

DELIVERED BY HAND

February 7, 2017

Board of Commissioners  
of Public Utilities  
P.O. Box 21040  
120 Torbay Road  
St. John's, NL A1A 5B2

Attention: G. Cheryl Blundon  
Director of Corporate Services  
and Board Secretary

Ladies & Gentlemen:

**Re: Application for approval of Capital Expenditures supplemental to Newfoundland Power Inc.'s (the "Company") 2017 Capital Budget Application, and for Approval of a Contribution In Aid of Construction for construction of a Distribution Line for the St. Lawrence Fluorspar Mine**

***The Application***

Please find enclosed the original and nine copies of an application (the "Application") for approval of capital expenditures supplemental to Newfoundland Power's approved 2017 capital budget. The proposed capital expenditures are in relation to 2 capital projects as follows:

1. Replacement of a substation transformer at the Company's Riverhead Substation; and
2. Construction of a 3-phase distribution feeder line between Newfoundland Power's Laurentian Substation and the fluorspar mine operated by Canada Fluorspar (NL) Inc. ("CFI") at St. Lawrence.

The Application also seeks approval of the contribution in aid of construction ("CIAC") the Company proposes to charge CFI in relation to the construction of the line to serve their mine facility.

***Riverhead Substation Transformer***

Routine oil sampling undertaken in October 2016 at Riverhead Substation indicated the presence of a fault condition in the substation's only power transformer. The transformer was taken out of service immediately and further testing confirmed the likelihood of an internal arcing fault condition within the transformer. Further assessment performed by a transformer consultant

**Newfoundland Power Inc.**

55 Kenmount Road • P.O. Box 8910 • St. John's, NL A1B 3P6

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resulted in a finding that the transformer had reached the end of its service life and should be replaced. The total required capital expenditures associated with replacement of the Riverhead Substation transformer are estimated at \$1,475,000. A detailed report is included as Schedule C to the Application.

### ***St. Lawrence Distribution Feeder***

CFI is developing a fluorspar mining facility near the Town of St. Lawrence on the Burin Peninsula. In order to provide the 3-phase supply required by CFI, it is necessary to construct approximately 8 kilometres of new distribution line from Laurentian Substation, along Route 220 and the new mine access road, to the fluorspar mining facility. The total required capital expenditures associated with the new distribution feeder are estimated at \$1,354,000. A detailed report on this project is included as Schedule D to the Application.

In accordance with the Company's *CIAC Policy for General Service Customers* (the "Policy"), CFI is required to pay a CIAC. Based on information provided by CFI, the Company Investment provided for in the Policy has been calculated at \$468,000. The CIAC, including a deposit paid in advance for detailed engineering, is \$886,056.

### ***Process Matters***

The Application is filed in accordance with the revised Capital Budget Application Guidelines issued in October 2007 (the "Guidelines"), in particular, part *B.1. Application for Approval of Supplemental Capital Expenditures*. The Guidelines provide for approval of a supplemental capital expenditure where a utility determines that a capital expenditure which was not anticipated and included in the annual capital budget is necessary in the year and should not be delayed until the following year. The capital expenditures associated with the Riverhead power transformer replacement were not anticipated at the time of preparation of the Company's 2017 Capital Budget Application. Similarly, details of the fluorspar mine's service requirements were not available when the 2017 Capital Budget Application was filed. It is necessary to proceed with both projects in 2017 and delaying either project until 2018 is not feasible.

The Schedules to the Application are presented in a manner consistent with the Company's annual capital budget filings. Schedule A summarizes the capital expenditures by asset class. Schedule B provides project descriptions and details on project expenditures as prescribed by the Guidelines. Schedule C is a report titled *Riverhead Substation Power Transformer Replacement* which provides full details of the requirement to replace the substation transformer. Schedule D is a report titled *Supply of 3-Phase Power St. Lawrence Fluorspar Mining Facility* which provides details on the selection and design of the new feeder and the calculation of the contribution in aid of construction to be paid by CFI.

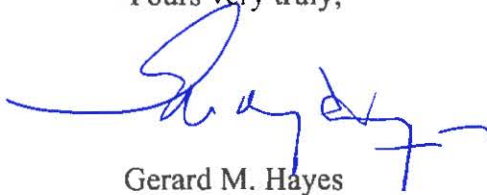
### **Newfoundland Power Inc.**

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***Concluding***

A draft of the Order requested is enclosed for the Board's convenience. If there are any questions in relation to this matter, please contact the undersigned at the direct number noted below.

Yours very truly,

A handwritten signature in blue ink, appearing to read 'G. Hayes', with a stylized flourish at the end.

Gerard M. Hayes  
Senior Counsel

Enclosure

c. Tracey Pennell  
Newfoundland and Labrador Hydro

Dennis Browne, QC  
Browne Fitzgerald Morgan & Avis

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**IN THE MATTER OF** the *Public Utilities Act*, (the "Act"); and

**IN THE MATTER OF** an Application by Newfoundland Power Inc. (the "Applicant") for:  
(i) approval to proceed with the construction and purchase of certain improvements and additions to its property pursuant to Section 41(3) of the Act, and  
(ii) approval of a contribution in aid of construction ("CIAC") for a three-phase service for Canada Fluorspar (NL) Inc. ("CFI") pursuant to s. 41(5) of the Act.

**TO:** The Board of Commissioners of Public Utilities (the "Board")

**THE APPLICATION OF** Newfoundland Power Inc. (the "Applicant") **SAYS THAT:**

**A. Introductory**

1. The Applicant is a corporation duly organized and existing under the laws of the Province of Newfoundland and Labrador, is a public utility within the meaning of the Act, and is subject to the provisions of the *Electrical Power Control Act, 1994*.
2. The Applicant operates transmission lines, distribution lines and substations to deliver electricity to customers throughout its service territory on the island portion of the Province of Newfoundland and Labrador.
3. The Application proposes total 2017 capital expenditures of \$2,829,000 as summarized in Schedule A.

**B. Riverhead Transformer Replacement**

4. The Applicant's Riverhead Substation (the "Substation") is a 12.5 kV distribution substation located on Salmonier Line in the community of Riverhead. The Substation's 2 distribution feeders serve approximately 900 customers in Riverhead, Mall Bay, Admiral's Beach, St. Mary's, Gaskiers-Point Le Haye, St. Vincent's, St. Stephens and Peter's River.
5. An oil sample obtained from the Substation's only power transformer in October 2016 during routine annual maintenance indicated high levels of acetylene, an indicator of a fault condition within the transformer. A second sample taken in November 2016 confirmed the initial results and the Applicant immediately deployed and installed a portable substation at the Substation, and removed the 49 year old power transformer from service. A subsequent condition assessment by a transformer consulting service has

shown that the transformer has reached the end of its useful life, and repairing the transformer would not be cost-effective. The most cost-effective option for continuing to provide safe, reliable electric service to the customers served by the Substation is to replace the transformer at a cost of \$1,475,000. Schedule B contains a formal description of the project.

6. Schedule C to this Application is a report titled *Riverhead Substation Power Transformer Replacement, January 2017* which details the results of the transformer condition assessment and provides estimates of the expenditures necessary to replace the transformer.

### **C. St. Lawrence Line Extension**

7. CFI is constructing a fluorspar mining facility near the Town of St. Lawrence, and requires a 3-phase power supply. To provide the required service, CFI has requested that the Applicant construct an 8 kilometre 3-phase distribution line (the "Extension") at a cost of \$1,354,000. Schedule B contains a formal description of the project.
8. A contribution in aid of construction (CIAC) for the Extension has been calculated in accordance with Clause 5(e) of the CIAC Policy: Distribution Line Extensions and Upgrades to General Service Customers, approved by Order No. P.U. 27 (2005), dated November 2, 2005 (the "Policy"). The Extension will supply service to a mining facility with an estimated peak demand of 2,874 kVA. The CIAC thus calculated is eight hundred eighty six thousand fifty six dollars (\$886,056.00), excluding HST.
9. The estimated demand and energy consumption for the facility is based on information supplied by CFI.
10. Schedule D to this Application is a report titled *St. Lawrence Fluorspar Mine Feeder Extension, January 2017* which details the alternatives for supplying CFI's mining facility, the required expenditures, and the calculation of the proposed CIAC to be paid by CFI.
11. Clause 10(ii) of the Policy states that the Applicant shall apply to the Board for approval of all line extensions or upgrades involving CIACs where the costs of the line extension or upgrade are calculated pursuant to Clause 5(e).

### **D. Justification and Relief Requested**

12. The Applicant submits that the proposed expenditures for 2017 as described in paragraphs 5 and 7 hereof, are necessary to provide service and facilities which are reasonably safe and adequate and just and reasonable, all as required pursuant to Section 37 of the Act.

13. The proposed CIAC as calculated in Schedule D is necessary to ensure that the Applicant's investment in the Extension is compensatory over the useful life of the extension and will not be to the detriment of the Applicant's other customers. The CIAC is calculated in accordance with the Policy.
14. Communications with respect to this Application should be sent to Gerard Hayes, Counsel for the Applicant.
15. **THE APPLICANT REQUESTS** that the Board approve:
  - (i) pursuant to Section 41 (3) of the Act, the capital expenditures associated with the purchase and construction of the improvements and additions to the Applicant's property as set out in this Application; and
  - (ii) pursuant to Section 41 (5) of the Act, the CIAC as calculated in Schedule D.

**DATED** at St. John's, Newfoundland and Labrador, this 7<sup>th</sup> day of February, 2017.

**NEWFOUNDLAND POWER INC.**



Gerard M. Hayes  
Counsel for the Applicant  
Newfoundland Power Inc.  
P.O. Box 8910  
55 Kenmount Road  
St. John's, Newfoundland A1B 3P6

Telephone: (709) 737-5609  
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**IN THE MATTER OF** the *Public Utilities Act*, (the "Act"); and

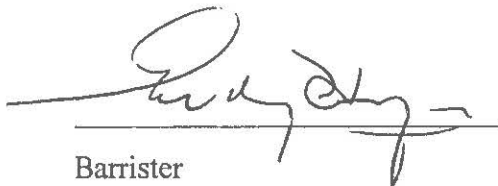
**IN THE MATTER OF** an Application by Newfoundland Power Inc. (the "Applicant") for:  
(i) approval to proceed with the construction and purchase of certain improvements and additions to its property pursuant to Section 41(3) of the Act, and  
(ii) approval of a contribution in aid of construction ("CIAC") for a three-phase service for Canada Fluorspar (NL) Inc. ("CFT") pursuant to s. 41(5) of the Act.

