

Report to the Responsible Minister for the Qulliq Energy Corporation On:

The Major Capital Project Permit Application Respecting Construction of a New Power Plant in Grise Fiord

Report 2014-02

February 20, 2014

THE UTILITY RATES REVIEW COUNCIL

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LIST OF ABBREVIATIONS

ARO	Asset Retirement Obligation
GRA	General Rate Application
MW	Megawatts
POD Style	Self Contained Genset Design
PLC	Programmable Logic Control
PSA	Public Sector Accounting
QEC	Qulliq Energy Corporation
URRC	Utilities Rates Review Council
VFD	Variable Frequency Drive

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1.0 BACKGROUND

Qulliq Energy Corporation (QEC), as a designated utility, is required pursuant to Section 18.1 of the Qulliq Energy Corporation Act (QEC Act), to seek approval from the responsible Minister prior to undertaking a major capital project. In this regard, Section 18.1 of the QEC Act provides as follows:

Definition

(1) In this section, "major capital project" means a capital project that has a total cost that exceeds \$5,000,000.

Major capital project

(2) The Corporation shall not undertake, nor permit any of its subsidiaries to undertake, a major capital project unless it applies in advance to the Minister for an order giving permission for the project.

Minister may seek advice

(3) Before responding to an application for permission made under subsection (2), the Minister may seek the advice of the Utility Rates Review Council established under the *Utility Rates Review Council Act*.

Corporation to provide information

(4) The Corporation shall provide the Minister and the Utility Rates Review Council with any information necessary for the Minister to decide whether permission should be granted.

What Minister may do

(5) The Minister may

(a) grant permission for undertaking the major capital project, with or without conditions; or

(b) refuse permission.

Order

(6) Permission granted by the Minister under paragraph (5)(a) shall be in the form of an order."

By letter dated December 4, 2013, QEC applied to the responsible Minister for approval of a major capital project permit for a new power plant in the community of Grise Fiord.

By letter dated December 5, 2013, the responsible Minister requested advice from the URRC with respect to QEC's Application. The URRC's consideration of the matter is set out in this Report.

2.0 PARTICULARS OF THE APPLICATION

QEC is requesting approval of a \$7.9 million capital project permit to replace the Grise Fiord power plant with a new plant at a different location.

QEC states the existing Grise Fiord power plant, constructed in 1963, has numerous problems in regard to its civil, mechanical, and electrical systems. It suffers from several deficiencies, including failing building foundation, unreliable superstructure and aging systems and equipment. QEC states the typical design life of a power generating facility is 40 years and the Grise Fiord facility is past its service life and requires replacement.

QEC states, proceeding with the proposed Project will provide the lowest overall cost over the life of the facility. Reductions in operating costs will be realized by the installation of new fuel efficient generator sets, reliable ancillaries with Variable Frequency Drive (VFD) controls for energy-saving, utilization of residual heat recovery for plant heating, installation of reliable switchgears and protection devices under Programmable Logic Control (PLC) monitor and automatic control for economic dispatch of units based upon demand.

3.0 PROCESS

3.1 MAJOR OR MINOR APPLICATION

Section 13(1.1) of the URRC Act Provides that:

Where, in the opinion of the Review Council, the application for the proposed rate or tariff is a minor application, the Review Council shall report to the responsible Minister within 90 days of receiving the responsible Minister's request for advice under subsection 12(2).

Upon review of QEC's application, the URRC has decided to treat this capital project permit application as a minor application.

3.2 PUBLIC CONSULTATION PROCESS

The URRC caused notice of the Application to be published in newspapers having general circulation in Nunavut from December 20 to January 8, 2014. The advertisement was published online and the Mayor of Grise Fiord was notified of the Application by letter dated December 12, 2013.

The URRC also provided an opportunity for the public to make written comments respecting the capital project permit application by the deadline of January 24, 2014. No written submissions or comments were received from the public or any other party.

QEC responded to information requests from the URRC on January 17, 2014.

