YIS").

4.1 EXISTING GRID CONTEXT

The YIS includes the 138 kV Whitehorse – Aishihik – Faro (WAF) and 69 kV Mayo-Dawson-Keno (MD) grids and the 138 kV Carmacks-Stewart Transmission Line (CSTL) that, since 2011, has connected the WAF and MD grids. The YIS has 92 MW of installed YEC hydro generation, of which approximately 70.5 MW can be relied upon for the winter peak.[5] In 2011, generation on the northern grid was expanded through the completion of the Mayo Hydro Enhancement Project which increased generating capacity for the Mayo Hydro Facility from 5 MW to over 10 MW. In 2015, 8.8 MW of LNG thermal capacity was added to the grid in Whitehorse, and by 2019 this LNG thermal capacity will be increased to approximately 13 MW with completion of the LNG Third Engine project.

Yukon Energy provides power to major industrial customers connected to the 69 kV or 138 kV grid. There is currently only one primary industrial load on the YIS – the Minto mine. Alexco's Bellekeno mine and related mill were connected to the grid in 2010 but have not operated since mid-2013. Yukon Energy also provides electricity utility distribution services in and around Mayo, Dawson and Faro.

Yukon Energy's General Rate Application (GRA) for the 2017 and 2018 Test Years includes forecast generation for firm sales with continued Minto mine operation at 420.4 GW.h in 2017 and 421.2 GW.h in 2018.

[4] The YEC McQuesten Substation Costs will be held in WIP until the Transmission Facilities Operation Date. Under the PPA provisions, these costs will then be included in the Transmission Facilities Fixed Cost per year, with 85% of the annual cost included in the Fixed Charge (or shared between VGC Group and any Other Industrial Customers).
[5] Includes 24.5 MW at Whitehorse GS, 37 MW at Aishihik GS, and 9 MW at Mayo GS.

- Minto mine load (purchases) for 2017 and 2018 was forecast at 38.2 GWh/year. It was noted in the GRA that the Minto mine is currently expected to operate through to at least 2020; based on past information, the mine might continue operation until approximately 2022.
- Alexco mine load was considered too uncertain to be included in GRA test year forecasts, however, Alexco continues to have prospects to renew mining in the Keno region, including exploration activities which, if successful, will allow the mine to optimally operate the existing mill infrastructure.[6] Based on current information, if Alexco's loads resume in 2019 these loads could approximate 19 GW.h/year in 2020 and 22 GW.h in 2021 and several subsequent years.
- Overall non-industrial firm sales are forecast in the GRA at approximately 349 GW.h in 2018.[7]
- Non-industrial firm peak loads are forecast in the GRA at approximately 86 MW in 2018. Available evidence indicates that this reflects continued growth in the non-industrial firm winter peak due to adoption of electric heating in almost all new residential units.

Yukon Energy's annual thermal generation costs for setting rates as approved by the Board are based in the YEC's last and current GRA on expected thermal generation required based on long-term average (LTA) annual hydro generation availability.

The Yukon Energy 2016 Resource Plan's updated load forecast scenario with "Very Low Industrial Activity" (i.e., no industrial loads after 2017) highlighted a drop in firm energy generation load in 2019 to about 383 GW.h absent the Minto mine operation and any other Major Industrial loads, and limited growth thereafter absent connection of industrial loads (i.e., forecast Yukon Energy firm generation at 395 GW.h in 2022, 431 GW.h in 2030, and declining to 424 GW.h in 2035). However, the 2016 Resource Plan indicated that non-industrial peak load is expected to continue increasing more quickly than firm generation load through at least the next decade.

The GRA and the 2016 Resource Plan indicate a dependable capacity shortfall on the YIS today, and continuing until adequate new dependable capacity is installed, based on the single contingency (N-1) criterion. Connection of the Mine and other potential industrial loads will not affect the dependable capacity planning assessments based on the N-1 criterion, as this criterion excludes consideration of winter peak industrial loads. Dependable capacity on the YIS currently satisfies the Loss of Load Expectation (LOLE) capacity planning criterion so long as the N-1 criterion is met, and connection of the Mine is not expected to change this assessment (particularly in light of the expectation, as set out in section 5.1(d) of the PPA, that Mine Electric Demand during an approximate 90 day period between December 1 and March 31 of every year will be reduced so as not to exceed approximately 6,000 kV.A).

[6] Alexco recently announced that it is beginning to develop the Keno Hill project for production over at least eight years, and that achieving start of production by the summer of 2018 will largely depend on ability to secure the necessary permits. Commodity and credit markets will also influence the possible return of this customer. While Alexco has publicly stated a desire to resume industrial mining activities by late 2018, YEC, to date, has received no official notification. YEC understands that it has the necessary PPA with Alexco to accommodate any likely renewed major industrial sales.

[7] Firm wholesales are forecast in the GRA at 309.0 GW.h for 2017 and 309.5 GW.h for 2018, assuming more normalized temperature conditions rather than the warmer-than-normal weather experienced since 2013, as well as updates to AEY's forecasts for Fish Lake hydro generation. In response to YUB-YEC-1-3 in the GRA, YEC updated the wholesale forecast to conform with the Board's approved 2017 forecast of 314.2 GW.h for the AEY GRA Compliance Filing (the updated forecast for 2018 is 315.8 GW.h).

4.2 EXISTING REGULATORY CONTEXT

The VGC Group PPA with YEC takes place in an existing regulatory context with well-established principles for the interconnection of industrial loads to the YIS, that have been reviewed as part of the 2007 Minto PPA proceeding; the 2009 Phase II Rate Application; and 2010 Alexco PPA proceeding.

The existing regulatory context for the current PPA application includes the following fundamental aspects of rate regulation in Yukon:

1. **Yukon Rate Policy regarding industrial customers as established by OIC 1995/90 and subsequent amendments to OIC 1995/90 –** OIC 1995/90 defines a major industrial customer as "a customer engaged in manufacturing, processing, or mining, whose peak demand for electricity exceeds 1 MW, but it does not include an isolated industrial customer." The OIC also establishes in Section 6(1) that the Board "must ensure that the rates charged to major industrial power customers, whether pursuant to contracts or otherwise, are sufficient to recover the costs of service to that customer class; those costs must be determined by treating the whole Yukon as a single rate zone and the rates charged by both utilities must be the same."

   PPA's for Minto and Alexco were approved on the understanding that, based on available information, major industrial customers as a class are paying rates under Rate Schedule 42 (with applicable rate riders) that conform to the OIC 1995/90 directions. The last cost of service analysis for Yukon, which was developed jointly by YEC and YECL for the 2009 GRA test year, indicated that major industrial customers were paying rates considerably in excess of allocated costs of service determined in accordance with OIC 1995/090 (including treating the whole Yukon as a single rate zone) and in accordance with normal regulatory principles applicable to similar regulated electricity utilities in Canada.[8]

2. **Terms and Conditions of Service for Industrial Customers -** Extension of electric power service to new customers seeking to connect to the YIS is governed by Terms and Conditions of Service approved by the YUB for Yukon Energy and AEY. Maximum Utility Investment Levels (MILs) for connecting new residential, commercial and industrial customers were last reviewed in the joint Yukon Energy and Yukon Electrical 2009 Rate Application and approved in Order 2011-05. The current industrial MIL policy for Yukon, as approved by the YUB, focuses on the following:

   - Maximizing potential industrial customer investment to new transmission facilities developed to extend service to them; and
   - Retaining direct assignment of annual capital-related transmission costs for existing facilities, where appropriate, based on past practice in Yukon.