**AFFIDAVIT**

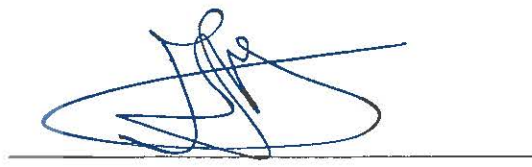
I, Gary Murray, of St. John's in the Province of Newfoundland and Labrador, make oath and say as follows:

1. That I am Vice-President, Engineering and Operations of Newfoundland Power Inc.
2. To the best of my knowledge, information and belief, all matters, facts and things set out in this Application are true.

**SWORN** to before me at St. John's  
in the Province of Newfoundland and  
Labrador this 7<sup>th</sup> day of February, 2017:



Barrister



Gary Murray

**2017 CAPITAL BUDGET SUPPLEMENTAL**

<b><u>Asset Class</u></b>	<b><u>Budget (000s)</u></b>
1. Substations	\$1,646
2. Distribution	\$1,183
<b>Total</b>	<b><u>\$ 2,829</u></b>



**2017 CAPITAL PROJECTS (BY ASSET CLASS)**

<b><u>Capital Projects</u></b>	<b><u>Budget (000s)</u></b>	<b><u>Description<sup>1</sup></u></b>
<b>1. Substations</b>		
Riverhead Substation Transformer Replacement	\$ 1,475	2
Laurentian Substation Feeder Termination	171	4
<b><i>Total Substations</i></b>	<b>\$ 1,646</b>	
<b>2. Distribution</b>		
New Laurentian-02 Feeder	\$ 1,183	7
<b><i>Total Distribution</i></b>	<b>\$ 1,183</b>	
<b><i>Total Supplemental Capital Expenditure</i></b>	<b>\$ 2,829</b>	

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<sup>1</sup> Project descriptions can be found in Schedule B at the page indicated.

**SUBSTATIONS**

**Project Title: Riverhead Substation Transformer Replacement**

**Project Cost: \$1,475,000**

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### **Project Description**

Riverhead Substation (RVH) was built in 1969 as both a transmission and distribution substation. The transmission portion of the substation contains two 66 kV transmission lines, 94L to St. Catherines Substation, and 95L to Trepassey Substation. There is a single 5/6.7 MVA, 66kV to 25/12.5kV power transformer (RVH-T1) which provides voltage to the 12.5kV distribution bus infrastructure. There are 2 feeders, RVH-01 and RVH -02, which serve 897 customers in the community of Riverhead and surrounding areas.

On October 13, 2016, routine annual maintenance was completed on the RVH-T1 which included an oil sample for gas analysis. The oil sample analysis showed high levels of acetylene, indicating a potential arcing fault condition within the transformer. An additional oil sample was taken which confirmed the results. This prompted an internal inspection of RVH-T1 which revealed evidence of extensive charred paper insulation debris, confirming the existence of an arcing fault condition within the transformer.

This Substation project involves replacement of the transformer. The report titled *Riverhead Substation Power Transformer Replacement* included as Schedule C provides detailed information on the project.

### **Justification**

The oil sample analyses showed, and subsequent internal inspection confirmed, high levels of acetylene within the transformer. A consultant specializing in transformer services concluded that the 49 year old transformer is at the end of its useful life. The consultant also concluded it would not be cost-effective to repair due to the extensive refurbishment that would be required. For these reasons, replacement of the transformer is the only viable option.

The project is justified upon the need to maintain safe, reliable electrical service to customers.

This project was not included in the 2017 Capital Budget Application as all prior testing of the RVH-T1 transformer did not indicate any problems with the unit. The requirement for this project came about as a result of testing, inspection, and assessment results that were completed in the fall of 2016. These results clearly indicate that an arcing fault condition exists within the transformer and that it has reached the end of its useful life.

## Projected Expenditures

Table 1 provides a breakdown of the proposed expenditures for 2017 and a projection of expenditures through 2021.

<b>Table 1</b> <b>Project Cost</b> <b>(000s)</b>				
<b>Cost Category</b>	<b>2017</b>	<b>2018</b>	<b>2019 - 2021</b>	<b>Total</b>
Material	\$1,121	-	-	\$1,121
Labour – Internal	170	-	-	170
Labour – Contract	-	-	-	-
Engineering	155	-	-	155
Other	29	-	-	29
<b>Total</b>	<b>\$1,475</b>	<b>\$0</b>	<b>\$0</b>	<b>\$1,475</b>

## Costing Methodology

The budget estimate for this project is based on an engineering cost estimate of the required work.

To ensure this project is completed at the lowest possible cost consistent with safe and reliable service, all material has been obtained through competitive tendering.

## Future Commitments

This is not a multi-year project.

**Project Title:** Laurentian Substation Feeder Termination

**Project Cost:** \$171,000

### Project Description

This Substations project is required to provide substation equipment necessary for the addition of a new distribution feeder at Laurentian Substation (“LAU”). The project involves the termination of a new 12.5 kV feeder LAU-02 at LAU.

### Justification

This project is necessary to meet the 3-phase load requirements of the customer’s mining facility at St. Lawrence. The mining facility is approximately 4 kilometres away from the existing distribution feeder. The existing distribution feeder would require upgrades and extension to supply the customer’s 3-phase load. A report detailing the expenditures required to meet the 3-phase load needs of the customer is attached to the Application as Schedule D.

A portion of the cost of this project will be recovered from the customer through a contribution in aid of construction.

### Projected Expenditures

Table 1 provides a breakdown of the proposed expenditures for 2017 and a projection of expenditures through 2021.

<b>Table 1</b> <b>Projected Expenditures</b> <b>(000s)</b>				
<b>Cost Category</b>	<b>2017</b>	<b>2018</b>	<b>2019 - 2021</b>	<b>Total</b>
Material	\$105	-	-	\$105
Labour – Internal	21	-	-	21
Labour – Contract	-	-	-	-
Engineering	41	-	-	41
Other	4	-	-	4
<b>Total</b>	<b>\$171</b>	<b>\$0</b>	<b>\$0</b>	<b>\$171</b>

### Costing Methodology

The budget estimate for this project is based on engineering estimates.

To ensure this project is completed at the lowest possible cost consistent with safe and reliable service, all material and contract labour will be obtained through competitive tendering.

**Future Commitments**

This is not a multi-year project.

**DISTRIBUTION**

**Project Title:** New Laurentian-02 Feeder

**Project Cost:** \$1,183,000

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### **Project Description**

Newfoundland Power's Laurentian Substation ("LAU") is a 12.5 kV distribution substation located near the community of St. Lawrence, on the Burin Peninsula. LAU has one distribution feeder serving approximately 707 customers throughout a wide area including the communities of St. Lawrence, Little St. Lawrence and Herring Cove.

The proposed capital expenditures are associated with a project to construct a new 8 km distribution feeder LAU-02 to serve the Canada Fluorspar (NL) Inc. mining facility. The customer requires 3-phase power for its fluorspar mine operations at St. Lawrence. The report titled *Supply of 3-Phase Power St. Lawrence Fluorspar Mining Facility* is included as Schedule D providing detailed information on the project.

### **Justification**

This project is necessary to meet the 3-phase load requirements of the customer's mining facility at St. Lawrence. The mining facility is approximately 4 kilometres away from the existing distribution feeder. The existing distribution feeder would require upgrades and extension to supply the customer's 3-phase load. A report detailing the expenditures required to meet the 3-phase load needs of the customer is attached to the Application as Schedule D.

A portion of the cost of this project will be recovered from the customer through a contribution in aid of construction.



### Projected Expenditures

Table 1 provides a breakdown of the proposed expenditures for 2017 and a projection of expenditures through 2021.

<b>Table 1</b> <b>Project Cost</b> <b>(000s)</b>				
<b>Cost Category</b>	<b>2017</b>	<b>2018</b>	<b>2019 - 2021</b>	<b>Total</b>
Material	\$442	-	-	\$442
Labour – Internal	228	-	-	228
Labour – Contract	283	-	-	283
Engineering	57	-	-	57
Other	173	-	-	173
<b>Total</b>	<b>\$1,183</b>	<b>\$0</b>	<b>\$0</b>	<b>\$1,183</b>

### Costing Methodology

The budget estimate for this project is based on an engineering cost estimate of the required work.

To ensure this project is completed at the lowest possible cost consistent with safe and reliable service, all material has been obtained through competitive tendering.

### Future Commitments

This is not a multi-year project.

**Riverhead Substation  
Power Transformer Replacement**

**January 2017**

Prepared by:

Mike Power, P. Eng.

Approved by:

John Pardy, P. Eng.



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## **1.0 Introduction**

Newfoundland Power's Riverhead Substation ("RVH") is a 12.5 kV distribution substation located on Salmonier Line in the community of Riverhead. RVH has been owned and operated by Newfoundland Power ("the Company") since 1972.<sup>1</sup> RVH is supplied by the 94L/95L 66 kV radial transmission system that originates from Blaketown Substation as shown on the map in Appendix A. RVH-T1 is the only substation power transformer located at RVH.

Routine annual transformer maintenance completed on October 13, 2016 indicated the presence of a fault condition on RVH-T1. On November 6, 2016, RVH-T1 was taken out of service and underwent an internal inspection that confirmed the likelihood of an internal arcing fault condition within the transformer. Further assessment performed by van Kooy Transformer Consulting Services Inc. resulted in the recommendations that it would be prudent to remove this transformer from service and that it would not be cost effective to undertake the repair of the unit.

This report recommends the immediate replacement of RVH-T1 with a new unit.

## **2.0 Background**

RVH-T1, company number 200242, is a 49 year old, 6.67 MVA, 66-25/12.5 kV substation power transformer manufactured by Westinghouse. RVH supplies power to 897 customers through 2 RVH distribution feeders that serve the communities of Riverhead, Mall Bay, Admiral's Beach, St. Mary's, Gaskiers – Point Le Haye, St. Vincent's, St. Stephens, and Peter's River. A single line diagram of RVH is included in Appendix B.