4.0 EXAMINATION OF THE APPLICATION

4.1 NEED FOR THE PROJECT

QEC states electricity generation and peak load for the community has been slowly increasing with the total generation increasing from 1,099 MWh in 2008/09 to 1,250 MWh in 2012/13 with an average growth rate of about 2.85%.

QEC states the existing plant was designed only for three small gensets and cannot accommodate newer larger units or the addition of any more units. A lack of available space within the building has impeded genset upgrades as well. QEC indicates that in addition to capacity concerns, the current plant has a number of technical and engineering deficiencies, including the following:

1) Plant safety issues from flooding: The power plant is subject to seasonal flooding due to summer melt events. Some serious operational safety concerns have arisen during flooding: passing through the flooded floor to access the emergency shutdown controls can place the operators in danger. Higher water levels can enter the energized generator breaker cells at the load side and cause the breakers to trip. As well, the flood waters can also enter the distribution transformer and cause a long-term power outage.

2) Plant foundation: After suffering from years of flooding, the plant foundation is in poor condition with one end of the building approximately six inches lower than the other. The interior slab has separated and has faults of two or more inches that have become tripping hazards. The concrete floor in the powerhouse is cracked at various locations due to the differential settling of the floor. This creates serious safety and operational concerns by deforming equipment mounting, piping, structure and electrical device connections within the plant.

3) Building stability: The building is settling due to thawing of the permafrost under the foundations. The water accumulation and flow due to the summer melt is exacerbating the foundation settlement problems.

4) Plant Location: The site and road access appear to be adequate for present use but no water drainage exists on the site. Surface water from the summer melt drains through and under the building. The run-off has also caused some erosion of the gravel base at the fuel tank farm.

5) Generating Equipment and Electrical Device:

Generator sets: Current generating units are all refurbished gensets. Tune ups are required every 5,000 hours and major overhauls every 20,000 hours, much more frequent than the standard intervals. The high frequency of maintenance has resulted in higher than normal operational costs. In addition, the prime unit G1 and G2 have excessive vibration, high fuel consumption rates, and serious oil leakage from the engine block.

Auxiliary equipment: Engine cooling equipment and piping has been in operation well beyond the normal life expectancy. Fouling problems in piping and equipment have affected cooling efficiency. The existing support frames for the equipment cannot bear any equipment upgrades. There are some safety concerns resulting from the non-insulated sections of high temperature pipe and emissions from the oil mist breathers in the plant.

Electrical devices: The switchgears, service station and most of the protection relays have been in service for more than 40 years. The Local Engine Control Panels are leaning because of the concrete floor cracks. There is no fire alarm system or PLC auto-control in the plant.

6) Fuel system and storage: The total containment volume is adequate for the existing tankage. However, for environmental protection the existing fuel storage tanks must be replaced with double-wall and self-anti-spill tanks. In addition, there is significant undermining of the gravel base under the tank farm caused by erosion of the gravel by summer melt water. Further undermining of the foundation may adversely impact the structural integrity of the containment structure as well as its ability to contain fuel spills.

7) Plant space: There is not enough space available to accommodate larger gensets. A sea container is used for additional storage. As well, there is no dedicated office or workshop area in the plant. The operators are directly exposed to a high noise environment during routine monitoring and simple shop work. It is also difficult to communicate or perform logging and any type of paperwork in the facility due to lack of space and excessive noise.

8) Plant ventilation: The system appears to be adequate for the current requirements most of the time. Nevertheless, there has been an overheating issue in summer. Furthermore, there is no surplus ventilation capacity for the necessary power capacity increase in the plant. All ventilation equipment has surpassed its design life by ten years.

9) The building floor and structures: The floor has cracked due to foundation undermining by the melt water. In summer, the plant floor has been immersed in the flooding as the building floor is below the level of the adjacent area; water and snow often inundate the building. The melting snows form pools of water inside the power plant and pose a safety hazard to operating personnel and plant equipment. [Application P6-8]

URRC Findings:

Having considered the foregoing, and the analysis presented by QEC, the URRC is satisfied that there is a need for the proposed new power plant at a new site in Grise Fiord, in 2016/17, in order to provide safe and reliable electric service.