   This policy reduces the risk of adverse ratepayer cost impacts to other utility ratepayers for new capital costs needed to connect a new major industrial customer, while facilitating enhanced

[8] The Compliance Filing by YEC and YECL in February 2011 included an updated cost of service estimate (Table 1) for 2009 indicating a Revenue/Cost ratio for Industrial of 111.4% per the Application and 113.7% per Order 2010-13. Board Order 2011-05 stated that the Board does not accept the Cost of Service as filed by the Companies, and "that the revenue-to-cost ratios derived from the application are without merit."

transmission facility development where this is feasible to reduce costs for major new industrial loads. Section 5.7 of the PPA provides that the Terms and Conditions of Service apply to the Parties with regard to Grid Electricity delivered by YEC to VGC Group under the PPA including, without limitation, the provisions regarding the responsibility and liability of each Party. If there is an inconsistency between the Terms and Conditions and this Agreement the Terms and Conditions will govern.

3. **Precedents for negotiated Power Purchase Agreements established for Minto mine (2007) and Alexco mine (2010) –** The Minto mine PPA was the first Power Purchase Agreement approved since the closure of the Faro mine, and established core principles for connecting industrial loads to the integrated grid. Incremental capital costs associated with specific transmission, substation and other related facilities required to connect the Minto and Alexco mines were recovered directly from each mine in accordance with the Power Purchase Agreement reviewed and approved by the YUB for each mine after a public hearing review. The Alexco mine and mill also paid YEC's costs to negotiate that mine's PPA and a Fixed Charge each year that it was in operation based on 85% of the annual fixed costs for the Mayo-Keno transmission facilities used to supply power to Alexco, pursuant to the approved PPA[9].

4.3 EXISTING PLANNING CONTEXT: STEWART KENO TRANSMISSION PROJECT (SKTP)

A new line from Mayo to the Keno City region is required to replace the end of life existing 69 kV line constructed in the 1950's.[10]

In the early 1990s, Yukon Energy noted that the line was significantly deteriorated and needed to be rebuilt or abandoned due to safety and reliability concerns;[11] however, at the time a rebuild could not be justified due to the closure of UKHM. As an alternative, minimal capital improvements were undertaken at that time to maintain the line and ensure continued service to existing non-industrial customers;[12] and over the past

[9] Board Order 2010-14, Appendix A: Reasons for Decision, approved the Fixed Charge determination for the Alexco PPA, including the direct transmission allocation (85%) as applied for. The Board noted that the comparison to the Faro mine situation when determining fixed charges for transmission line costs was the best available evidence for that proceeding.

[10] A 5 MW hydro facility at Mayo and 69 kV transmission line between Mayo and Keno City (L250) were initially built in the 1950's by Northern Canada Power Commission (NCPC) to provide electricity to the United Keno Hill Mine (UKHM). The Mayo to Keno City line remained in service after the closure of UKHM (in the late 1980's) in order to service smaller local loads that developed along this transmission line. There are approximately 23 non-industrial customers currently connected to the line between Mayo and Keno City (L250).

[11] The Yukon Energy 1992 Resource Plan notes "This line was built in 1952 with untreated native poles, which have long since rotted at ground level. Virtually every pole on this line has been stubbed (a small pole attached at ground level) or cribbed (a rock filled culvert or container added) over the last forty years. The line was identified as a severe safety hazard for Company employees and the general public."

[12] In its 1992 Resource Plan, Yukon Energy noted that "it was recognized for many years, by both NCPC and YEC, that the Mayo-Elsa-Keno City transmission line urgently needed to be either re-built or abandoned." At the time, it was noted that "this project just could not continue to be deferred indefinitely," and "essential work had to be performed to ensure the safety of the line." The option of abandoning the transmission line was considered and discarded at the time for the following reasons: (1) Additional loads are also supplied from this line, via Keno City, CBC and NWTel tower sites, Silver Trail Lodge and a number of YTG Highways heat traces in culverts; and (2) The cost of diesel generation would be at least $250,000 per annum based on approximately 2.5 kWh consumption at 10 cents per kWh by UKHM.

fifteen years transmission line repairs have been required on an ongoing basis to address reliability concerns.

Yukon Energy is pursuing the SKTP at this time to improve the electrical transmission infrastructure in central Yukon between Stewart Crossing and Keno City; reinforce and strengthen the grid between Stewart Crossing and Mayo; and replace and remove deteriorated and 'end of life' transmission infrastructure between Mayo and Keno City. The project is being planned to ensure continued safe and reliable service and to facilitate future economic development within the territory.

- The SKTP as defined for environmental review and permitting, and/or for the engineering/costing work, included the following components:
    - 138 kV H-frame transmission line development involving the following segments:
        - L179 Stewart to Mayo (58 km) [the existing new 69 kV line would remain as well for this segment];
        - L180 Mayo to McQuesten (31 km) [to be operated at 138 kV]; and
        - L250 McQuesten to Keno City (20 km) [this segment would initially be operated at 69 kV].
    - Substation development at McQuesten (S258) as well as at Stewart Crossing South (S251) to accommodate the new line and an SVC/Statcom;[13] and at Mayo (S249) for fibre tie in.
    - Other elements including PT sites and structures and First Nation benefits.
- An initial $5.3 million tranche of funding was provided by the Yukon Government for the costs required to advance the project to a shovel ready stage by Q4 2016.
- Initial engineering, planning and assessment activities required to prepare and submit a Yukon Environmental and Socio-economic Assessment Act (YESAA) project proposal to YESAB were undertaken in Q3 and Q4 2015. A YESAA Project Proposal was filed before the end of 2015, with a YESAA Screening Report issued May 31, 2016. A Land Use application was submitted to the Yukon government and authorizations required to proceed with geo-technical and survey work to complete detailed engineering were obtained in September 2016.
- Preliminary design work oriented to confirming the technical ability to construct the project, and the timing and configuration of major project components has been undertaken, and has provided cost estimates within a +20-15% range. Detailed line design and detailed substation design contracts were competitively tendered and awarded in 2016, with this work completed in Q1 2017.

[13] The SVC/Statcom is a recent addition for system stability. It will be located with the Stewart Crossing South substation, and will not affect the environmental review and permitting for the SKTP.