On October 13, 2016, Newfoundland Power obtained an oil sample during routine annual maintenance on RVH-T1.<sup>2</sup> The oil sample was sent to a laboratory in Calgary, Alberta for analysis and diagnostics.<sup>3</sup> The dissolved gas in oil analysis results indicated high levels of acetylene, which is an indicator of an internal arcing fault condition within the transformer.<sup>4</sup>

On November 1, 2016, to confirm the initial results, a second oil sample was taken and the results of that analysis confirmed that high levels of acetylene were present.<sup>5</sup> These test results prompted the immediate deployment and installation of Portable Substation No. 1 ("P1") to RVH to allow RVH-T1 to be removed from service and isolated for an internal inspection.

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<sup>1</sup> In Board Order No. 48 (1972) the electrical system between the communities of Whitbourne and Trepassey, which includes RVH, was transferred by the Board of Trustees of the Power Distribution District of Newfoundland and Labrador to Newfoundland Light and Power Company Ltd.

<sup>2</sup> The analysis of oil samples is part of the Company's transformer condition monitoring program.

<sup>3</sup> The analytical laboratory in Calgary, Alberta is owned and operated by TJ/H2b Analytical Services Inc. This company specializes in diagnostic testing of oil, gas and other insulating materials used in transformers, power circuit breakers and load tap-changers.

<sup>4</sup> Dissolved gas analysis is useful in evaluating transformer health, as the breakdown of electrical insulating materials inside a transformer generates gases within the transformer. Any sharp increase over time in key gas concentration is indicative of a potential problem within the transformer.

<sup>5</sup> The transformer condition assessment report that shows the results of the last 5 oil samples for RVH-T1, dating back to 2014, is contained in Appendix C. It can be seen that the acetylene levels from the last 2 samples in the fall of 2016 are significantly higher than those recorded in the previous 3 samples.

On November 6, 2016, the internal inspection of RVH-T1 revealed evidence of extensive charred paper insulation debris, confirming the existence of an internal arcing fault condition within the transformer. As a result, RVH-T1 was not placed back in service and a full condition assessment of RVH-T1 was undertaken immediately. Additionally, a portable substation is required to remain in service at RVH to carry the substation load indefinitely.<sup>6</sup> Portable substations are designed for mobility, and are not intended for long-term use in a substation situation. Pictures of RVH-T1, P1, and the charred paper insulation debris are included in Appendix D.

### **3.0 Transformer Assessment**

Shortly after the internal inspection of RVH-T1, the Company engaged van Kooy Transformer Consulting Services Inc. (“the Consultant”) to perform a transformer condition assessment on RVH-T1.<sup>7</sup> The results of the dissolved gas in oil analysis, internal inspection results and RVH-T1 specifications were all forwarded to the consulting firm for review and to aid in their assessment.

On November 25, 2016, Newfoundland Power received the Consultant’s transformer condition assessment for RVH-T1. The assessment indicated that:

- i) The data provided shows strong evidence of transformer deterioration resulting in a recommendation not to return this transformer to service.
- ii) This 49 year old transformer has reached the end of its useful life and it would not be cost-effective to repair this transformer due to the extensive refurbishment that would be required to bring it back to operational condition.

The transformer condition assessment completed by the Consultant is included in Appendix E.

### **4.0 Assessment of Alternatives**

In general, the alternatives for addressing an in-service power transformer failure involve the following:

- (i) The complete refurbishment of the existing power transformer, typically including extensive internal component disassembly and replacement.
- (ii) The replacement of the power transformer with an existing unit, if one is available.
- (iii) The replacement of the power transformer with a new unit.

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<sup>6</sup> P1 is currently in-service at RVH but will be replaced with another portable substation before the RVH-T1 replacement is complete.

<sup>7</sup> The Consultant has more than 35 years of experience in the transformer services industry. The Company has been using the Consultant in various aspects of its power transformer asset management program since 2002.

The estimated cost of refurbishing a power transformer of this vintage is similar to the purchase price of a new unit. Any benefit associated with a marginally lower refurbishment cost, and possible expedited delivery compared to a new unit, is offset by a reduced warranty period and additional losses associated with the 50 year old core. As a result, replacing a power transformer of this vintage is the least cost alternative when compared to refurbishing the existing unit.

Newfoundland Power does not have any existing units, either spare or in service, that could be used as a replacement transformer for RVH-T1.

Based on RVH-T1's (i) age, (ii) high levels of acetylene, (iii) presence of charred paper insulation debris, and (iv) the Consultant's report, the recommended least cost alternative is to replace RVH-T1 with a new unit in 2017.

## **5.0 Project Description**

This project involves the removal from service of the existing RVH-T1 and the purchase and installation of a new transformer. A portable substation will be utilized to carry the RVH load until the new power transformer is in service.

Currently, voltage regulation in RVH is controlled by a bank of voltage regulators that are mounted on the secondary side of RVH-T1 within the substation yard. The current design standard for distribution bus voltage regulation is that new power transformers are equipped with on load tap changers ("OLTC") to eliminate the requirement for a separate bank of voltage regulators within the substation. As a result, the new power transformer will be equipped with an OLTC and the existing bank of voltage regulators will be repurposed.<sup>8</sup>

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<sup>8</sup> The new OLTC equipped power transformer will be equipped with additional control and communication equipment, which will also be installed in RVH as part of this project. The addition of the control and communication equipment will allow the transformer to be remotely monitored and controlled from the SCADA system.

## 6.0 Project Cost

The current estimate to complete all work associated with the replacement of RVH-T1 is \$1,475,000. Table 1 below provides a detailed breakdown of the total project cost.

**Table 1**  
**2017 Project Costs**  
**(\$000's)**

<b>Cost Category</b>	<b>Expenditure</b>
Material	\$1,121
Labour	170
Engineering	155
Other	29
<b>Total</b>	<b>\$1,475</b>

## 7.0 Project Schedule

The following high level schedule has been established to ensure that RVH is returned to its normal operating configuration as soon as possible.

- February 2017 – Award contract for supply of new transformer
- June 2017 – Delivery of new transformer at RVH
- July 2017 – All RVH work completed and new transformer placed in service

## 8.0 Concluding

RVH-T1 is a critical piece of equipment at RVH. It is recommended that this substation power transformer be replaced as described in this report.

This project was not included in the 2017 Capital Budget Application as all prior transformer testing completed on RVH-T1 did not indicate any problems with the unit. The requirement for this project came about as a result of the testing, inspection, and assessment results that were completed in the fall of 2016. These results clearly indicate that an arcing fault condition exists within RVH-T1 and that this transformer has reached the end of its useful life.

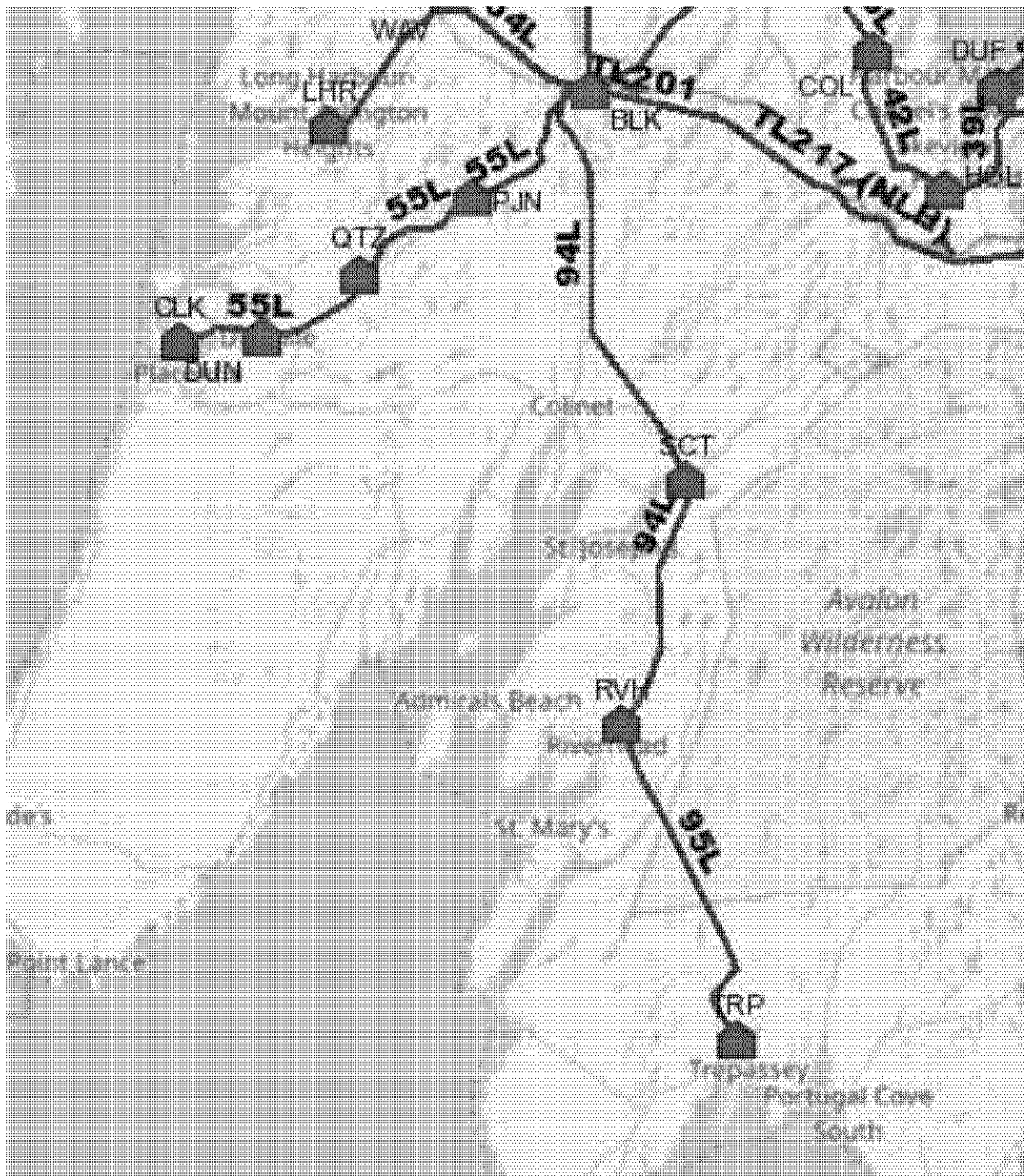
This project should be completed in 2017, as deferring the project until 2018 would require that a portable substation remain at RVH for at least another year. This delay would make a portable substation unavailable for its normal use. This could impact the delivery of the Company's 2017 and 2018 capital programs. It would also affect the 2017 and 2018 power transformer maintenance schedules and would reduce the number of portable substations available for meeting their primary function of responding to emergencies.