4.2 PROJECT COSTS

The capital cost of the replacement plant at Grise Fiord is estimated at \$7.9 million. Total installed capacity of the plant, excluding the emergency unit, is expected to be increased from 570kW to 600kW. QEC states, the final installed capacity will depend on the results of final design and tendering processes.

The following details respecting the project costs estimate were provided by QEC:

GRISE FIORD NEW F	POW	'ER PLANT PR	OJECT COST	ESTIMATE (\$000))
Cost Category	Budget Year Estimate				Total Project
Cost Category		2014/15	2015/16	2016/17	Estimate
Eng Design/Project Management		\$350			350
Geotechnical Study		\$50			50
Foundations / Piles			\$400		400
Site Development			\$250		250
Equipment Procurement			\$3,200		3200
Mechanical/Electrical			\$750		750
Fuel Storage System			\$300		300
Shipping / Freight			\$500		500
Site Fencing				\$250	250
Testing/Commissioning				\$150	150
Total Construction		\$400	\$5,400	\$400	6,200
Contingency - 10%					620
QEC - Overhead at 9%					614
QEC - AFUDC at 6%					454
Total Admin Costs	\$				1,688
Total Project Cost \$					7,888

QEC expects the project to commence in the spring or summer of 2014. QEC states initial efforts will focus on community consultation to select a location for the new facility and the design guidelines of the new power plant. QEC estimates the new power plant design to be completed by 3rd quarter of 2014/15 fiscal year, with specifications and tenders being left for ordering of materials and construction contracts. QEC states, pre-fabrication of the plant could be completed by 2nd quarter of 2015/16. Site work will begin during the summer/fall of 2015 and materials

will be delivered via sealift in 2016. Construction would begin during the 2nd quarter of 2015/16 with completion scheduled for early 2017. QEC states the existing plant will remain in operation while the new facility is being constructed.

In 2010, QEC engaged Wardrop Engineering to perform a condition assessment and planning study of the plant. The study assessed the available options and recommended replacement of the plant at a new location. QEC states, cost estimates for the new Grise Fiord plant included in the application were prepared for a "POD" style (power plant design and this POD style design is different from that used in the Wardrop report. QEC indicated it is not able to provide a cost breakdown of the proposed POD style design in a format comparable to the Waldrop report.

QEC states, the cost estimates included in the project permit application are based on QEC's review of a POD style power plant installed in British Columbia. QEC indicates that adjustments to the BC Hydro cost estimates were made to account for higher Northern costs for contractor services, wages, shipping and travel. QEC states, the cost estimates also include overhead charge and allowance for interest capitalization assumptions. QEC noted that total project cost estimates for both design approaches are approximately equivalent.

QEC states it will employ the following methods to ensure completion of the project to the required design specifications, within budget and on a timely basis:

- An onsite QEC representative will undertake monitoring and inspection of the construction phase of the project to ensure quality control, to ensure the project as constructed satisfies the required design specifications and to mitigate potential risks that may result in the actual costs being higher than budget.
- QEC project managers will maintain interaction with construction contractors in every stage of construction.
- QEC's Finance department will prepare regular variance reports to assist with cost control and project management.

URRC Findings:

The URRC notes the capital project permit application contemplates a POD style design selfcontained Genset design for the power plant whereas the Wardrop report appears to contemplate a traditional design. QEC did not provide any explanations comparing and assessing the costs and benefits of the POD style design versus traditional design. QEC indicates the existing generating units are not compatible with the preferred POD design for the new plant. However, QEC states it will investigate the potential to redeploy these units in other places and this will depend on the condition of the units after final decommissioning work and capacity requirements in other communities. Further, QEC could not provide the same level of detail with respect to construction costs estimates respecting the POD style design as was reflected in the Wardrop report for the traditional design.

In the URRC's view QEC should have prepared a project cost estimate at a level comparable to that provided in Appendix C (Attachment A) to the Wardrop report. A more detailed project cost estimate would provide greater assurance as to the accuracy of project cost estimates. Further, the costs and benefits of the POD design, including implications for potential redeployment of existing equipment, should have been fully documented for purposes of the capital project permit application.