Class 2 cost estimates (+15%, -10%) are as follows for the two options relevant to the PPA (each option includes $6.6 million estimate for SVC/Statcom at Stewart Crossing South substation):[14]

1. Full SKTP development: $90.96 million, including costs that VGC Group and/or YEC will fund for the McQuesten Substation pursuant to the PPA.[15]
2. L180 Mayo to McQuesten 138 kV line (assumed to be operated at 69 kV): $32.2 million, including costs that VGC Group and/or YEC will have funded for the McQuesten Substation pursuant to the PPA.[16]

YEC is exploring options to secure funding for the full SKTP (or portions thereof) up to 100% of full revenue requirement impact. A number of Federal infrastructure programs have been identified under which this project could qualify. YEC will work further with YDC and the Yukon government in pursuit of these options within the next several months. A decision will be undertaken in 2018 on whether to advance the full SKTP, once Yukon Energy has confirmed the potential funding availability.

Yukon Energy is also evaluating options for proceeding in the event that government funding cannot be secured for the full SKTP by September 30, 2018, including options for staged project development, with the initial stage to remove and replace deteriorated and 'end of life' transmission infrastructure between Mayo and McQuesten Substation, in the event that third party funding is not available.

- **Initial Stage of Development:** In this context, YEC is examining an option to replace just the Mayo-McQuesten portion of the Mayo to Keno City transmission line, which is at end of life and is considered the worst section of line between Mayo and Keno City. This initial step, combined with SPV/Statcom installation at Stewart Crossing South, will ensure reliability of service for the prospective Victoria Gold connection, while addressing the section of the existing YEC grid which is in the poorest condition.
- **Subsequent Stage of Development:** Further stages of the project would involve replacing the line between McQuesten and Keno City, and at some time thereafter, installing a new 138 kV line between Stewart Crossing and Mayo. The objective of this subsequent phase of the project would be to improve reliability along the whole length of the line (i.e., replace the McQuesten-Keno section), and increase the total transmission capacity of the line in response to additional (future) industrial load and/or local renewable resource supply development.

[14] Upgrading L180 from Mayo to McQuesten enhances transmission capability over this line to customers in the Keno region, including VGC Group and Alexco. Installing the SVC/Statcom at Stewart Crossing enhances the ability to import power from WAF to the MD grid. Both improvements are required to enable the higher Maximum Electric Demand for VGC Group of the PPA after the Transmission Facilities Development Operation Date (see Section 5.1 of PPA).

[15] The all in-costs estimated for the McQuesten Substation in this option is $9.869 million, with $8.939 million estimated to be funded by VGC Group under the PPA (includes $6.715 million estimate for initial substation, $0.884 million risk contingency, and future Step Down transformer cost estimate of $1.34 million); the balance of the McQuesten Substation costs of $0.930 million are to be funded by YEC under the PPA to facilitate initial development prior to the Transmission Facilities Development.

[16] Cost estimated for the McQuesten Substation in this option is $8.529 million (the lower cost compared to the first option is because there is no need for Step Down transformer); this cost is to be funded by VGC Group and YEC as outlined for the first option.

5.0 PPA AGREEMENT

This section reviews in more detail the following elements of the PPA:

- Conditions Precedent to the Agreement;
- Initial Activities and Key Milestones;
- Electricity and Maximum Electric Demand;
- YEC Capital Costs Recovered from VGC Group; and
- Firm Mine Rate & Fixed Charge.

5.1 CONDITIONS PRECEDENT TO THE AGREEMENT

The PPA includes provisions outlining the obligations of YEC and VCG Group and the Conditions that must be fulfilled for the PPA to be binding. Section 3.1 includes the following Conditions:

1. **VGC Group Demonstrates to YEC ability to Proceed by February 15, 2018** - VGC Group will have provided evidence satisfactory to YEC, acting reasonably, that VGC Group has sufficient funds or financing available and adequate approvals to proceed with the design, engineering, procurement, construction and commissioning of the McQuesten Substation, the Mine, the Mine Facilities and the Mine Facilities Spur on the schedule set out in this Agreement to enable the Mine Facilities Operation Date to occur on or before June 30, 2019. [Section 3.1(b)]
2. **YUB Approval of PPA by February 28, 2018** - The YUB will have approved the Agreement by February 28, 2018, including the Firm Mine Rate and the Fixed Charge on terms and conditions satisfactory to the Parties, acting reasonably. [Section 3.1(a)]
3. **VGC Group Commence Site Construction of Mine Facilities, Mine Facilities Spur and McQuesten Substation by May 15, 2018** - VGC Group will have provided evidence by May 15, 2018 satisfactory to YEC, acting reasonably, that VGC Group has commenced site construction of the Mine Facilities, the Mine Facilities Spur and the McQuesten Substation and is proceeding diligently and in good faith such that VGC Group is expected to achieve the Mine Facilities Operation Date under Section 3.1(b). [Section 3.1(c)]
4. **YEC Receipt of necessary Approvals for Transmission Facilities Development by September 30, 2018** - YEC will have received all approvals reasonably required by YEC from YDC, the Yukon Territorial Government and such other approvals as YEC may reasonably require to proceed with and complete the design, engineering, procurement construction and commissioning of the Transmission Facilities Development as set out in Section 4.5. [Section 3.1(d)]

The first two Conditions are for the benefit of both Parties and can only be waived, altered or the time period extended by agreement between the Parties. The other Conditions are for the benefit of YEC and relate to YEC's obligations to undertake the Initial YEC System Improvements upon execution and delivery of the Agreement in order to accommodate Commencement of Delivery in March 2019; and to proceed with the Transmission Facilities Development on or before October 1, 2018 as required under Section 4.5.

If YEC does not receive necessary approvals for the Transmission Facilities Development by September 30, 2018 [per Section 3.1(d)], it has no obligation to proceed with the Transmission Facilities Development as outlined in section 4.5 of the PPA agreement and the timelines therein specified; however, non-fulfilment of this Condition will not terminate the Agreement.

5.2 INITIAL ACTIVITIES AND KEY MILESTONES

Yukon Energy has an opportunity to interconnect a new industrial load in a manner that will facilitate timely replacement of the end-of-life transmission infrastructure between at least Mayo and McQuesten, and potentially also facilitate proceeding with additional necessary upgrades that will provide long term enhancement benefits to infrastructure on the northern grid. In order to ensure this opportunity can proceed to be developed on a timely basis and in a manner that mitigates risks to ratepayers, the following key development milestones are outlined in the PPA:

- **Requirements for Achieving Commencement of Delivery by March 2019:** Completion of the McQuesten Substation, the Initial YEC System Improvements, the VGC Group Power Facilities, and the Mine Facilities Spur is required for the Mine to be able to receive Grid Electricity from YEC for the targeted March 2019 Commencement of Delivery. As such, upon execution of the PPA and fulfilment of the relevant Conditions, the Parties will proceed with the following:
    - **McQuesten Substation:** Yukon Energy and VGC Group are working together to design, engineer, procure, construct and commission the McQuesten Substation [as set out in Schedule B of the PPA]. Yukon Energy and VGC Group have entered into the McQuesten Substation MOU provided in Schedule B to the PPA (the "MOU") to establish the formal relationship between the Parties and the commitments to enable the Parties to work together on tendering, procurement, construction, commissioning and eventual turnover of the McQuesten Substation to YEC. Pursuant to the MOU, (a) the McQuesten Substation design was directed and reviewed by YEC, (b) the VGC Group will order long lead equipment and undertake other steps as needed in Q4-2017 and Q1-2018 to protect the schedule for the McQuesten Substation development, and (c) thereafter VGC Group will undertake construction management and pre-commissioning activities. This facility will be built with capability to accommodate future connection of 138 kV transmission from Stewart Crossing or from Mayo. The target date for McQuesten Substation operation is February 28, 2019 in order to accommodate Commencement of Delivery of power to the Mine in March 2019. [See Section 4.2 and Section 4.3 of the PPA]
    - **Initial YEC System Improvements:** Yukon Energy will proceed to design, engineer, procure, construct and commission the Initial YEC System Improvements to facilitate Commencement of Delivery targeted for March 2019 [as set out in Schedule C of the PPA].
    - **Mine Facilities, Mine Facilities Spur and VGC Group Power Facilities:** VGC Group will also proceed to design, engineer, procure, construct and commission the Mine Facilities, the Mine Facilities Spur and the VGC Group Power Facilities to facilitate Commencement of Delivery targeted for March 2019 [as set out in Schedule D of the PPA].

- **Scope and Timing for Transmission Facilities Development [to be confirmed by October 1, 2018] -** The Transmission Facilities must be upgraded to ensure ongoing reliable delivery of Grid Electricity to the Mine Facilities after Commencement of Delivery. Subject to securing required approvals from YDC and the Yukon Territorial Government, Yukon Energy will proceed with design, engineering procurement, construction and commissioning of the Transmission Facilities Development. The scope of the Transmission Facilities Development will depend, in part, on available third party funding and other YDC and Territorial Government approvals. Yukon Energy expects to receive confirmation of available funding and approvals for proceeding with the development by September 30, 2018.

  Subject to confirmation of necessary approvals by September 30, 2018, it is expected that completion of the Transmission Facilities Development will occur in 2020 or 2021, with the targeted completion date depending on the development option confirmed before October 1, 2018 (under each development option the SVC/Statcom will be installed at Stewart Crossing Substation):

  - **Transmission Facilities Development expected to be completed by March 31, 2021 –** The preferred option assumes federal and Yukon government funding as needed for completion of Transmission Facilities Development that includes new 138 kV Transmission Facilities connecting the McQuesten Substation with a substation at Stewart Crossing. This option assumes minimal costs to be funded by YEC that would need to be recovered through rates as approved by the Board.
  - **Transmission Facilities Development expected to be completed by June 30, 2020** – This development option, which is the default option, assumes completion of Transmission Facilities Development that includes only new Transmission Facilities located between McQuesten Substation and the existing Mayo Substation (L180) that are to be operated at 69 kV. Costs for this option are assumed to be funded by Yukon Energy and to be recovered through rates as approved by the Board.

5.3 ELECTRICITY & MAXIMUM ELECTRIC DEMAND

Section 5.1 of the PPA provides for the Grid Electricity to be delivered by YEC to VGC Group, subject to the Maximum Electric Demand amounts specified before and after the Transmission Facilities Development, and a load Power Factor requirement of 96% leading.

Prior to the Transmission Facilities Development Date, the Maximum Electric Demand that YEC is to deliver to VGC Group is 10,100 kVA, reflecting the limits on the existing L180 as well as the limits on the existing Yukon grid to import power from WAF to the MD grid. Maximum Electric Demand has been assessed assuming existing loads in the Keno region as well as resumption of Alexco operations as a major industrial customer. Under the conditions prior to the Transmission Facilities Development Date, VGC Group will likely need to operate its on-site diesel generators from time to time to meet some of its load.[17]

[17] VGC Group current forecast peak load is 10,400 kVA in year 1 of operations, rising to 11,900 kVA in year 2 and to 13,300 kVA by year six of operations (estimates assume 96% power factor). As noted in Section 5.1 of the PPA, during an approximate 90-day

After the Transmission Facilities Development Date, the Maximum Electric Demand that YEC is to deliver to VGC Group is 14,300 kVA, reflecting the improved Yukon grid capabilities secured with this development and the expectation that the specified limit is approximately 1.0 MVA higher than the VGC Group forecast peak Electric Demand in year six of operation.

Section 5.1 of the PPA includes following VGC Group forecasts of annual Electric Energy loads during the first six years of operation:[18]

- Year 1: 51.8 GW.h
- Year 2: 63.6 GW.h
- Year 3: 67.4 GW.h
- Year 4: 70.2 GW.h
- Year 5: 72.6 GW.h
- Year 6: 74.1 GW.h

Section 5.2 of the PPA includes provisions for VGC Group annual and other forecasts for Grid Electricity requirements at the Mine Facilities, including provisions with regard to Grid Electricity requirements after year six of operation.

Section 5.6 of the PPA specifies standards for usage of Grid Electricity by VGC Group, including regulation of its electrical load in accordance with the Power Quality Requirements of YEC as set out in Schedule F.

5.4 YEC CAPITAL COSTS RECOVERED FROM VGC GROUP

Section 6.1 of the PPA provides for YEC to recover from VGC Group its reasonably incurred YEC Capital Costs for the following:

- YEC's actual costs to negotiate and conclude the PPA, estimated at $200,000;
- YEC's actual Initial YEC System Improvements capital costs as set out in Schedule C of the PPA, currently estimated at $1,677,883;
- YEC's actual capital costs for the McQuesten Substation development ("YEC's Owners Costs") as specified in Table B-1 of Schedule B to the PPA, currently estimated at $443,240; and
- YEC's actual costs for the Step Down Transformer to be located at the McQuesten Substation and designed to step down from 138 kV to 69 kV, if it is determined to be required.

Section 6.1(d) of the PPA identifies YEC McQuesten Substation Costs of $930,563, as set out under Section B.4 of Schedule B, associated with the McQuesten Substation as initially developed being able to operate

period that falls between December 1 and March 31 of every year VGC Group Electric Demand will be reduced so as not to exceed approximately 6,000 kVA.

[18] Forecast loads are for 12-month periods (i.e., not for calendar years). Based on the PPA assumed schedule, the first month is March 2019 (approximately four months prior to initial gold production).

in future (if and when so required) at 138 kV. YEC funding of VGC Group costs for these added facilities for 138 kV service recognizes that these facilities are not required at the outset for delivery of Grid Electricity to the 69 kV Mine Facilities Spur line, but are required as part of any planned Transmission Facilities Development option. YEC will retain these costs in WIP until the Transmission Facilities Development Operation Date, after which time these costs will be added to rate base and included in the Transmission Facilities Fixed Cost that determine the Fixed Charge for VGC Group and any Other Industrial Customer using the Transmission Facilities. In the event that 138 kV operation occurs, VGC Group will pay YEC's actual costs for the required Step Down Transformer at the McQuesten Substation.

