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October 25, 2011

Jennifer Anthony, Manager
Whitehorse Assessment District/Whitehorse Designated Office
Yukon Environmental & Socio-economic Assessment Board
Suite 203-309 Strickland St.
Whitehorse, YT Y1A 2J9

(Via YESAB Online Registry)

Dear Ms. Anthony,

RE: PROJECT PROPOSAL FOR RENEWAL OF AIR EMISSIONS PERMIT NO. 4201-60-010 – WHITEHORSE RAPIDS DIESEL PLANT

Yukon Energy is pleased to submit for your consideration the project proposal for the renewal of the Corporation's existing Air Emissions Permit.

This submission has been provided electronically via the YESAB Online Registry, only. The application includes the associated Form 1, which has been completed and filed to the YESAB online registry as well. The supporting document attached to this letter, and referenced in Form 1, forms part of the proposal and is intended for use in the assessment and permitting processes.

Please note that in preparing this project proposal Yukon Energy has taken special care to ensure that the same type of information that was included in the 2008 permit renewal project proposal, as well as the responses to the Designated Office's request for additional proposal information during the adequacy review stage, have been addressed in this filing. Moreover, there have been no changes to the proposed activities or facilities associated with the required permit since the last assessment. We trust that with this knowledge meeting the test for proposal adequacy should be substantively simplified for the Designated Office to confirm for this renewal assessment.

Please do not hesitate to contact me at 867.393.5350 or by email: travis.ritchie@yec.yk.ca should there be any questions, comments, or concerns regarding the proposal.

Thank you for your time and consideration in this matter.

Yours Sincerely,

Travis Ritchie, P.Biol., CCEP
Manager – Environment, Assessment & Licencing

Attachment

AIR EMISSIONS PERMIT (NO. 4201-60-010) RENEWAL APPLICATION SUPPORTING DOCUMENT

October 25, 2011

YUKON ENERGY

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LIST OF ACRONYMS AND ABBREVIATIONS

CAC	Common Air Contaminants of Concern
GHG	Green House Gasses
GWh	Gigawatt hour
Max POI	Maximum Point of Impingement
MD	Mayo-Dawson Power Generation and Transmission System
MW	Megawatt
MWh	Megawatt hour
WAF	Whitehorse-Aishihik-Faro Power Generation and Transmission System
YESAA	*Yukon Environmental & Socio-economic Assessment Act*
YESAB	Yukon Environmental & Socio-economic Assessment Board
YUB	Yukon Utilities Board

1.0 INTRODUCTION

1.1 PROJECT OVERVIEW & DOCUMENT STRUCTURE

The Yukon Energy Corporation (Yukon Energy) is applying under Parts 6 and 9 of the *Environment Act* and Part V of the *Air Emissions Regulations* for a three-year renewal of Air Emissions Permit No. 4201-60-010 authorizing Yukon Energy to operate its existing diesel-fired electricity generating facilities in Dawson City, Faro, Mayo, and Whitehorse.

Yukon Energy seeks a renewal of the Permit for a three-year term commencing on or before the expiration of the term of the existing Permit (which expires on December 31, 2011), and expiring on December 31, 2014.

The renewal is subject to an environmental and socio-economic effects assessment at the Designated Office level by the Yukon Environmental and Socio-economic Assessment Board (YESAB) under the *Yukon Environmental and Socio-economic Assessment Act* (*YESAA*).

Pursuant to that assessment, Yukon Energy requests a recommendation from the Designated Office to allow the Permit renewal to proceed, on the basis that the Project (i.e., the continuing operation of the Yukon Energy"s diesel generating facilities during the 2012-2014 period in accordance with the terms and conditions of the Permit and the applicable provisions of the *Environment Act* and *Air Emissions Regulations*) **will not have a significant adverse environmental or socio-economic effect** within the meaning of section 56(1)(a) of *YESAA*.

This document provides supporting information for the Permit renewal process and the associated environmental and socio-economic assessment, and includes detailed information referenced in the *YESAA* Designated Office Evaluation Form 1, which has also been completed and is filed on the YESAB Online Registry.