**Appendix A**

**94L/95L 66 kV Radial Transmission System Map**



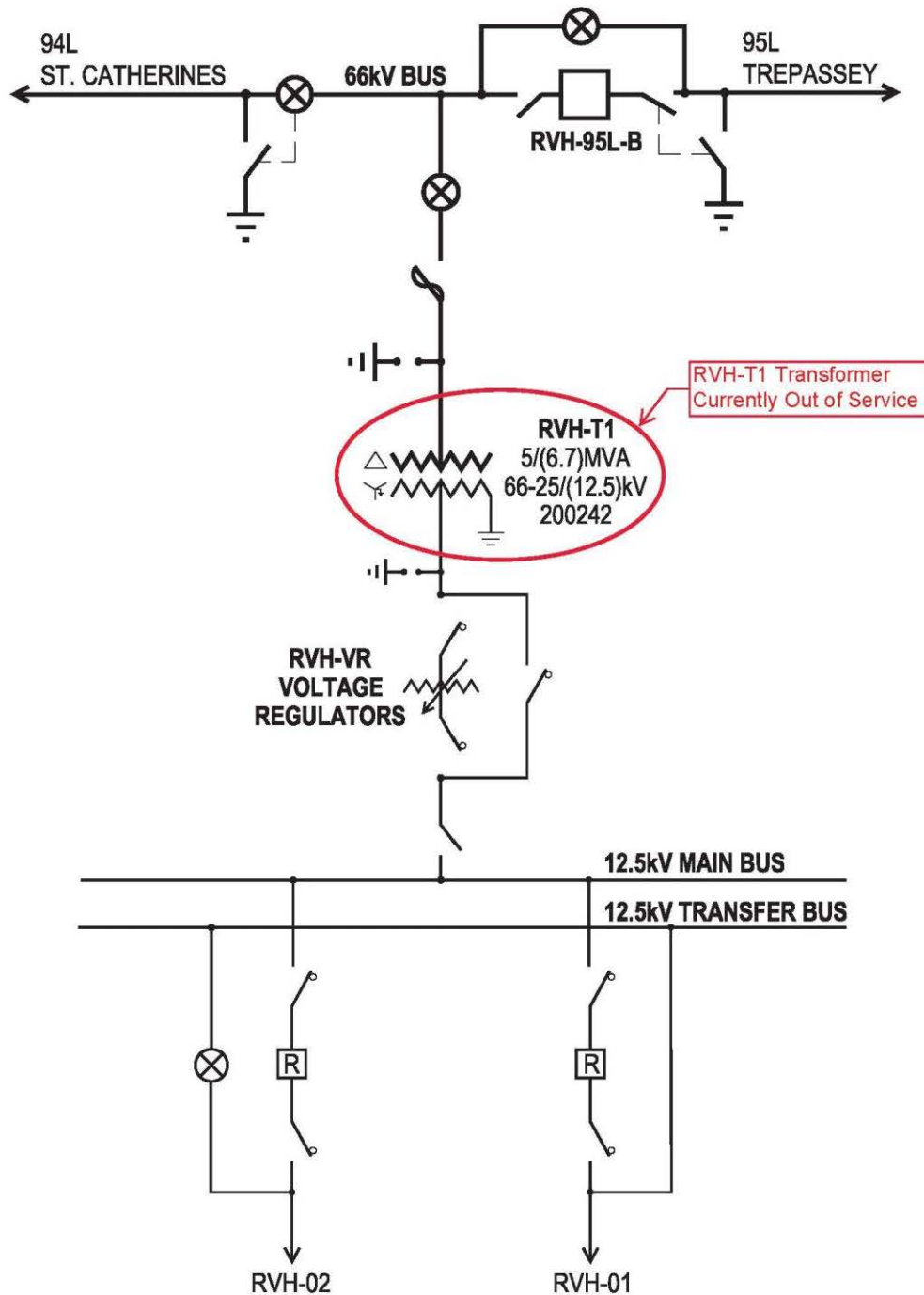
94L/95L 66 kV Radial Transmission System Map



**Appendix B**

**Riverhead Substation Single-Line Diagram**

### Riverhead Substation Single Line Diagram



**Appendix C**

**TJ/H2B Analytical Services Inc. Transformer Condition Assessment**



## Transformer Condition Assessment

TM

Glenn Samms  
Newfoundland Power  
P.O. Box 8910  
55 Kenmount Road  
St. John's, NF A1B 3P6

Location : RIVERHEAD  
Bank & Phase : RVH-T1  
Serial Number : A3S-6054  
Manufacturer : West  
Date Mfgd : 1968  
Size (kVA) : 6700  
Rating kV: 66

Date : 11-04-2016  
Report Number : 5057106  
Fluid volume : 1510 G  
Fluid type : Mineral Oil  
Preservation : Conservator  
Cooling : ONS/ONP  
Core & coil wt. : 12800  
Impedance :

		Sample Date :	11/1/2016	10/13/2016	10/15/2015	3/25/2015	3/20/2014
		Laboratory No. :	5057106	5056914	5053191	5050852	5047250
		Container No. :	34622	34152	31758	30174	25945
		Temperature :		30	33	28	20
H2	Hydrogen	(ppm) :	24	22	13	32	10
CH4	Methane	(ppm) :	11	10	5	27	3
C2H6	Ethane	(ppm) :	8	7	6	12	2
C2H4	Ethylene	(ppm) :	83	75	73	119	6
C2H2	Acetylene	(ppm) :	147	133	3	11	0
CO	Carbon monoxide	(ppm) :	58	66	71	118	20
CO2	Carbon dioxide	(ppm) :	877	825	822	956	594
N2	Nitrogen	(ppm) :	78582	77279	80794	88334	60674
O2	Oxygen	(ppm) :	38764	33728	30358	19331	18795
		Total (ppm) :	118554	112145	112145	108940	80104
		TDCG (ppm) :	331	313	171	319	41
		SHL (%) :	5.02	5.32	6.97	6.34	5.72
		ETCG (% in blanket) :	0.10	0.11	0.08	0.16	0.05
Particles	5 to 15 um :		38950	57500	17935	54090	139115
Particles	15 to 25 um :		7850	7150	4220	13710	22260
Particles	25 to 50 um :		4850	3500	2340	6870	12005
Particles	50 to 100 um :		1450	250	295	535	2070
Particles	> 100 um :		250	0	0	0	10
D1533	Moisture	(ppm) :	7	4	14	1	2
D1816	Dielectric BV	(kV) :	22	32	25	24	20
D974	Acid Number	(mg KOH/g) :	0.008	0.009	0.011	0.013	0.013
D971	Interfacial Tension	(dynes/cm) :	37.8	37.8	36.6	38.4	37.4
D1500	Color Number	:	<1.5	<1.5	<1.0	<1.5	<1.5
D924	Power Factor	:	0.038	0.044	0.052	0.043	0.062
D2668	Oxidation Inhibitor	(%) :	0.073	0.073	0.073	0.058	0.069
5 HMF	5 hydroxymethyl-2-furaldehyde	(ppm) :	<0.010	<0.010	<0.010	<0.010	<0.010
2 FAL	2 furaldehyde	(ppm) :	0.045	0.048	0.205	0.025	0.127
2 ACF	2 acetyl furan	(ppm) :	<0.010	<0.010	<0.010	<0.010	<0.010
5 MEF	5 methyl-2-furaldehyde	(ppm) :	<0.010	<0.010	<0.010	<0.010	<0.010
2 FOL	2 furfurol	(ppm) :	<0.010	<0.010	<0.010	<0.010	<0.010
Estimated DP		:	817	807	628	890	688

### Transformer Condition Assessment Diagnostic Evaluation

TCA Assessment : 4\* ID:200242 Sampler: N/A

Sampling Interval : Retest immediately.

Operating Procedure : Consider removal from service. Paper condition is normal.

Comments : Arcing is indicated.

Field Comments : Fluid condition is within acceptable in-service parameters.

TJH2B Analytical Services, Inc. Bay #1, 2835 - 19 Street N.E. Calgary, AB T2E 7A2 Canada Phone: (403) 282-8542

Sacramento, CA (916) 361-7177 / Jefferson, LA (504) 734-9722 / Sun Prairie, WI (608) 825-2022 / Kennett Square, PA (610) 925-0688

Glen Waverly, Australia +61 3 9574 9467 / Chester, United Kingdom +44 0 151 339 5100