5.5 FIRM MINE RATE & FIXED CHARGE

The existing Industrial Primary Rate (Rate Schedule 39) is set out in Schedule A of the PPA for approval of the Board (the Firm Mine Rate). The Firm Mine Rate is amended: (1) to revise the wording for the Fixed Charge to be applied to Alexco mine; (2) to provide a new Fixed Charge applicable to the VGC Group; and (3) to edit the "Available" section as needed to reflect todays Yukon Integrated Grid. The determination of the Fixed Charge for the VGC Group is outlined in Section 7.7 of the PPA and summarized below.

Fixed Charge Applicable to Industrial Customers – Established Principles

Yukon precedent for industrial grid connections establishes that industrial customers are required to make contributions towards existing and new transmission infrastructure built specifically to provide them with industrial service.[19]

The existing transmission facilities, i.e., the 69 kV Mayo-Keno transmission line located north of Mayo, were initially built and maintained to provide service to the UKHM mine site. YEC continued to incur capital-related costs for this line after the closure of the UKHM mine based on the assumption that such costs would be directly assigned to any new mine to receive service in the future from that transmission line.[20] In 2010, prior to Alexco receiving grid service as an industrial customer, a Fixed Charge was established and included in the YUB-approved Alexco PPA. This ensured that Alexco paid its share of costs for transmission facilities maintained in service to serve future industrial customers after the closure of the UKHM mine.[21] This also established a precedent that industrial customers connecting to the existing Mayo-Keno transmission facilities would collectively be assigned, through a fixed charge included in Rate Schedule 39, an 85% share of annual depreciation and return costs related to these transmission facilities.

[19] The Yukon Energy and Yukon Electrical 2009 Phase II Rate Application (Tab 5, Section 5.3.5) summarizes the principles applied in Yukon related to investment in facilities required to provide service to industrial customers.

[20] This issue was specifically discussed during the 1992 Capital Hearing. At that time, the Mayo-Elsa-Keno transmission line was identified as at end of life and urgently needed to be rebuilt or abandoned. The rebuild costs were estimated at $1.5 to $2.0 million but the expenditure could not be justified due to the closure of UKHM. YEC decided to proceed with repairs at that time absent an agreement from UKHM towards a customer contribution (a modest expenditure of $333,000), with the remaining work to be completed prior to reopening of the UKHM mine. YEC noted to the Board during the 1992 Capital Hearing that details regarding costs of line repairs would be coordinated with whoever the future management of the UKHM might be prior to the mine reopening.

[21] Section 6.7 of the Alexco PPA notes that each time a Major Industrial Customer proposes to commence for the first time to receive Grid Electricity from the Transmission Facilities as defined in the PPA, YEC is required to determine on a reasonable basis a proposed amended fixed charge applicable to Alexco and all other Major Industrial Customers receiving Grid Electricity from the Transmission Facilities.

The basis for the fixed charge applicable for the Mayo-Keno Transmission Facilities was initially reviewed and approved by the YUB in 2010 as part of the Alexco PPA; the premise for the Fixed Charge and allocation of 85% share of costs continues to be reasonable based on the following:

- **The Industrial Customer share of forecast loads going through the Mayo-Keno Transmission Facilities [over 99%]** - The annual Keno retail load absent mine-related activities is estimated at approximately 0.3 GWh. In contrast, industrial customer load with only the VGC Group Mine will range from approximately 50 to over 70 GWh/year.
- **Allocating 85% of annual costs of the line to the industrial customer is considered reasonable based on similar treatment of Faro Mine in the past**[22] - When the Faro mine was operating, it was directly assigned as a fixed charge 85% of the annual depreciation and return costs related to the Whitehorse-Faro transmission line on the basis that these facilities were primarily developed to serve that industrial customer. The 85% direct cost allocation was considered to reasonably reflect the mine's share of load on the line (approximately 96.8%). The remaining 15% was rolled into pooled costs to be paid by all customer classes in the Yukon Hydro zone (including industrials) based on their respective demands.

Fixed Charge Applicable to VGC Group

YEC's annual Transmission Facilities Fixed Cost forecast for the existing Transmission Facilities for 2019, including depreciation and return for YEC's transmission assets, is $118,621 as calculated in Attachment B of this Application based on forecasts for 2017. Section 7.7 of the PPA provides for the Board's approval of future amendments to the Transmission Facilities Fixed Cost after the Transmission Facilities Development Operation Date, including provision at that time to include YEC's McQuesten Substation Costs.

Assuming no Other Industrial Customer is using the Transmission Facilities, the VGC Group PPA initial Fixed Charge as determined pursuant to Section 7.7(c)(i) is $8,402/month ($100,828 per annum), equal to 85% of the specified Transmission Facilities Fixed Cost related to the existing Transmission Facilities. The Fixed Charge will change whenever the following occurs:

- In calendar years when there is any Other Industrial Customer, defined as an other YEC Major Industrial Customer other than VGC Group, that receives Grid Electricity from the Transmission Facilities:
    - Section 7.7(c)(ii) provides for determining the VGC Group Share and setting a final Fixed Charge after each calendar year end in order to allocate the 85% amount among the relevant industrial customers based on actual MW.h load during the calendar year for the VGC Group and any Other Industrial Customer; and
- The Board approves an amended Transmission Facilities Fixed Cost:

[22] The 85% share of fixed costs included in the approved Alexco PPA is based on the NEB 1985 NCPC Report finding regarding the Faro Mine which was subsequently retained by the YUB to set the fixed charge for the Faro Mine under Rate Schedule 39.

- VGC Group will have a Fixed Charge set at 85% of the amended Transmission Facilities Fixed Cost.

Fixed Charge Applicable to Alexco Mine and Other Industrial Customers

The Bellekeno mine and related mill were connected to the grid and received grid electricity as industrial customers in 2010 but have not operated since mid-2013. However, Alexco continues to have prospects to renew mining in the Keno region, including exploration activities which, if successful, will allow the mine to optimally operate the existing mill infrastructure.

The PPA provisions will require amendment to the Alexco fixed charge at such time as the VGC Group receives Grid Electricity from YEC.

Section 7.7(c) provides that in years where there is one or more Other Industrial Customers, the estimated VGC Group portion of the Major Industrial Customer MWh load on the Transmission Facilities during the calendar year (the VGC Group Share) will be estimated by YEC and the Fixed Charge for months during the calendar year will equal the VGC Group Share of 85% of the Transmission Facilities Fixed Cost as last determined by the YUB. Within 60 days of the calendar year end, YEC will adjust the Fixed Charge based on the actual VGC Group Share as determined by actual MWh load during the calendar year for VGC Group and any Other Industrial Customers. The fixed charge applicable to each Other Industrial Customer in any calendar year will be determined in the same manner, based on each such customer's share of the Major Industrial Customer MWh load on the Transmission Facilities during the calendar year.