As this document and its attachments form part of an application to renew an existing permit, and given that the last assessment occurred only three years ago,

Yukon Energy requests that reviewers of this project examine the previous assessment documentation maintained on the YESAB Online Registry (Projects 2008-0228 through 2008-0231), for further information and clarifications previously requested regarding the proposed activities, as well as the comprehensive responses provided by Yukon Energy during that assessment. The information maintained in the YESAB Online Registry for the previous assessments may be especially instructive, to the extent Yukon Energy has already provided responses to many questions asked in the context of the previous assessments, and for which the responses were accepted by each applicable Designated Office. There have been no changes to the proposed activities or facilities associated with the required permit since the last assessment in 2008.

Section 1 of this document contains general application information including:

- The intent and structure of this document and related information;
- The proponent, Yukon Energy;
- The purpose of, and need for, the Project; and,
- An identification of the required assessment and regulatory approvals.

Section 2 of this document contains information regarding the assessment approach and scope, including:

- A brief description of the air quality impact assessment conducted;
- The identification of valued components for focussed effects assessment; and,
- The context and criteria Yukon Energy has used for determining the significance of any identified potential effects to the valued components.

Section 3 of this document contains information describing the character and location of our diesel generators, including:

- Operational requirements and ranges;
- A generation inventory;

- Site specific facility descriptions;
- A description of the typical emission character of the generators;
- Operational resource usage and waste generation; and,
- Brief comments on the applicable regulatory context under the *Public Utilities Act* and applicable legal and regulatory constraints on the operation of the facilities under the existing Permit and applicable environmental legislation.

Section 4 of this document contains information regarding the environmental setting in each community of operation, including:

- Reference to previous studies and the community emissions inventories; and,
- Ambient air quality assessment for Whitehorse.

Section 5 of this document presents the effects assessment and includes:

- A description of the modelled diesel generation profiles;
- An identification of sensitive receptor sites in the vicinity of Yukon Energy"s diesel operations;
- A discussion regarding the indicators and measures used to determine the significance of potential effects to receptors;
- A summary of the potential effects of diesel generation air emissions; and,
- Assessment conclusions respecting the significance of the potential effects.

Four appendices are included as follows:

- Appendix A contains Yukon Energy"s application to renew the Air Emissions Permit;
- Appendix B contains a report describing the results and findings of an updated air quality assessment of Yukon Energy"s diesel generation operations conducted by SENES Consultants Ltd.;
- Appendix C contains drawings for each of Yukon Energy"s diesel plants in Yukon;

- Appendix D contains a copy of Yukon Energy"s current Air Emissions Permit No.4201-60-010 (as amended on July 22, 2011).

1.2 PROPONENT INFORMATION

Yukon Energy is the Project proponent. Established in 1987, Yukon Energy is a public electric utility that operates as a business, at arm"s length from the Yukon Government, and is wholly owned by the Yukon Development Corporation (a Crown corporation).

Yukon Energy"s headquarters are located near the Whitehorse Rapids hydro plant in Whitehorse, with community offices in Mayo, Faro, and Dawson City. It employs approximately 85 highly skilled and motivated Yukoners who are committed to offering the highest quality service possible. Yukon Energy works hard to meet the challenge of providing electricity and related energy services to Yukoners in the most economical, yet environmentally and socially responsible way.

Yukon Energy is the main generator and transmitter of electrical energy in the Yukon, and works with its parent company, Yukon Development Corporation, to provide Yukoners with a sufficient supply of safe, reliable electricity and related energy services. Yukon Energy owns and operates the 138 kV Whitehorse-Aishihik-Faro (WAF) and 69 kV Mayo-Dawson (MD) transmission grids, which are now connected as a single grid, as well as over 90% of the electric generation resources on these grids; it is also the public utility with primary responsibility for planning and development of new generation and transmission facilities in Yukon.

There are almost 15,000 electricity consumers in the territory. Yukon Energy directly serves about 1,800 of these customers, most of who live in and around Dawson City, Mayo and Faro. Indirectly, we provide power to approximately 15,000 other Yukon customers in Whitehorse, Carcross, Carmacks, Haines Junction, Ross River, Teslin, and Pelly Crossing, through the sale of energy to the Yukon Electrical Company Limited. Yukon Electrical buys wholesale power from Yukon Energy and sells it to retail customers in the territory via its own distribution network.