## **Appendix D**

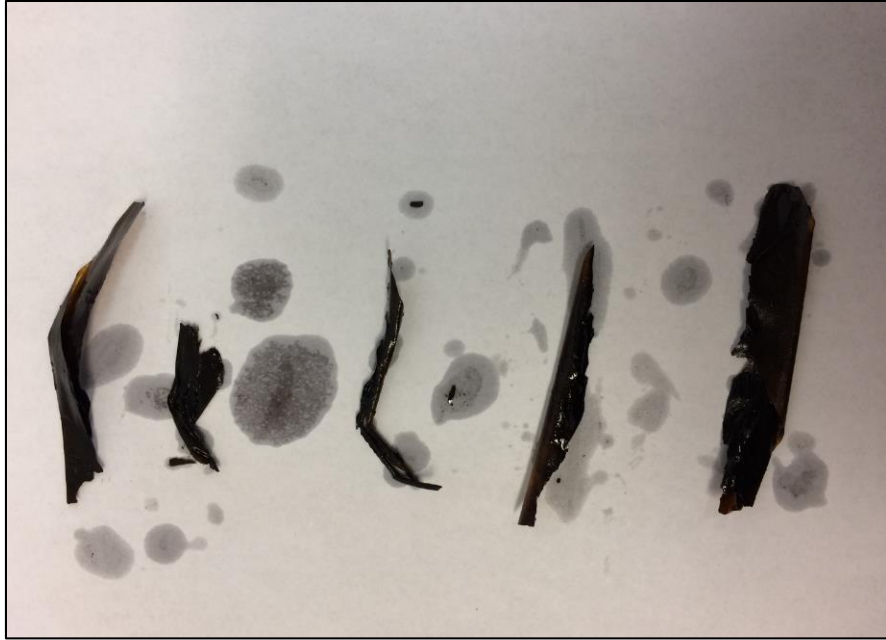
### **Pictures**



**Riverhead Substation RVH-T1 Power Transformer**



**Portable Substation No.1 installed at Riverhead Substation**

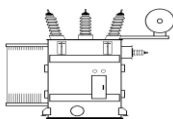


**Charred paper insulation debris removed from the  
Riverhead distribution power transformer**



**Appendix E**

**van Kooy Transformer Consulting Services Inc.  
Transformer Condition Assessment**



November 25, 2016

Rev. 1 January 19, 2017

To: Glenn Samms, Newfoundland Power

Subject: Riverhead Transformer CO. # 200242  
Westinghouse S# 3S6054  
5000/6667 kVA, 66 kV to 25//12.5 kV  
Review of Test Data and Internal Inspection Information  
Condition Assessment

### **Executive Summary**

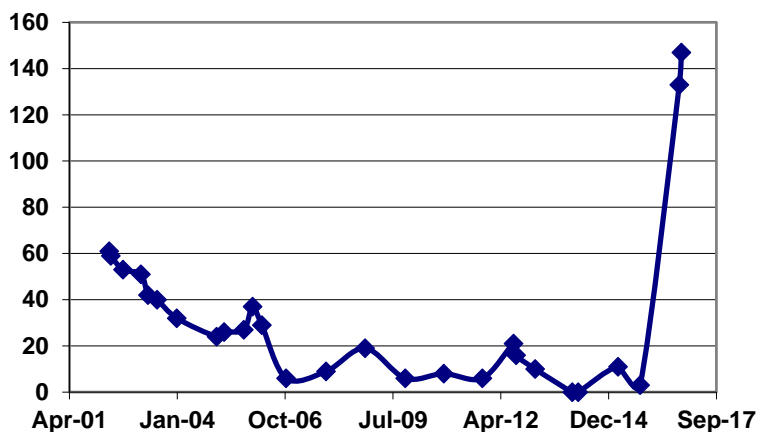
The internal inspection that was prompted by the latest Dissolved Gas in Oil Sample analysis shows strong evidence of deterioration. It would be prudent not to return this transformer to Service.

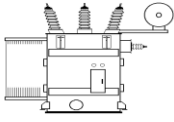
Based on the age of the equipment and the extensive rework required to bring it back to operational condition, it is not cost effective to repair this transformer.

### **Detailed Analysis**

This transformer was manufactured in 1968. A review of the Dissolved gas in Oil Analysis from this transformer shows a long term, perhaps intermittent localized overheating and arcing condition that showed a marked ramp up in October/November 2016.

**3S6054**  
**Dissolved Acetylene in Oil**



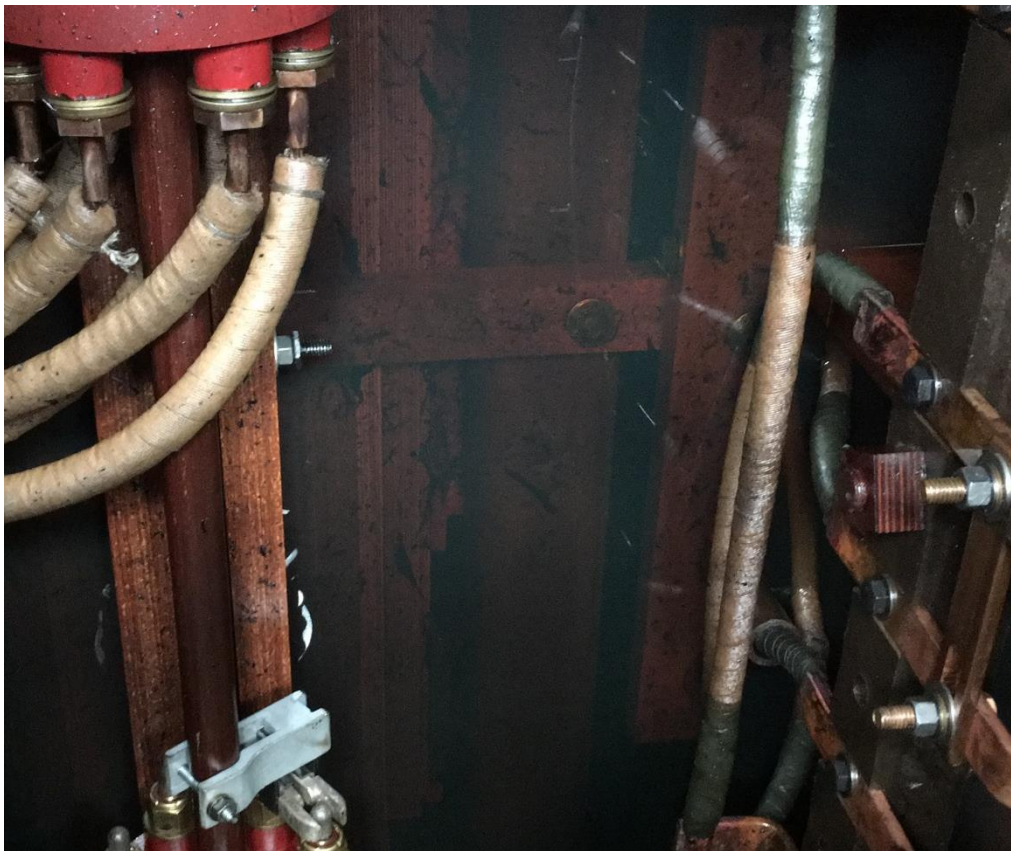


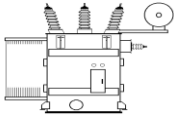
This graph shows the levels of dissolved Acetylene in oil in ppm. Any value over 2 ppm is outside the norm and any level over 10 ppm is of concern.

The graph shows a number of peaks and valleys indicating conditions, perhaps lightning strikes that has resulting in internal phase to phase or phase to ground faults. Until recently, these stress points have been followed by periods of calm where the dissolved Acetylene levels dropped. The last two samples are double the next highest level of the past 15 years and were showing a rapidly worsening trend.

Based on these results, and internal inspection was performed by viewing the internal components through a top cover manhole and dropping to the oil level to allow inspection of the top of the transformer core and coil assembly.

Evidence of extensive charred paper insulation debris was noted.



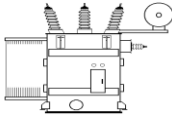


### Paper Insulation Debris Removed from the Transformer



The suspected origin of this charred paper is from interconnecting insulated leads not visible from the top of the transformer assembly.

Further, the transformer was refilled with oil and testing was performed. This testing yielded questionable results. The transformer turns ratio is indicating a problem with 'A' phase and HV winding resistance was not obtainable.



**van Kooy**  
**Transformer Consulting Services Inc.**

Ph. 905 308-9888

Email [john@vankooy.com](mailto:john@vankooy.com)

web site [www.vankooy.com](http://www.vankooy.com)

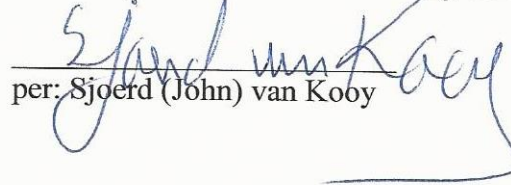
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The test and visual evidence points to a transformer that is at the end of life.

A 49 year old transformer that requires a complete rewind and mechanical refurbishment is not worth repairing. The cost for a fully electrically and mechanically refurbished used transformer (new windings, new bushings and other accessories) is about the same as buying a new transformer although the turnaround time may be less with an expedited repair. The down side of the refurbishment is that the tank and core will be reused and the core of older transformers has much higher loss/more inefficient than modern core material. Further, the repair factory will offer a shorter warranty than a new transformer supplier. Refurbishment of transformers of this vintage is not a cost effective alternative.

Regards,

van Kooy Transformer Consulting Services Inc.

  
per: Sjoerd (John) van Kooy

**Supply of 3-Phase Power  
St. Lawrence Fluorspar Mining Facility**

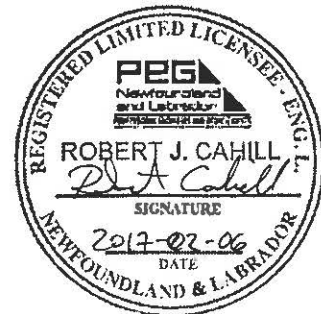
**January 2017**

Prepared by:

Larry Pelley

Approved by:

Robert Cahill, Eng. L.



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7.0 Concluding.....	4

Appendix A: May 9, 2016 Letter to Canada Fluorspar (NL) Inc.

Appendix B: Map Showing New Feeder

Appendix C: Quote Acceptance Form

Appendix D: CIAC Calculation

Appendix E: CIAC Quote Acceptance

## **1.0 Introduction**

Canada Fluorspar (NL) Inc. (“CFI”) is constructing a fluorspar mining facility near the Town of St. Lawrence on the Burin Peninsula. Electricity in the area is supplied from Newfoundland Power’s Laurentian Substation (“LAU”) by the LAU-01 distribution feeder. LAU-01 feeder was constructed in the mid-1960s, and much of the existing distribution infrastructure is of original construction. The existing trunk feeder runs along main roads through the community of St. Lawrence.