With regard to securing any required YUB approvals related to Fixed Charge amounts, including amounts related to the VGC Group Share or the Transmission Facilities Fixed Cost, YEC will provide the YUB pursuant to Section 7.7 (c)(iii) with such supporting documentation as required by the YUB, and will use commercially reasonable efforts to obtain the approval of the YUB.

6.0 IMPACTS ON GRID AND RATEPAYERS

The PPA enables a new major industrial customer load to be connected at the northern extreme of the existing Yukon integrated grid, in close proximity to where the initial United Keno Hill Mine (UKHM) load provided the economic base for development in the 1950s of Mayo hydro generation and Mayo-Keno City transmission. The Mine's environmental permitting and development is based on being connected to the Yukon integrated grid, rather than relying on its electricity to be supplied from on-site fossil fuel thermal generation.

Table 1 summarizes forecast VGC Group power demand and electricity consumption at the Mine for each of the Mine's first six operating years based on the expected schedule in the PPA. Table 1 also indicates the related YEC generation requirements that will impact YEC's revenue requirements and overall rates. The forecast highlights the material reduction in peak power demand and energy requirements during the approximate 90-day period each year between December 1 and March 31 when stockpiling will occur at the Mine. The forecast also shows increases each year in the Mine power requirements.

Mine operation based on existing reserves is forecast for ten years; however, forecasts for power requirements after year 6 are to be developed by VGC Group during the first years of operation and are not included in Table 1. When Mine operations end, rinsing of the Heap Leach Pad will occur for one to two years followed by active closure activities for approximately three years, and during this period the Mine Site power requirements are expected to be much lower than any annual amounts forecast in Table 1.

Table 1: VGC Group Power Demand & Consumption, and Related YEC Generation (Initial 6 years)

		Forecast VGC Power Demand & Consumption					YEC Generation	
		90 day winter period between Dec 1 & Mar 31		Balance of Year		Total Year	Annual Total*	
Iniital 6 Years	PPA Expected Schedule (Mar-Feb)	Energy MW.h	Peak Demand MW	Energy MW.h	Peak Demand MW	Energy MW.h	Losses** MW.h	Generation MW.h
1	2019-20	7,892	5.11	43,910	10.04	51,802	4,559	56,360
2	2020-21	8,404	5.38	55,166	11.41	63,571	5,594	69,165
3	2021-22	8,696	5.52	58,656	11.87	67,351	5,927	73,278
4	2022-23	8,987	5.66	61,188	12.29	70,175	6,175	76,350
5	2023-24	9,298	5.81	63,332	12.60	72,630	6,391	79,021
6	2024-25	9,369	5.84	64,729	12.72	74,098	6,521	80,619

∗ Prior to the Transmission Facilities Development Date, the PPA limits Maximum Electric Demand delivered by YEC to VGC at 10,100 kVA (equivalent to 9.70 MW at 96% power factor lead required by PPA); thereafter, the Maximum Electric Demand is 14,300 kVA (equivalent to 13.73 MW at 96% power factor lead required by PPA). YEC generation shown in table has not been reduced in the initial years to reflect the Maximum Electric Demand constraint as estimates of the impact from this constraint currently are not available.

** System losses estimated at 8.8% (system average).

6.1 IMPACTS ON YUKON INTEGRATED GRID

The PPA enables the Mine to be connected to the Yukon grid. This development will have impacts on the Yukon grid development and operation.

The Mine being developed by VGC Group will increase utility electrical sales in the Keno region well above earlier levels even when UKHM was operating. This new load will utilize available Mayo hydro generation resources, and require import to the northern grid of available WAF renewable and thermal generation.

Initial Yukon Grid Improvements

Prior to Commencement of Delivery to the Mine in 2019, the PPA provides for development on the Yukon grid of the McQuesten Substation plus the Initial YEC Facilities Improvements, as described in Schedule C of the PPA.

These Yukon grid enhancements and facilities are required to connect the Mine to the existing transmission, to maintain acceptable system voltages while supplying this new load, and to address potential contingent operating conditions such as loss of generation at Mayo or loss of the transmission connection between Mayo and Whitehorse.

These initial new facilities and enhancements are to be funded by VGC Group, with the exception of YEC McQuesten Substation Costs of approximately $0.93 million as described in Schedule B, Table B-2.

The PPA recognizes that, with these initial measures, the Yukon grid likely can only deliver to the Mine up to 10,100 kVA until further Yukon grid improvements (i.e., the Transmission Facilities Development) are implemented[23] – and the Mine will likely need to utilize its on-site diesel generation to supply some of its peak load from approximately March through to December in years before the Transmission Facilities Development Operation Date.

Near-term Transmission Facilities Development

The PPA and the Mine's development provide the basis for moving as quickly as possible to replace the end of life existing Mayo to Keno City transmission facilities.

As reviewed in section 4.3 of this Application, YEC is exploring options to secure funding in 2018 for the full SKTP up to 100% of full revenue requirement impact to replace and greatly improve the existing Yukon grid facilities in this region. The PPA is expected to enhance initiatives to secure this funding.

The PPA also provides for a default option if such funding cannot be secured in a timely manner, where specific required improvements would be implemented by YEC with costs to be included in rate base and revenue requirements.

In summary, after Commencement of Delivery to the Mine and during 2020 or early 2021 under the expected schedules in the PPA, the PPA provides that the Transmission Facilities Development will at a minimum replace the existing end-of-life transmission between Mayo and McQuesten Substation (L180) with new 138 kV facilities[24] and install an SVC/Statcom at Stewart Crossing Substation.[25]

These two basic enhancements will enable the Maximum Electric Demand limits in the PPA to be increased to supply all of the Mine's forecast requirements, and also to enhance significantly Yukon grid long-term

[23] This limit allows for existing Keno region power loads plus some renewed Alexco loads.
[24] The existing conductor on this line is replaced with larger conductor, enhancing this line's ability to carry higher power loads; until the full SKTP is developed with 138 kV transmission from Stewart Crossing to McQuesten Substation, the new L180 line will operate at 69 kV. Rebuild of the line will carry out brushing of the line, adjust and improve line location in many segments, replace end of life poles and equipment, and improve access for future brushing and line maintenance.
[25] The SVC/Stacom will provide voltage support equipment (a Static-Var Compensator or a Statcom) that enhances the MD import ability from WAF following contingencies.

capability to supply customers on the northern grid.[26] As reviewed in Section 4.3 of this Application, estimated YEC capital costs for these two enhancements are $24.8 million. At the time that these facilities come into service, the PPA also provides for YEC to include in the Transmission Facilities costs the YEC McQuesten Substation Costs ($0.93 million as per the PPA).

The PPA provides that VGC Group and any Other Industrial Customer supplied by the Transmission Facilities will, through the Fixed Charge provisions applicable in each year that these customers are supplied under Rate Schedule 39, pay for 85% of YEC's depreciation and return (debt and equity) costs related to these Transmission Facilities improvements. The balance of these fixed costs will be recovered through rates charged to all firm customers in the Yukon (including Major Industrial Customers).