By the end of 2011 Yukon Energy will have the capacity to generate approximately 133 megawatts (MW) of power:

- at present, 75 MW of that capacity are provided by Yukon Energy"s hydro generation facilities in Whitehorse, Mayo and Aishihik Lake (40 MW at Whitehorse, 30 MW at Aishihik, and 5 MW at Mayo); however, this will be increased to approximately 92 MW of total hydro generating capacity by the end of 2011, due to upgrading of the power plants at Mayo and Aishihik (which will add approximately 10 MW and 7 MW, respectively to those facilities);
- approximately 40 MW of capacity are provided by Yukon Energy"s diesel-fired generators, including seven generators in Whitehorse, two in Mayo, five in Dawson City, four in Faro, and several relatively small portable generators; and
- 0.8 MW of capacity are provided by two wind turbines located on Haeckel Hill near Whitehorse.

In contrast to the diesel generation facilities operated by the Yukon Electrical Company Ltd. in communities such as Watson Lake and Old Crow, for example, which are isolated from the transmission grid and must therefore operate continuously (24 hours per day, 365 days per year), Yukon Energy only uses its diesel-fired generators as back up during renewable energy system outages (planned and unplanned) and, occasionally, to supplement energy demand during colder periods of the year. This is because most of the needs of customers on the system are satisfied by Yukon Energy"s three hydro generating stations. For the vast majority of the time, the diesel generators do not operate. However, Yukon Energy"s diesel generation facilities are essential to its ability to provide a reliable supply of electricity to customers whenever demand outstrips hydro supply (e.g. as a result of planned maintenance, emergency repair, or peaking demand during cold temperatures).[1]

Yukon Energy is regulated principally under the Yukon *Business Corporations Act*, *Public Utilities Act*, and *Waters Act*, and the federal *Fisheries Act.* In particular, under

[1] For example, Yukon Energy"s reliance on the diesel generation facilities was essential when a major power outage occurred on the WAF grid in January 2006 due to a failure on the connection to the Aishihik hydro generating facility. If Yukon Energy had not had the ability to operate its diesel units in those circumstances, customers would have been left without power in the middle of the winter.

the *Public Utilities Act*, Yukon Energy has an obligation to supply electricity service to its customers, and its rates and operations are subject to regulation by the Yukon Utilities Board. Yukon Energy"s diesel generation facilities are also subject to regulation under the Yukon *Environment Act* and *Air Emissions Regulations*, as well as *YESAA*.

1.3 PROJECT/ACTIVITY PURPOSE AND NEED

Yukon Energy"s diesel electric generating plants are installed and operated so as to ensure the overall WAF and MD systems, and so all customers on these systems can receive reliable power consistent with Yukon Energy"s corporate and regulatory obligations.

Given the current generation mix (hydro, wind, and diesel) and system design, Yukon Energy"s ability to operate the installed diesel plants, particularly during conditions where demand for electricity cannot be adequately met by hydro (e.g., planned maintenance, emergency repair, demand during cold winter temperatures), is essential to avoid scenarios where there would be a requirement to impose blackout conditions to various customers. This is particularly relevant during times where the lack of such ability would at best be very inconvenient, and at worst dangerous to infrastructure and human health and safety, such as would be the case during cold winter temperatures.

1.4 REQUIRED AUTHORIZATIONS AND REGULATORY APPROVALS

Yukon Energy requires renewal of its existing Air Emissions Permit no. 4201-60-010 on or before December 31, 2011, in order to maintain the ability to operate its diesel generating facilities, and ensure the continuity of a reliable supply of power to Yukoners. The Permit is renewable by the Minister responsible for the Department of the Environment, for a period of up to three years, pursuant to section 12 of the *Air Emissions Regulations* under the *Environment Act*.

To renew the Permit, the Yukon Government must issue a decision document based on the environmental and socio-economic assessment of the renewal application under *YESAA*. An environmental and socio-economic assessment is required under Schedule 1, Part 4, Item 2(b) of the *Assessable Activities, Exceptions and Executive Committee*

Projects Regulations under *YESAA,* because the Permit is for the "operation … of … a fossil fuel-fired electrical generating station".