In February 2016, Newfoundland Power (“the Company”) received a request from CFI to extend 3-phase power to their fluorspar mining facility. The proposed facility is located approximately 4.0 kilometres from the nearest available supply of 3-phase power. In discussion with CFI and considering project costs, timelines and load requirements, Newfoundland Power developed 3 alternatives to serve the fluorspar mining facility, and completed preliminary cost estimates for each.<sup>1</sup>

To provide the amount of 3-phase power requested by CFI approximately 8 kilometres of new distribution feeder will be constructed along Route 220 and the new mine access road from LAU to the fluorspar mining facility.<sup>2</sup>

## **2.0 Background**

LAU is located just off Route 220 in the Town of St. Lawrence. LAU has one 12.5 kV distribution feeder supplying approximately 710 customers. LAU-01 feeder extends east from LAU, supplying all customers in the St. Lawrence area.

The CFI mining facility is located 4.0 kilometres outside of St. Lawrence, and approximately 8.0 kilometres from LAU along Laurentian Avenue and Director Drive. CFI will construct a new road from Route 220 intersecting Director Drive providing a second 8.0 kilometre route. In correspondence dated March 8, 2016, CFI indicated that the mining project would proceed in 2 phases. Phase 1 is the above ground mine with a 5.2 MVA demand for the first 4 to 5 years. Phase 2 involves development of an underground mine requiring an additional 4.4 MVA of demand. After reviewing CFI’s load requirements and in consideration of construction timelines and costs, Newfoundland Power developed 3 alternatives to serve the customer.

On May 9, 2016, the Company provided a letter to CFI outlining the preliminary contribution in aid of construction (“CIAC”) cost estimates for the 3 alternatives. On May 13, 2016, the Company met with CFI on site to review the alternatives and discuss advantages and disadvantages of each. On May 26, 2016, Newfoundland Power received a signed quote acceptance form and payment of the deposit required to undertake detailed engineering and a final CIAC cost estimate to proceed with CFI’s preferred alternative.<sup>3</sup>

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<sup>1</sup> Appendix A provides a copy of the letter sent to CFI outlining details and preliminary costs for the 3 potential service options.

<sup>2</sup> Appendix B includes a map showing the new feeder to the fluorspar mining facility.

<sup>3</sup> Appendix C provides a copy of the signed quote acceptance form for deposit paid towards detailed engineering and final CIAC cost quote.



### **3.0 Assessment of Service Alternatives**

Three possible service alternatives were considered for the provision of 3-phase electrical service to the CFI mine site.

- Alternative 1 involves the construction of 4.0 kilometres of new distribution line from LAU along Route 220, and following the new access road yet to be constructed. Estimated cost of approximately \$1,115,000 to provide 9.6 MVA of capacity.
- Alternative 2 requires the upgrade of approximately 3.8 kilometres of the existing LAU-01 feeder along Laurentian Avenue and Director Drive to the point of intersection with the new access road yet to be constructed. Estimated cost of approximately \$1,409,000 to provide 9.6 MVA of capacity.
- Alternative 3 involves replacing conductor on approximately 2.0 kilometres of the existing LAU-01 feeder along Director Drive. Estimated cost of approximately \$806,000 to provide 5.2 MVA of capacity.<sup>4</sup>

Each alternative also includes the construction of approximately 4.0 kilometres of new distribution line from the intersection of the new access road and Director Drive to the CFI mining facility.<sup>5</sup>

Preliminary cost analysis for the 3 alternatives was presented to CFI on May 9, 2016. After reviewing each alternative in detail, CFI requested Newfoundland Power move forward with detailed engineering for Alternative 1, the 8.0 kilometre new distribution line from LAU to the CFI mine facility. Due to the increased reliability and future capacity for full Phase 1 and Phase 2 loads, CFI felt that this is the best alternative for them.<sup>6</sup>

---

<sup>4</sup> Load limitations of this alternative would require a 2<sup>nd</sup> CIAC to be applied for in the future in order to provide the required 9.6 MVA capacity at full production. The Phase 2 load requirements could be served by either (1) a new 4.0 kilometre distribution line from LAU along Route 220 to the new mine access road or (2) upgrading the remaining 1.8 kilometres of existing LAU-01 feeder along Laurentian Avenue and Director Drive.

<sup>5</sup> See map attached in Appendix B.

<sup>6</sup> CFI has paid Newfoundland Power a deposit in the amount of \$86,050 to complete a detailed distribution design and planning study required to provide the final CIAC cost for Alternative 1.

#### 4.0 Project Description

The purpose of this project is to provide full 3-phase power to the CFI fluorspar mining facility in St. Lawrence. The project involves the construction of 8.0 kilometres of new distribution line from LAU, along Route 220 and following the proposed access road to the CFI mine facility.<sup>7</sup>

After completion of the detailed distribution design and planning study, based on updated projected mine loads provided August 25, 2016, it was determined that a 2<sup>nd</sup> recloser would be required at the substation creating LAU-02 feeder. The 2<sup>nd</sup> feeder provides the required capacity for full mine construction (Phase 1 and Phase 2) as well as providing improved reliability to the mine site. The new distribution line will be constructed using 477ASC conductor with a capacity of 12.7 MVA.

#### 5.0 Project Cost

The detailed estimate to complete all work associated with the new line extension, including installation of voltage regulators on the feeder and a new recloser at LAU, is approximately \$1,354,000. Table 1 provides a detailed breakdown of the total project cost.

**Table 1**  
**2017 Project Cost**

<b>Description</b>	<b>Distribution</b>	<b>Substations</b>	<b>Total</b>
Material	\$442,000	\$105,000	547,000
Contract Labour	283,000	0	283,000
Labour	228,000	21,000	249,000
Engineering	57,000	41,000	98,000
Other	173,000	4,000	177,000
<b>Total</b>	<b>\$1,183,000</b>	<b>\$171,000</b>	<b>\$1,354,000</b>

#### 6.0 Customer Contribution

CFI's service requirement for 3-phase power requires a significant investment in the Company's distribution system. As outlined in the Company's *Schedule of Rates, Rules and Regulations* and the *CIAC Policy for General Service Customers*, the costs of providing this service, less company investment, must be recovered from the customer.

The calculation of customer contribution for the required distribution line extension is based on construction of 8.0 kilometres of new 3-phase distribution line including poles, crossarms, conductor and associated hardware required to meet current Newfoundland Power construction

<sup>7</sup> In earlier correspondence with CFI dated May 9, 2016, the length of the new distribution line was stated to be 8.6 kilometres. Subsequent to that letter, detailed design for the proposed route reduced the overall line length to 8.0 kilometres.

standards. Also included in the calculation is the installation of voltage regulators and a new recloser at LAU. Table 2 provides a breakdown of the calculation of the required customer contribution.

**Table 2**  
**Calculation of Customer Contribution**

<b>Project Cost</b>	
Construction Cost	\$1,353,890
Less Company Investment	<u>(\$467,834)<sup>8</sup></u>
<b>Total CIAC</b>	<b>\$886,056</b>
Less Deposit for Detailed Engineering	(\$86,050)
Outstanding Customer Contribution	\$800,006

The estimated cost to complete this work is \$1,353,890. The load based company investment is \$467,834 based on the projected 20 year life of the mine. CFI previously paid a deposit of \$86,050 for detailed engineering. The outstanding customer contribution is \$800,006.

CFI requested that the contribution be broken down into specific construction phases to achieve a more flexible payment schedule. Newfoundland Power presented a payment schedule as detailed in the CIAC agreement letter to CFI dated December 5, 2016.<sup>9</sup> The project will be broken down into 4 phases.

- Phase A – initial payment before start of construction (\$221,514)
- Phase B – After 25% of line extension completed (\$221,514)
- Phase C – After 50% of line extension completed (\$177,211)
- Phase D – After 75% of line extension completed (\$179,767)

This offer was presented contingent on receiving Public Utilities Board approval.

## **7.0 Concluding**

CFI is currently in the construction phase for the mining facility. They are at a point in construction where they will need power to the site for construction purposes to proceed as planned. For Newfoundland Power to supply CFI's service requirements, it is necessary construct a new 3-phase distribution line from the Laurentian Substation to the mine site.

The customer has requested 3-phase power as early as possible in 2017. Newfoundland Power will proceed with construction upon receiving Board approval of the application.

<sup>8</sup> Appendix D includes the CIAC calculation, including the calculation of the Company investment.

<sup>9</sup> Appendix E provides a copy of the signed CIAC Agreement letter sent to CFI on December 5, 2016.

**Appendix A**

**May 9, 2016 Letter to Canada Fluorspar (NL) Inc.**



*Newfoundland Power Inc.*

112 Manitoba Drive  
Clareville, NL  
A5A 1K7  
Business: (709) 466-8301  
Facsimile: (709) 466-8380  
newfoundlandpower.com  
undlandpower.com

May 9<sup>th</sup>, 2016.

Canada Fluorspar (NL) Inc.  
P.O. Box 337  
St. Lawrence, NL.  
A0E 2V0

Dear Mr. Frank Pitman,

Thank you for your inquiry regarding the provision of electrical service to the proposed fluorspar mining facility located at St. Lawrence. Newfoundland Power has reviewed the load requirements for the proposed facility and identified three different service options that may be available. Construction costs estimates for each of the options have also been prepared and are attached to this letter.

Please note - at this point in time only preliminary construction cost estimates are being presented. These estimates are based on our best determination of the work required to complete construction of new line extensions or to upgrade existing distribution lines. Once a final service option has been chosen, Newfoundland Power will provide a final construction cost quote based on a detailed engineering design for the chosen route. While the cost estimates presented are preliminary, they do represent a reasonable approximation of the expected costs and provide for a comparable order of magnitude for each option.

The service options are as follows:

Option #1 – construct approximately 8.6 km of new distribution line from the Laurentian Substation, along Route 220, and following a new proposed access road to the mine site (road to be constructed). The cost to construct this section of distribution line is \$1,114,994.

Option #2 – upgrade approximately 3.8 km Newfoundland Power's existing Laurentien-01 distribution feeder along Laurentian Avenue and Director's Drive to the point of intersection with the new access road to the mine site and then construct a further 4.0 km of distribution line to the mine site. The cost to construct this option is \$1,408,909. However, the Company will provide a credit towards the construction costs for this option that reflects the remaining life in the assets being retired. After applying the credit, the portion of the construction costs to be passed to the customer is \$933,446.

Both these options provide 8 MW-capacity for the proposed future load requirements of the mining facility.