These facility improvements will continue to provide benefits for the Yukon grid and its customers long after the Mine ceases to receive Grid Electricity from YEC.

6.2 RATEPAYER IMPACTS

Rates for utility delivery of firm electricity in Yukon are generally set (as directed by OIC 1995/90) to be the same for all regions and for each customer class served by both YEC and Atco Electric Yukon ("AEY"). Accordingly, impacts on YEC revenue requirement costs and rate requirements resulting from the PPA and connection of the Mine to the Yukon grid will affect all Yukon ratepayers using firm electricity supplied by YEC and AEY.

In general, the expected overall rate impact on Yukon ratepayers will reflect the extent to which supplying Grid Electricity to the Mine is expected to increase YEC and AEY revenues more than it increases YEC annual costs to supply electricity (i.e., YEC's annual revenue requirement). Any change to rates as a result of YEC supplying the Mine, however, will require future YUB review and approval following a new general rate application by YEC.

The following analysis is intended to provide a reasonable indication of likely ratepayer impacts from the PPA and YEC delivery of Grid Electricity to the Mine. For simplicity, the analysis focuses on three years (calendar 2020, 2021 and 2025) to provide an indication of potential utility revenue and cost impacts after the initial year of power delivery and in year six of power delivery.

Incremental Rate Revenue Impacts

The PPA confirms (subject to Board approval) the Firm Mine Rate applicable to VGC Group and the Mine, including the provisions for the Fixed Charge whereby VGC Group and any Other Industrial Customer together pay for 85% of the ongoing annual Transmission Facilities Fixed Cost of YEC.

Major industrial customers such as VGC Group are charged an existing Rate Schedule 39, which is subject to general rate riders approved for both YEC and AEY (see Schedule A to the PPA). Table 2 provides forecast incremental YEC and AEY rate revenues from the Mine, excluding the Fixed Charge, based on the PPA and

[26] By way of example, these two enhancements are estimated to increase the L180 (Mayo to McQuesteen Substation) capability to supply the Mine from 9.7 MW to 16.7 MW and increase the MD import limit from WAF from 11 MW to 19 MW. The forecast Mine peak load in year six of operation is approximately 12.7 MW (see Table 1).

the Mine forecast loads in Table 1 (adjusted to calendar basis for each year, to reflect YEC fiscal years). Table 2 includes Rider J as applied for in YEC's current GRA, and the Rider R approved recently for AEY (applicable by 2018). To the extent that the Board approved different riders in future for either utility, the estimates in Table 2 would need to be adjusted accordingly.

Overall, the average YEC rate revenues per kW.h of sales to the Mine forecast in Table 2 over 2020, 2021 and 2025 remain reasonably stable, ranging from $0.1384 to $0.1388 per kW.h. Total incremental annual YEC revenues excluding Fixed Charge increases from $8.8 million in 2020 to $10.3 million in 2025.

Incremental forecast rate rider revenue to AEY in Table 2 equals $0.0097/kW.h sales in each year, and in total increases from $0.6 million in 2020 to $0.7 million in 2021.

Table 2: Forecast Utility Rate Revenues from the VGC Group Mine (excluding Fixed Charge)

			Billing Determinants			Rate Revenues ($000)		
	Assumed rates		2020	2021	2025	2020	2021	2025
YEC revenues (ex. Fixed Charge)								
Demand $/kVA per month	$15.94	MVA	11.21	12.03	13.17	$2,144	$2,300	$2,518
Energy $/kW.h	$0.0808	MW.h	63,245	67,157	74,051	$5,110	$5,426	$5,983
Fixed Rider F $/kW.h	$0.00211					$133	$142	$156
Rider J % [GRA]	$0.1847					$1,364	$1,453	$1,599
Total YEC						$8,752	$9,322	$10,257
Average $ per kW.h						***0.1384***	***0.1388***	***0.1385***
AEY revenues								
Rider R %	8.30%					$613	$653	$719
Total YEC and AEY (ex. Fixed Charge)						$9,365	$9,975	$10,976
Average $ per kW.h						***0.1481***	***0.1485***	***0.1482***

YEC will also receive Fixed Charge rate revenues from the Mine under the PPA.

- Prior to the Transmission Facilities Development Date, these revenues per the PPA would at most be $100,828,[27] or about $0.0016 per kW.h for the year 2020.
- After the Transmission Facilities Development Date, the PPA allows for the Fixed Charge to VGC Group (and any other Industrial Customer) to be adjusted to equal 85% of any adjusted YEC Transmission Facilities Fixed Cost that may result from bringing the new facilities into service.

Incremental YEC Costs and Net Rate Revenue Impacts

New sales to the Mine will require added YEC generation, as indicated in Table 1.

[27] Equals 85% of the specified Transmission Facilities Fixed Cost of $118,621. If Alexco is also connected at that time as a major industrial customer, this charge would be allocated between VGC Group and Alexco.

The main incremental cost impact for YEC from this added generation will be incremental long-term average (LTA) thermal generation costs.[28]

LTA thermal generation costs for YEC are sensitive to the overall YEC grid load without the VGC Group Mine (i.e., higher grid loads lead to higher incremental LTA thermal for new added loads) as well as to any new renewable resource generation developments that reduce LTA thermal generation required at each grid load level.

Table 3 provides a conservative assessment of LTA thermal generation impacts for 2020 and 2021, assuming grid sales to both the Minto mine and the Alexco mine as well as no new renewable generation resources or enhancements. In contrast, the 2025 assessment in Table 3 removes the Minto mine (which has to date never been discussed as extending beyond 2022) as well as the Alexco mine in order to highlight the VGC Group Mine incremental LTA generation sensitivity to overall grid loads (this scenario continues to assume no new renewable generation resources or enhancements).[29]

- The 2020 assessment, with Minto and Alexco assumed loads, shows 49.8 GW.h incremental LTA thermal for 68.8 GW.h incremental generation with the VGC Group Mine, i.e., incremental LTA thermal accounts for 72% of the incremental generation needed for the VGC Group Mine.
- The 2021 assessment, also with Minto and Alexco assumed loads, shows 54.4 GW.h incremental LTA thermal for 73.1 GW.h incremental generation with the VGC Group Mine, i.e., incremental LTA thermal accounts for 75% of the incremental generation needed for the VGC Group Mine. The high grid load assumed in this scenario results in LTA thermal being a higher share of new generation in 2021 versus 2020.
- The 2025 assessment without any assumed other mine loads shows 52.0 GW.h incremental LTA thermal for 80.61 GW.h incremental generation with the VGC Group Mine, i.e., incremental LTA thermal accounts for only 65% of the incremental generation needed for the VGC Group Mine. LTA thermal accounts for a lower share of the new generation in 2025 versus 2020 or 2021 due to the lower overall level of the grid load in 2025, highlighting the sensitivity of LTA thermal generation impacts to the overall level of the grid load.