As noted in the Project Overview above, Yukon Energy is requesting a recommendation by the Designated Office to allow the Permit renewal to proceed, on the basis that the Project (i.e., the continuing operation of the Yukon Energy"s diesel generating facilities during the 2012-2014 period in accordance with the terms and conditions of the Permit and the applicable provisions of the *Environment Act* and *Air Emissions Regulations*) will not have a significant adverse environmental or socio-economic effect within the meaning of section 56(1)(a) of *YESAA*.

2.0 ASSESSMENT APPROACH & SCOPE

2.1 AIR QUALITY STUDIES

In 2008, SENES Consultants Ltd. was initially engaged to conduct an air quality assessment for Yukon Energy"s diesel operations around Yukon in order to understand the potential effects of its operations and of other sources of emissions. The results of this assessment were submitted to YESAB for review in 2008 to facilitate the previous renewal of Yukon Energy"s air emissions permit.

The components of the 2008 study included the following:

1. Emission inventories for the communities of Whitehorse, Dawson City, Faro and Mayo. The inventories for each community are summarized in the context of Yukon Energy"s operations in Section 4.0 – Environmental & Socio-economic Setting. The inventories include the following components:
   a) Common Air Contaminants (CAC)
      i) nitrogen oxides (NO_x)
      ii) carbon monoxide (CO)
      iii) volatile organic compounds (VOC)
      iv) sulphur oxides (SO_x)
      v) inhalable particulate matter (PM_{10})

vi) respirable particulate matter ($PM_{2.5}$)

vii) ammonia (NH_4)

b) Greenhouse Gases (GHG)

i) carbon dioxide (CO_2)

ii) methane (CH_4)

iii) nitrous oxide (N_2O)

2. A summary of air quality monitoring data for Whitehorse during the period 2000-2005 based on the monitoring station in downtown Whitehorse operated by Environment Canada as part of the National Air Pollution Surveillance (NAPS) network.
3. Air dispersion modelling of emissions from the Yukon Energy diesel plant in Whitehorse were conducted based on normal and hypothetical operational scenarios.
4. A screening level human health risk assessment of the emissions from several generation profiles for the Whitehorse facility.

The 2008 air quality impact assessment report was submitted as part of the previous permit renewal process and is available to reviewers on the YESAB Online Registry under projects 2008-0228 through 2008-0231 (File 002-1).

To Yukon Energy"s knowledge, the air emissions inventories prepared by SENES for the four communities, and SENES"s further detailed modelling and analysis of air emissions in Whitehorse, together represented one of the most comprehensive and thorough studies of the potential effects of air emissions that has ever been carried out in the Yukon.

Yukon Energy undertook this study in recognition of its corporate and regulatory obligations, and its specific commitment to provide energy services to Yukoners in the most economical, yet environmentally and socially responsible way.

For the purposes of its air dispersion modelling, SENES considered Whitehorse to provide an ideal modelling situation since both surface and upper air data were available to use as inputs to the atmospheric model. The Whitehorse modelling was conducted to get a good sense of what, if any, effect Yukon Energy"s diesel engine emissions may have on air quality within the Whitehorse community. Since Whitehorse has „good" meteorological data available, it was appropriate to conduct the modelling in this airshed instead of any other. For this reason, the modelling simulation for Whitehorse was considered to be superior to simulations that could have been conducted in the other three airsheds where Yukon Energy units are operated.

In the previous assessment conducted by the Designated Offices in 2008, the following two mitigation measures were included as conditions of the recommendation for an air emissions permit renewal to be granted to Yukon Energy:

- Yukon Energy was required to report its emissions to the National Pollutant Release Inventory (NPRI) if its operational emissions meet the thresholds for required reporting under that national reporting program. Calculation of annual emissions and reporting (as required) to the NPRI program is an annual exercise undertaken by Yukon Energy. The results of that reporting are available publically on Environment Canada"s NPRI website (available at http://www.ec.gc.ca/inrp-npri/default.asp?lang=En&n=B85A1846-1).