Option #3 – replace the conductor on approximately 2.0 km of the Laurentian-01 distribution feeder to upgrade the capacity of the feeder to meet 4 MW loading capacity, then construct a further 4.0 km of distribution line to the mine site. The cost to construct this option is \$805,794. The Company will provide a credit towards the construction costs for this option that reflects the remaining life in the



Join us in the fight against cancer.

assets being retired. After applying the credit, the portion of the construction costs to be passed to the customer is \$711,343. As noted above, this option only provides capacity for a maximum of 4 MW of load. In order to supply the 8 MW-capacity necessary to meet the future load requirements of the mining facility, additional construction would have to be undertaken. The cost of this work would be estimated at that time and would require an additional payment from Canada Fluorspar Inc.

The attached table summarizes the amount of contribution which would be required from Canada Fluorspar Inc. for each option. The amount of contribution is based on the construction costs for each option less the estimated value of company investment based on your projected load requirements.

Newfoundland Power looks forward to meeting with you to further discuss these options. This would allow us to answer any questions you may have regarding the cost estimates and provide any additional information required.

Yours truly,



Larry Pelley  
Engineering Technologist

**St. Lawrence Fluorspar Mining Facility**

Option #1 - Build 4.6 km Line from Laurentian Substation along Highway 220 & Mine Access Road

Option #2 - Upgrade 3.8 km of Existing Lau-02 Feeder along Laurentian Ave and Director's Drive

Option #3 - Reconnector 2.0 km of Existing Lau-02 Feeder along Laurentian Ave

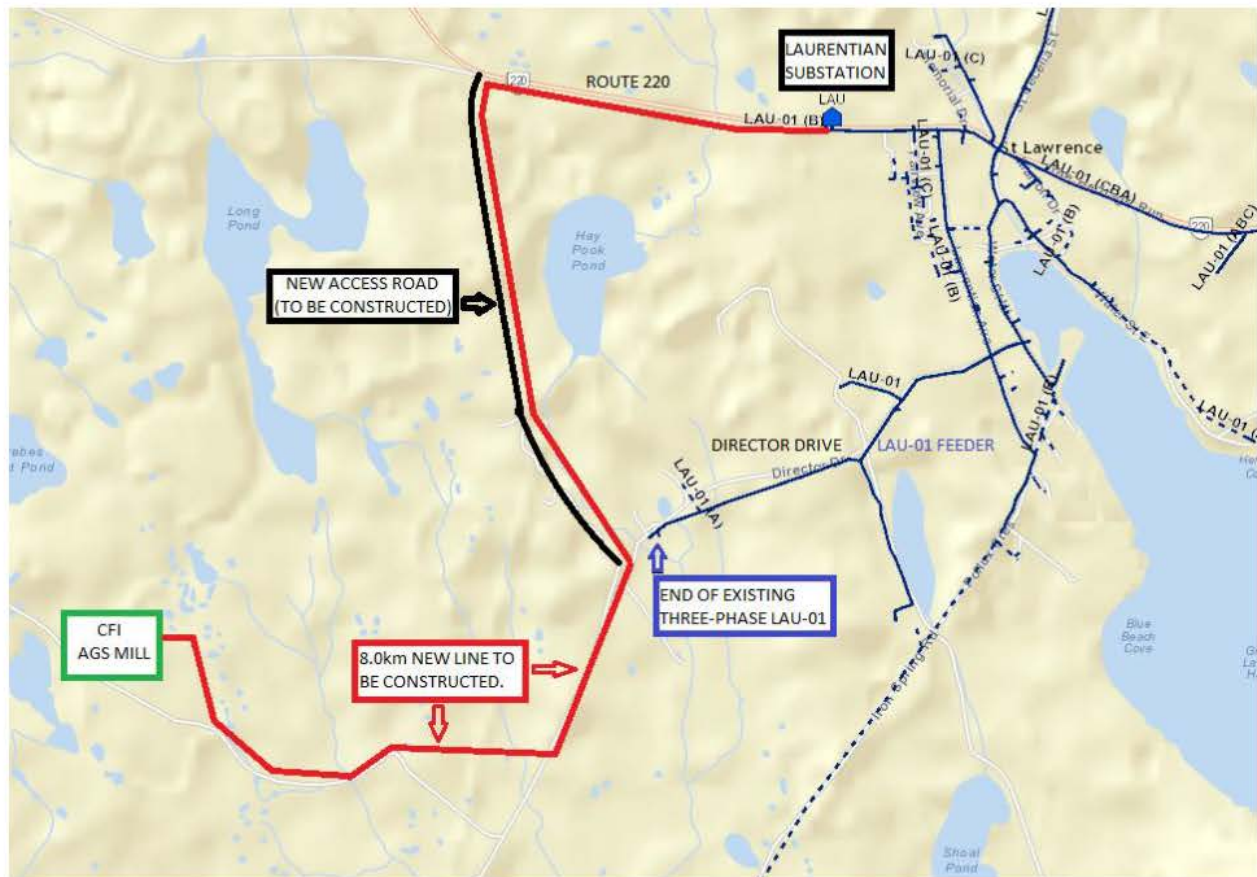
	Option #1	Option #2	Option #3
Construction Cost	\$595,163	\$ 889,078	\$285,963
Construct 4.0 km line (Access road to Site)	\$519,831	\$ 519,831	\$519,831
Total Const. Cost	\$1,114,994	\$1,408,909	\$805,794
Less: Betterment	-	(475,463)	(94,451)
	\$1,114,994	\$ 933,446	\$711,343
Less: Co. Investment	(470,515)	(470,515)	(470,515)
CIAC to Customer	\$644,479	\$ 462,931	\$ 240,828

**Appendix B**

**Map Showing New Feeder**



Map Showing Route for the New Feeder



**Appendix C**

**Quote Acceptance Form**

## Quote Acceptance Form - Technical Work Request



The charges below have been calculated in accordance with the Rules & Regulations governing the provision of service as approved by the Newfoundland and Labrador Board of Commissioners of Public Utilities.

The undersigned ("the Customer") requests Newfoundland Power Inc. ("the Company") to undertake work as detailed below and agrees to pay to the Company a fee of \$86,049.95 (including HST) for the provision of that service.

This quotation is valid until November 25, 2016 after which a new quotation must be calculated to reflect possible changes in labour and material costs.

## Customer Information

TWR Job Reference Number:	<u>N/A</u>	Electricity Account No.	<u>12524419</u>
Customer Name:	<u>Canada Fluorspar Inc.</u>	Service Address:	<u>St. Lawrence</u>
Mailing Address:	<u>P.O. Box 337</u>	Home Telephone No.	<u>709-873-3331</u>
	<u>St. Lawrence, NL</u>	Daytime Telephone No.	
	<u>Canada</u>		
Postal Code:	<u>A0E 2V0</u>		

## Details of service Request and Quotation

Deposit required for detailed engineering	
and CIAC cost calculation for the new line	
extension to the Laurentian Fluorspar Mine site.	
-	
-	

I, Stephen Cole as an authorized representative of Canada Fluorspar Inc  
accept this quote and request Newfoundland Power Inc. to proceed with the work as detailed above.

Customer Signature: Stephen Cole Date: 25 May 2016

## Privacy Policy Statement

Newfoundland Power collects, maintains and uses personal information to establish credit relations with customers to support customer program financing. By Completing and submitting this form, you consent to its use for these purposes. Newfoundland Power will safeguard all of the information you provide to us, and will not share this information with outside parties except for purposes identified in the Company's personal information policy or when required to do so by law.

Return To: Fax # 709-737-5339

or

Email: [pf.AvantisTWRUpdates@nfpower.nf.ca](mailto:pf.AvantisTWRUpdates@nfpower.nf.ca)

**Appendix D**  
**CIAC Calculation**

**GENERAL SERVICE****CUSTOMER:** Canada Fluorspar (NL) Inc.**LOCATION:** St. Lawrence NL**BASIS OF ESTIMATE:** Construct 8.0 kilometres of new 3-phase line  
Install a new recloser at Laurentian Substation**Materials & Other Costs**

Material Costs (excluding poles)	\$239,886
Stores Overhead (15%)	35,983
	<hr/> \$275,869

Poles	\$116,646
Travel & Accommodations	55,527
Brush Cutting	19,400
Survey/Easements	13,200
Flagging Services	24,000
Equipment Rental	41,520

Total Material & Other Costs	<hr/> \$546,162
------------------------------	-----------------

**Labour Costs**

Labour (Newfoundland Power)	\$252,621
Contract Labour	251,225

Total Labour Costs	<hr/> \$503,846
--------------------	-----------------

<b>Total Material, Labour &amp; Other Costs</b>	<b>\$1,050,008</b>
GEC (5%)	52,500

Subtotal Construction Costs	<hr/> \$1,102,508
Operating and Maintenance (7.3%)	80,483

Subtotal Construction Costs	<hr/> \$1,182,991
-----------------------------	-------------------

Recloser at Laurentian Substation	<hr/> 170,899
<b>Total Construction Costs</b>	<b>\$1,353,890</b>
Less Company Investment	<hr/> (\$467,834)
<b>TOTAL CIAC</b>	<b>\$886,056</b>

Less Deposit for Detailed Engineering	<hr/> (\$86,050)
---------------------------------------	------------------

<b>Balance Due From Customer</b>	<b>\$800,006</b>
----------------------------------	------------------

**CALCULATION OF COMPANY INVESTMENT**

Connected Load (kW)	5,225 kW
Connected Load (kVA)	5,748 kVA
Peak Demand (50% Demand Factor)	2,874 kVA
Estimated Demand	2,874 kVA
Estimated Load Factor	50%
Plant Support Factor	\$242 per kVA
Potential Company Investment	\$693,088
Reduction due to 20 Year Life	(\$225,254)
<b>Net Company Investment</b>	<b>\$467,834</b>

**Appendix E**

**CIAC Quote Acceptance**



*Newfoundland Power Inc.*

50 Duffy Place  
PO Box 8910  
St. John's, NL  
Canada A1B 3P6  
Business: (709) 737-2802  
Toll Free: 1-800-663-2802  
Facsimile: (709) 737-2903  
Email at [customerrelations@newfoundlandpower.com](mailto:customerrelations@newfoundlandpower.com)  
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December 5<sup>th</sup>, 2016

Mr. Frank Pittman  
Canada Fluorspar (NL) Inc.  
P.O. Box 337  
St. Lawrence NL A0E 2V0

**All information contained in this letter is subject to the approval of the Board of Commissioners of Public Utilities. All calculations are subject to change, based on the ruling of this Board.**

Dear Frank:

Thank you for your inquiry regarding the provision of electrical service for the fluorspar mining facility located in St. Lawrence. In accordance with the Contribution in Aid of Construction (CIAC) Policy approved by the Board of Commissioners of Public Utilities ("PUB"), general service customers are sometimes required to pay a CIAC, which represents a portion of the construction cost of the line required to serve their premises. The amount of your CIAC depends on both the length of the line and the load requirements.