For each of the years examined in Table 3, the LTA thermal will decline when new renewable resources or enhancements are developed. YEC's 2016 Resource Plan identifies several potential short-term action recommendations for potential in-service prior to 2023, including two hydro storage enhancement projects (Southern Lakes, and Mayo Lake [which includes dredging of the Mayo Lake Outlet Channel]), an IPP Standing Offer Program project, uprates at the Aishihik and Whitehorse hydro stations, and Mayo A refurbishment.

Overall, Table 3 with its conservative assumptions shows average YEC incremental LTA thermal generation cost per kW.h of sales to the Mine forecast in 2020 and 2021 that range from $0.125 to $0.128 per kW.h

[28] Working capital increases related to incremental thermal generation fuel requirements will result in a small added YEC revenue requirement (potentially in the range of $0.025 million per year increases in return costs).
[29] Table 3 LTA thermal generation estimates based on YECSIM as per YEC 2017/18 GRA, with model runs to reflect the respective grid loads assumed in Table 3.

VGC Group sales; in 2025 these costs are lower, at $0.111 per KW.h VGC Group sales, reflecting the impact of the assumed lower grid load. Total incremental annual YEC thermal generation costs in Table 3 increase from $7.88 million in 2020 to $8.6 million in 2021, and decline to $8.2 million in 2025.

Table 3 also shows the VGC Group impact on YEC net costs to be recovered from all ratepayers beyond direct revenues from VGC Group, based on Table 2 rate revenues (which exclude Fixed Charge revenues) and Table 3 LTA thermal generation costs. Based on this assessment, the overall net impact of the Mine under the assumption adopted is to reduce future rate increase pressures. YEC net revenue requirement amounts that need to be recovered from all ratepayers are reduced as follows with the VGC Mine load:

- $0.87 million reduction in 2020, when assume total grid load includes Minto and Alexco mines;
- $0.69 million reduction in 2021, when assume three mines in operation (shows scenario where the increase in LTA thermal cost more than offsets the increase in revenues from higher VGC Group load); and
- $2.02 million reduction in 2025, when assume VGC Group Mine is the only mine of the grid (shows impact of higher revenues due to higher VGC Group load, combined with lower LTA thermal cost per kW.h VGC Group sales due to lower overall grid load without Minto or Alexco mine loads).

The Table 3 assessment does not address potential impacts from any Transmission Facilities Development costs that YEC may need to be included in rate base. The following high level assessment reviews potential impacts from an assumed $25 million added to YEC rate base for such transmission development[30]:

- Transmission Facilities Fixed Cost impact, assuming 55-year average depreciation[31] and 4.92% average return on YEC rate base per 2017/18 GRA[32]:
    - o Depreciation — $0.454 million per year
    - o Return on rate base (mid year in year 2) — $1.196 million
    - o Total Annual Cost — $1.650 million in year 2 of assets
- Allocation of Annual Cost
    - o Fixed Charge: VGC Group/ Others (85%) — $1.402 million
    - o All ratepayers / general rates (15%) — $0.248 million

In summary, based on the assumptions in Table 3, even if the Transmission Facilities Development results in an addition of $25 million to YEC's rate base the overall impact on all ratepayers from the PPA, the VGC Group Mine load and the new facilities development would still be a reduction in YEC net revenue requirement amounts to be recovered from other ratepayers.

[30] Section 4.3 of this Application estimated costs for the default option (no government funding, new L180 transmission connection from Mayo to McQuesten Substation plus SVC/Statcom at Stewart Crossing Substation and other related costs) at $23.8 million, excluding McQuesten Substation costs funded by VGC Group and/or YEC. The cost added to YEC's rate base for McQuesten Substation ($0.93 million) increases this amount to $24.8 million.
[31] Assumes transmission assets at 65 year life (about 67% of total cost); YEC McQuesten Substation Costs per the PPA assumed at 54 year life; balance assumed conservatively at 40 year life.
[32] See Table 3.15 of YEC 2017/18 GRA (2.32% average cost of debt, and 8.82% return on equity, with 60/40 debt/equity ratio).

Table 3: YEC LTA Thermal Generation Costs & Net Rate Revenue Impact - VGC Group Mine

	2020	2021	2025
Assumed YEC Grid Sales[1] (GW.h)			
Non Industrial	359.7	364.2	386.6
Minto Mine	38.2	38.2	-
Alexco Mine	19.0	21.9	-
VGC Group Mine	63.2	67.2	74.1
Total YEC (firm)	480.1	491.5	460.7
YEC Grid Generation	***522.4***	***534.7***	***501.2***
Incremental Generation due to VGC Group Mine	*68.8*	*73.1*	*80.6*
YEC LTA Thermal Generation (GW.h)			
With VGC Mine Load	81.9	91.7	66.1
Without VGC Group Mine Load	32.2	37.2	14.0
YEC Incremental thermal generation	49.8	54.5	52.0
Thermal share of increased generation	*72%*	*75%*	*65%*
YEC added thermal generation cost[2] ($million)	***$7.88***	***$8.63***	***$8.24***
Average $ per kW.h VGC Group Sales	***0.1246***	***0.1285***	***0.1113***
YEC Added Revenues ex. Fixed Charge ($million)	***$8.75***	***$9.32***	***$10.26***
Average $ per kW.h VGC Group Sales	***0.1384***	***0.1388***	***0.1385***
VGC Group Mine Net Impact on YEC Net Costs (Added Costs less Added Revenues)			
Rate Revenue Shortfall (Surplus) ($million)	***-$0.87***	***-$0.69***	***-$2.02***
Average $ per kW.h VGC Group Sales	***-$0.014***	***-$0.010***	***-$0.027***

1. Non-industrial sales per YEC 2016 Resource Plan, Medium Industrial forecast. Minto and Alexco loads are assumptions for scenario assessment. VGC Mine load based on Table 2.

2. Assumed average cost per 2017/18 GRA at $0.1583/kW.h (90% LNG, 10% diesel).

ATTACHMENT A
POWER PURCHASE AGREEMENT

ATTACHMENT B
YEC ANNUAL TRANSMISSION FACILITIES FIXED COST

ATTACHMENT B – YEC ANNUAL TRANSMISSION FACILITIES FIXED COST

YEC's annual Transmission Facilities Fixed Cost of $118,621 was determined as follows for the PPA:

Transmission Facilities costs as of	**2017**	**2018**
Total assets at cost	2,244,721	2,244,721
Accumulated depreciation	534,434	571,656
Net book value at yr. end	**1,710,287**	**1,673,065**
Annual depreciation	**37,222**	**37,222**
Projected Net Book Value:		$1,673,065
At end of 2018:		
At end of 2019:		$1,635,843
$1,673,065-37,222		
2019 Mid Yr Rate Base		**$1,654,454**

Transmission Facilities Fixed Cost	**2019**
Average Cost of Capital (per GRA)	4.92%
Return on Rate Base	81,399
Depreciation	37,222
Total Annual Cost	**118,621**