The URRC expects QEC to provide full justification for the prudent cost of construction of the Grise Fiord plant in light of the foregoing comments, including explanations for variances between a detailed project cost budget, prepared prior to commencement of construction and actual costs, at the time the plant is proposed to be added to rate base in 2016/17.

4.3 RATE IMPACTS

QEC quantified the rate impact resulting from the Grise Fiord plant replacement in Attachment C of the Application. The following table shows the rate impact of the Grise Fiord plant replacement, if the cost of the replacement plant were recovered on the basis of Nunavut wide sales, from all of QEC customers:

Rate Impact Assuming Nunavut Wide Cost Recovery			
Year Rate Increase per k Before Nunavut Subsidy)			
	Cents per kWh		
2016/17	0.20		
2017/18	0.40		
2018/19	0.39		
2019/20	0.37		
2020/21	0.36		
2021/22	0.34		
2022/23	0.33		
2023/24	0.31		
2024/25	0.30		
2025/26	0.29		

The following table shows the rate impact of the plant replacement if the cost of the replacement plant were recovered from Grise Fiord customers on a community cost of service basis:

10 Year Rate Impact if New Plant Costs Recovered from Community of Grise Fiord						
Year	Incremental Revenue	Generation at Grise	Grise Fiord Line	Grise Fiord Station	Sales at Grise	Rate Increase per
	Requirement Per	Fiord as per	Losses Per 2010/11	Service Per 2010/11	Fiord	kwh-Before
	Attachment C	Attachment C	GRA	GRA		Nunavut Subsidy)
	\$000	MWh	%	%	MWh	Cents per kWh
2016/17	364	1314	13.2%	4.0%	1088	33.46
2017/18	738	1339	13.2%	4.0%	1109	66.56
2018/19	723	1364	13.2%	4.0%	1129	64.02
2019/20	709	1390	13.2%	4.0%	1151	61.60
2020/21	694	1417	13.2%	4.0%	1173	59.15
2021/22	679	1444	13.2%	4.0%	1196	56.79
2022/23	665	1471	13.2%	4.0%	1218	54.60
2023/24	650	1499	13.2%	4.0%	1241	52.37
2024/25	635	1528	13.2%	4.0%	1265	50.19
2025/26	620	1557	13.2%	4.0%	1289	48.09

Clearly, recovery of the replacement plant costs from Grise Fiord customers on a community basis would have a much more significant impact on Grise Fiord customers although this impact would be somewhat mitigated to the extent the Nunavut subsidy program continues to be available.

URRC Findings:

The URRC expects QEC to put forward rate design proposals that would help mitigate the impact of increases in costs due to the major capital project planned for Grise Fiord at the time the plant is proposed to be added to rate base.

4.4 ACQUISITION OF LAND

QEC states the Corporation and the hamlet of Grise Fiord have concluded site selection discussions. The hamlet has designated and rezoned an area uphill from the fuel distribution area as the site of the new plant. QEC states, the hamlet of Grise Fiord has also agreed to develop the road leading up to the area. QEC will maintain communication and coordination with the community during planning, design and construction of the new plant. QEC states the following criteria were considered in the final site selection:

- Sufficient space for the plant and all necessary ancillary buildings and equipment i.e. power plant, cooling radiators, fuel storage tank(s), barrel / drum storage, service garage, transient quarters (if deemed necessary), electrical distribution infrastructure, public and QEC parking, access routes for vehicular traffic.
- Relative proximity to the existing community fuel pipeline system;
- Possess good storm / runoff water drainage; and
- To the extent feasible, located away from residential areas to reduce potential for noise, vibration and air quality disturbances. [URRC QEC 1a)]

URRC Findings:

In the URRC's view establishment of the above noted site selection criteria reflects good utility practice and they appear to address the issue of poor drainage at the existing site. Accordingly, the URRC accepts QEC's explanations and proposals with respect to land acquisition.

4.5 DECOMMISSIONING

QEC indicates it has not yet developed a schedule or estimates related to future decommissioning costs in relation to the plant sites that are being retired.