Based on Newfoundland Power's detailed engineering design for the construction of approximately 8.0 km of new distribution line from the Laurentian Substation, along route 220, and following a new proposed access road to the mine site (road to be constructed), as well as, the inclusion of a new recloser at the Laurentian substation, your CIAC is estimated to be \$1,353,890 excluding HST.

We understand that the service will be a 12,500/7200V service with a connected load of 5225/5748 kW/kVA and an estimated demand of 2613/2874 kW/KVA. If this electrical service information is not correct, please contact us by December 12<sup>th</sup>, 2016 with the correct information.

Based on the above noted load information, Newfoundland Power can provide additional company investment in the amount of \$467,834 based on the 20 year life of the mine. With the inclusion of this additional company investment, your CIAC would be reduced to \$886,056 excluding HST.

To achieve a more flexible payment schedule for Canada Fluorspar (NL) Inc., we are willing to break the project down into specific construction phases. The start dates established for each project phase will determine the payment schedule for the full CIAC and the connection date of service. This offer is contingent on receiving PUB approval. It is important to note that all payments are non-refundable in the event that the project is not completed or service is ultimately not requested due to reasons beyond the control of Newfoundland Power.



The project will be broken down into four phases. Phase A – initial construction phase up to 25% line extension completion. Phase B – construction phase >25% up to 50% line extension completion. Phase C – construction phase >50% up to 75% line extension completion. Phase D –Final phase including installation Newfoundland Power substation equipment, metering and service connection. Table 1 below contains the payment schedule.

**Table 1: Canada Fluorspar (NL) Inc. Payment Schedule**

<i>Phase</i>	<i>Payment #</i>	<i>Due Date</i>	<i>Amount (Excluding HST)</i>	<i>% of Total CIAC</i>
A – Initial Construction phase up to 25% line extension construction	1	Prior to start date	\$221,514	25
B – 50% line extension construction	2	Prior to start date	\$221,514	25
C – 75% line extension construction	3	Prior to start date	\$177,211	20
D – Final phase including NP substation equipment, metering and service connection.	4	Prior to start date	\$179,767	≈20
Payment Received to Date:			\$86,050	≈10
<b>Total (CIAC in full excluding HST):</b>			<b>\$886,056</b>	

The CIAC is subject to PUB approval. Your CIAC Reference Number for the above quote is #2016-31-109. It is valid for a period of six months and is based on the completion of construction twelve months from the date of this letter. If the CIAC is not accepted before the expiration of six months or if construction is not completed within twelve months, we reserve the right to review and adjust costs.

The CIAC will be subject to review after a period of twenty-four (24) months from the date of service is made available to determine whether the demand and energy consumption data provided by yourself and used in the CIAC calculation was reasonably accurate. Your CIAC will be recalculated using your actual load data for the twelve (12) months preceding the review, and if there is a variation of more than \$100 from your original CIAC, the difference will be applied to your account as either a credit or an additional charge.

To date, Newfoundland Power has received \$86,050 from Canada Fluorspar (NL) Inc. for detailed engineering associated with the CIAC cost calculation for the new line extension to the fluorspar mining facility located in St. Lawrence which has been credited as per Table 1.

**Construction of your line extension is subject to the following conditions:**

1. Before construction begins, Newfoundland Power requires standard easement rights for any portion of the line that we must construct over private property. This ensures that Newfoundland Power has access to the line and equipment should the need arise. Newfoundland Power will arrange for any necessary easements. If, however, easements

cannot be obtained for the proposed route, Newfoundland Power will determine a new route and calculate a corresponding revised CIAC.

2. Should additional three phase customers connect to the upgraded line within 10 years from the date of its construction, you may be entitled to a CIAC refund. Newfoundland Power will calculate the refund in accordance with established guidelines as approved by the Board of Commissioners of Public Utilities.
3. Newfoundland Power shall make all reasonable efforts to identify when a CIAC refund is required and to ensure the appropriate refund is paid within 90 days of any new connection. If your refund is not processed within 90 days of the connection of another customer, the refund amount will earn interest for each day past the 90 day deadline.
4. Newfoundland Power retains legal title to the line extension and may connect other customers to it at any time.
5. Newfoundland Power is responsible for the maintenance of the line extension and for its eventual replacement.

The attached agreement must be signed and returned to us forthwith so that we may proceed with preparation of an application to the PUB for approval of the arrangements.

We trust the above is satisfactory and look forward to receiving your written reply with respect to how you wish to proceed.

Yours truly,



Barry Keating  
Manager Regional Operations

**Agreement**

Canada Fluorspar (NL) Inc. hereby confirms that it understands all of the terms and conditions referred to in the above letter and agrees that Newfoundland Power may proceed to seek approval for the new line extension to the St. Lawrence Fluorspar mine site from the Board of Commissioners of Public Utilities.

Dated at St. Lawrence, Newfoundland this 6<sup>th</sup> day of December, 2016.

  
Canada Fluorspar (NL) Inc.

NEWFOUNDLAND AND LABRADOR

AN ORDER OF THE BOARD OF COMMISSIONERS OF PUBLIC UTILITIES

NO. P.U. \_\_\_\_ (2017)

IN THE MATTER OF THE PUBLIC  
UTILITIES ACT, R.S.N. 1990,  
CHAPTER P-47 (THE “ACT”)

AND

IN THE MATTER OF AN APPLICATION  
BY NEWFOUNDLAND POWER INC. (THE “APPLICANT”)  
FOR (1) APPROVAL OF A SUPPLEMENTAL CAPITAL  
EXPENDITURE FOR THE CONSTRUCTION  
AND PURCHASE OF CERTAIN IMPROVEMENTS  
AND ADDITIONS TO ITS PROPERTY PURSUANT  
TO SECTION 41 (3) OF THE ACT AND  
(2) APPROVAL OF A CONTRIBUTION  
IN AID OF CONSTRUCTION FOR  
THE CONSTRUCTION OF A DISTRIBUTION LINE  
FOR CANADA FLUORSPAR (NL) INC. (“THE “CUSTOMER”)  
PURSUANT TO SECTION 41 (5) OF THE ACT.

WHEREAS the Applicant is a corporation duly organized and existing under the laws of the Province of Newfoundland and Labrador, is a public utility within the meaning of the Act, and is also subject to the provisions of the Electrical Power Control Act, 1994, and

WHEREAS the Applicant operates transmission lines, distribution lines and substations to deliver electricity to customers throughout its service territory on the island portion of the Province of Newfoundland and Labrador, and

WHEREAS the Applicant’s Riverhead Substation (the “Substation”) is a 12.5 kV distribution substation located on Salmonier Line in the community of Riverhead. The Substation’s 2 distribution feeders serve approximately 900 customers, and

WHEREAS oil sampling of the Substation’s only power transformer during routine annual maintenance in 2016 indicated high levels of acetylene, an indicator of a fault condition

within the transformer, and subsequent condition assessment by a transformer consulting service has shown that the transformer has reached the end of its useful life, and repairing the transformer would not be cost-effective, and

WHEREAS the most cost-effective option for continuing to provide safe, reliable electric service to the customers served by the Substation is to replace the transformer at a cost of \$1,475,000, and

WHEREAS Canada Fluorspar (NL) Inc. (“CFI”) is constructing a fluorspar mining facility near the Town of St. Lawrence (“the Facility”), and requires a 3-phase power supply, and

WHEREAS the electrical requirements of the Facility are beyond the Applicant’s ability to service the Customer from the existing distribution line and in order for the Applicant to meet the Facility’s electrical service requirements, it is necessary that the Applicant construct 8 kilometres of new distribution line (the “Feeder”) from Laurentian Substation to the Facility, and

WHEREAS a contribution in aid of construction (CIAC) for the construction of the Feeder has been calculated in accordance with Clause 5(e) of the CIAC Policy: Distribution Line Extensions or Upgrades For General Service Customers, approved by Order No. P.U. 27 (2005), dated November 2, 2015 (the “Policy”), which calculation assumes an investment by the Applicant towards the cost of the Extension calculated as Four hundred sixty-eight thousand dollars (\$468,000.00), excluding HST, and the CIAC thus calculated is Eight hundred eighty-six thousand and fifty-six dollars (\$886,056.00), excluding HST, and

WHEREAS Clause 10(ii) of the Policy states that the Company shall apply to the Board for approval of all line extensions or upgrades involving CIACs where the cost of the line extension or upgrade is calculated pursuant to Clause 5(e), and

WHEREAS the proposed capital expenditures are necessary for the Applicant to provide service and facilities which are reasonably safe and adequate and just and reasonable pursuant to Section 37 of the Act, and

WHEREAS the proposed CIAC is necessary to ensure that the Applicant’s investment in the Feeder is compensatory over the useful life of the Feeder and will not be to the detriment of the Applicant’s other customers.

IT IS THEREFORE ORDERED THAT:

1) Pursuant to Section 41 (3) of the Act, the Board approves the capital expenditures in excess of \$50,000 associated with the improvements and additions to the Applicant's property as proposed in the Application.

2) Pursuant to Section 41 (5) of the Act, the Board approves the CIAC of Eight hundred eighty-six thousand fifty-six dollars (\$886,056.00), excluding HST, as calculated under the Policy to provide a three-phase supply to the fluorspar mine facility near St. Lawrence for Canada Fluorspar (NL) Inc..

DATED at St. John's, Newfoundland and Labrador, this \_\_\_\_\_ day of \_\_\_\_\_, 2017.

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\_\_\_\_\_

G. Cheryl Blundon

Board Secretary