- The Designated Offices" recommendations also incorporated requirements for Yukon Energy to conduct stack testing of its diesel engines (upon certain conditions being met) to address uncertainty with regard to the actual emission rates of Yukon Energy"s diesel engines, and to confirm the character of Yukon Energy"s actual emissions to ensure the assumptions relied on by SENES in its previous air quality assessment were appropriate. This recommendation was incorporated (with some variation) into the renewed permit issued by Yukon Government in 2009; and, in 2011, stack testing was in fact completed for each of the Whitehorse diesel engines to reliably measure the actual emission character of Yukon Energy"s diesel generation facilities.

The results of the stack testing completed in 2011 indicate that the emission rates assumed by SENES for the purposes of the 2008 air quality impact assessment were overestimated, i.e., the actual measured emissions for Yukon Energy"s diesel generators are actually lower than the published emission factors used in the model during the 2008 assessment. This information removes the uncertainty that previously existed in 2008 with regard to the character of Yukon Energy"s diesel generator emissions.

In support of Yukon Energy"s current application to renew the air emissions permit for the 2012-2014 period, SENES has prepared an update to the previous 2008 study.

SENES"s updated air quality assessment report (attached as Appendix B):

- is based on the actual measured emission rates for each of the stationary diesel generators in Yukon Energy"s Whitehorse facility (in place of the assumed emission rates that were used in the 2008 assessment);
- also takes into account projected increased power demand in the Yukon through to 2014 (which projections are incorporated into updated operating scenarios for the 2012-2014 period);
- uses updated meteorological data; and
- reflects the Yukon Ambient Air Quality Standards adopted by the Yukon Government in 2010, which were not yet in existence at the time of the 2008 assessment.

As with SENES"s original 2008 study, SENES"s updated air dispersion modelling was completed for emissions from the Yukon Energy facility in Whitehorse. As previously accepted by the Watson Lake, Mayo and Dawson City Designated Offices in 2008, the implications of the modelling analysis for Whitehorse can again be used to determine what the likely impacts may be in the other three communities (Faro, Mayo and Dawson City), since the engine configuration (engine size, exhaust stack height, etc.) in the other three communities is similar to that in Whitehorse. Although further modelling could theoretically be conducted in the three other Yukon communities, the results would have to be considered as having a higher degree of uncertainty, since surface and upper air data are not available at these locations. There is also no air quality monitoring data to provide estimates of background concentrations, although it is likely that background

levels in these communities would be lower than in Whitehorse due to lower population levels and lower overall emissions as determined in the 2008 assessment by SENES.

2.2 IDENTIFICATION OF VALUED COMPONENTS

For the purpose of identifying and assessing potential environmental and socio-economic effects, value may be attributed to a component of the environment and/or the socio-economic system for economic, social, environmental, aesthetic or ethical reasons.

Valued environmental and socio-economic components (or VESECs) are parts of the local environment and socio-economic fabric that are valued because of their ecological and/or socio-economic importance. VESECs can represent a class of species, a type of ecosystem, or an important component of a social and/or economic system, and are used in the assessment of potential effects arising from a project and associated activities.

Based on its understanding of the environmental and socio-economic setting of its generating facilities, and upon an examination of known and typical interests related to air emissions, Yukon Energy has identified Human Health and Safety to be the key valued component for the purpose of the environmental and socio-economic assessment of this Project.

Other components of the environment, such as water, soils, and general maintenance of environmental quality, are more appropriately related to such things as the potential for petroleum hydrocarbon releases, and have not been examined beyond the scoping stage of this assessment, as such matters are adequately addressed by operational and non-discretionary regulatory controls currently in place such as Yukon Energy"s Special Waste Permit, Storage Tank Permit, etc, and not by the Air Emissions Permit renewal which Yukon Energy is applying for at this time.

2.3 ANALYSIS & SIGNIFICANCE OF POTENTIAL EFFECTS

The Designated Office must evaluate the potential effects, if any, on human health and safety resulting from the renewal of Yukon Energy"s Air Emissions Permit for another three-year term, and must make a recommendation to the Environment Minister based on that evaluation, in accordance with section 56(1) of *YESAA*.