In GRA Report 2011-01, the URRC directed QEC as follows:

"The URRC notes the responsibility for environmental liabilities related to site clean-up may not rest entirely with QEC. Accordingly, QEC is directed to carry out an amortization study for the next GRA that provides a realistic assessment of future removal and site restoration costs. QEC is to include these costs and estimates for positive or negative salvage, by account, in the amortization rates." [URRC Report 2011-01; Page 55]

In his letter dated May 26, 2011, the responsible Minister states as follows with respect to the above direction:

QEC will carry out an amortization study to address whether there is a need for an ARO provision and provide additional information at the time of its next GRA. [Responsible Minister's letter dated May 26, 2011; Item 12]

QEC expressed the view that potential environmental liabilities may be recognized as part of the Asset Retirement Obligation (ARO) provisions, under Public Sector Accounting (PSA):

QEC's accounting practice is compliant with Public Sector Accounting. As such QEC no longer has a reserve for future removal and site restoration and ordinarily decommissioning costs would be considered operations and maintenance expenses in the year incurred. However, QEC understands Public Sector Accounting does allow for the recognition of Asset Retirement Obligation (ARO) provisions, related to potential environmental liabilities, into amortization rates. QEC will be undertaking analyses related to the potential magnitude of environmental liabilities and the appropriate accounting treatment for such liabilities and may include a provision for an ARO related to environmental liabilities in future general rate applications. [URRC QEC 1b) and c)]

URRC Findings:

The URRC considers the intent of the ARO provisions under PSA is to create a liability account for legal obligations related to future site restoration and environmental cleanup costs and amortize those costs over the life of the asset. In the URRC's view the recognition of negative net salvage under depreciation accounting as previously used by QEC and the ARO method as described above are both intended to achieve the same purpose. Both approaches are intended to create a fund/liability account for future site restoration and environmental costs and to amortize those costs over the life of the asset. Although the methodology used to arrive at the liability amount and the annual amortization amounts under ARO is prescribed by PSA, the net effect will be the creation of a liability and an annual amortization of costs. Accordingly, the URRC considers its direction in Report 2011-01 that site restoration and environmental cleanup costs should be included in the annual amortization rates and amortization expense is appropriate under PSA and for regulatory purposes.

The URRC recognizes there may not be a clear understanding of QEC's liability for site restoration and environmental cleanup costs, if any, prior to the date the Federal ownership of the electric utility was transferred to Territories. However, it must be recognized QEC will be the party responsible for carrying out the site restoration and environmental cleanup and, to the extent there are legal liabilities for site restoration and environmental cleanup costs on the part of QEC, those liabilities should be included in the ARO and the amortization rates, in accordance with URRC Report 2011-01.

In the URRC's view appropriate and timely action on site restoration and environmental cleanup in accordance with the applicable laws is part of QEC's corporate responsibilities and is in the public interest. The URRC considers a plan for site restoration and environmental cleanup in accordance with the applicable laws including an estimate of the costs for which QEC is responsible should be developed forthwith. QEC is directed to address the decommissioning and environmental cleanup plan for the existing site as well as the corresponding costs at the time the new Grise Fiord plant is proposed to be included in rate base.

5.0 URRC RECOMMENDATION

- 1. Having considered the foregoing matters, the URRC recommends that the major capital project permit approval for construction of the new power plant in Grise Fiord be granted, in accordance with the Application.
- 2. The URRC recommends the prudence of the cost of construction of the project be examined at the time the project is proposed to be included in rate base.
- 3. The URRC recommends QEC be directed to address the decommissioning and environmental cleanup plan for the existing site as well as the corresponding costs at the time the new Grise Fiord project is proposed to be included in rate base, and further, that site restoration and environmental cleanup costs be reflected in the annual amortization rates and amortization expense for regulatory purposes.
- 4. Nothing in this Report shall prejudice the URRC in its consideration of any other matters respecting QEC.

ON BEHALF OF THE

UTILITY RATES REVIEW COUNCIL OF NUNAVUT

Crf

DATED: February 20, 2014 Raymond Mercer Chair