In particular, under section 56(1)(a), if the Designated Office is satisfied that Yukon Energy"s continuing operation of its diesel generators in 2012-2014, in compliance with the terms and conditions of its Air Emissions Permit and all other relevant legislative and regulatory requirements (e.g. under the *Environment Act* and *Air Emissions Regulations),* will not have "significant adverse environmental or socio-economic effects in or outside the Yukon", the Office must recommend that the renewal of the Permit be allowed to proceed.[2]

In its September 8, 2009 Designated Office Evaluation Report on Project Number 2009-0107 (YECL Air Emissions Permit Renewal – Watson Lake, YT), the Watson Lake Designated Office determined it was appropriate to exercise its authority under section 56(1)(a) with reference to both "the application of existing legislation as well as the mitigation measures proposed by the proponent" (at page 1).

This was in the context of an application by Yukon Electrical Company Ltd. ("YECL") to renew the air emissions permit for the diesel generator station it operates on a full-time basis, year round as the sole source of electrical supply for the communities of Watson Lake, Upper Liard, and Lower Post, BC (in contrast to Yukon Energy"s diesel generating facilities, which are operated only as back-up during hydro system outages, and, occasionally, to supplement energy demand during colder periods of the year).

Accordingly, in Project Number 2009-0107, where the Watson Lake Designated Office found that the application of existing legislation as well as mitigation measures proposed by the proponent would be "adequate to eliminate, reduce or control the significant

[2] Alternatively, the Designated Office also has authority to recommend that the Permit be renewed subject to specified terms and conditions, if it determines that the continuing operation of the diesel generators "will have significant adverse environmental or socio-economic effects…that can be mitigated by those terms and conditions" within the meaning of section 56(1)(b).

adverse effects of the project" resulting from the continuous, year round operation of YECL"s diesel generator station in Watson Lake, the Designated Office concluded that the project "will not have significant adverse environmental or socio-economic effects in or outside Yukon", and recommended under section 56(1)(a) that the project be allowed to proceed.

The same approach to section 56(1)(a) was adopted with respect to YECL"s other air emission permit renewal applications, by:

- the Dawson City Designated Office in its September 9, 2009 Evaluation Report on Project Number 2009-0104 (YECL Air Emissions Permit Renewal – Old Crow) (in the context of another YECL diesel generating station operated on a full-time basis year round, as the sole source of electrical supply for the community of Old Crow);
- the Teslin Designated Office in its September 4, 2009 Evaluation Report on Project Number 2009-0105 (Teslin Electrical Generating Station Air Emissions Permit Renewal);
- the Watson Lake Designated Office in its September 4, 2009 Evaluation Report on Project Number 2009-0106 (YECL Air Emissions Permit Renewal – Ross River, YT);
- the Haines Junction Designated Office in its September 8, 2009 Evaluation Report on Project Number 2009-0108 (Air Emissions Permit Renewal – Haines Junction, YT); and
- the Mayo Designated Office in its September 4, 2009 Evaluation Report on Project Number 2009-0109 (Air Emissions Permit Renewal – Carmacks).

To ensure consistency in the interpretation and application of section 56(1) of *YESAA*, the same approach must be applied by the Designated Office in assessing and issuing a recommendation with respect to Yukon Energy"s proposed renewal of its Air Emissions Permit: i.e., the potential effects (if any) of the project must be assessed on the basis of Yukon Energy continuing to operate its facilities (on an emergency back-up/secondary supply basis only) during 2012-2014 in compliance with the terms and conditions of the Permit and all other legislative and regulatory requirements, in addition to the principal mitigation measures proposed by Yukon Energy, which include the following:

- Generators being operated and maintained regularly as per manufacturer"s specifications to provide a reliable and efficient source of electricity;
- Visual opacity limits and monitoring;
- Use of ultra-low sulphur fuel only.

In assessing whether any effect resulting from such continuing operation of Yukon Energy"s facilities may be considered "significant" within the meaning of section 56(1) of *YESAA*, the Designated Office should further apply the framework of analysis adopted by the YESAB Executive Committee in Part 4.3 of its November 2, 2007 Screening Report & Recommendation on Project Assessment 2006-0286 (Yukon Energy Corporation Carmacks-Stewart/Minto Spur Transmission Project) (at page 15):

> The determination of whether or not a particular effect is significant is undertaken in the context of the effect, and the circumstances encountered. In developing mitigative measures to address effects, the level of adversity (duration, magnitude, extent, reversibility) and acceptability (i.e., as linked to social expectations) are key criteria that facilitate the determination of which effects should be mitigated. Societal expectations are often a reflection of the adversity of an effect as compared to the level of effort required to address the effect.
>
> Two broad categories of effects exist along the spectrum of significance: insignificant, and significant …
>
> Category A [Insignificant] consists of those potential effects for which mitigation is not necessary. This category would include beneficial effects as well as adverse effects that are within established norms (e.g. natural variation of baseline conditions), and levels of acceptable change/societal expectations (e.g. effects from walking through the forest).
>
> Category B [Significant] consists of all those effects that do not fall under category A. In this category, there exists a broad spectrum of adverse effects that are considered significant, which may range from minor adverse effects outside of local environmental norms/societal expectations to major consequential effects. Mitigative measures have been recommended for all adverse effects in this category, as required by *YESAA*.

As explained in Part 12.0 of YESAB"s "Guide to Socio-economic Effects Assessment", the significance of a Project"s potential effects on a particular VESEC (such as human health and safety) should also be assessed under section 56(1) of *YESAA* with

reference to any relevant effect attributes, which could include the direction of change (i.e., positive, neutral, negative, or both positive and negative), the magnitude of a potential effect, its geographic extent, duration, frequency, reversibility, and likelihood of occurrence, and the applicable socio-economic context.

Having regard to the foregoing:

- the determination of the "significance" of the potential effects of the continuing operation of Yukon Energy"s diesel facilities on human health and safety requires the identification and assessment of both the potential beneficial and adverse effects;
- in that exercise, potential adverse effects should be assessed with reference to those effect attributes which are relevant to the level of adversity and acceptability of the effect;
- attributes relevant to the character of an effect may include the reasonably contemplated frequency, likelihood of occurrence, duration, magnitude, extent, and reversibility of the effect over the three-year term of the renewed Permit (as referenced in one or both of the Carmacks-Stewart Screening Report and/or in YESAB"s Guide to Socio-economic Effects Assessment); and
- the level of acceptability of an effect should also be assessed with reference to the environmental standards now established under the Yukon Ambient Air Quality Standards, which have been developed in consideration of those common effect attributes and reasonable societal expectations.

3.0 FACILITY DESCRIPTIONS

3.1 OPERATIONAL RANGES & REQUIREMENTS

As previously discussed, Yukon Energy"s diesel electric generating plants are installed and operated so as to ensure the overall integrated WAF and MD systems, and so all customers on these systems can receive reliable power consistent with Yukon Energy"s corporate and regulatory obligations. Hydro generation stations on the Yukon grid are typically supplemented as necessary by diesel for peaking or maintenance purposes.

The current need for diesel generation is related to several factors including:

- The need to meet demand for electricity during those times when hydro-electric facilities are taken offline for routine maintenance;
- The need to meet demand for electricity during those times when hydro-electric facilities are offline as a result of an emergency condition;
- The need to meet demand for electricity during those times when hydro-electric facilities are otherwise unable to meet current demand for energy;
- The need to „exercise" a particular diesel unit as a part of routine maintenance;

The following table summarizes the annual diesel generation required over the last few years.

Table 1 Summary of Annual Diesel Generation 2008-2010

Location	2008		2009		2010	
	Run Time (unit hrs)	Energy Produced (GWhr)	Run Time (unit hrs)	Energy Produced (GWhr)	Run Time (unit hrs)	Energy Produced (GWhr)
Mayo	2	0.00	10	0.00	82	0.08
Whitehorse	444	0.99	697	1.86	1163	2.92
Faro	86	0.08	374	0.25	163	0.39
Dawson City	190	0.17	674	0.29	3181	3.01

Note: Results with positive run time hours, but zero generation represent units running at speed with no load for maintenance or testing purposes,

Electricity demand is growing in Yukon and, through 2014, Yukon Energy is forecasting increased need to support its hydro assets with diesel electricity in order to meet the needs of Yukoners.

Having regard to this increased demand, the attached table presents three generation profiles for Yukon Energy"s diesel facilities in Whitehorse, Mayo, Faro, and Dawson City, which were analyzed by SENES for the purpose of completing its updated air quality assessment report:

- **Scenario 1:** actual 2010 generation levels by facility.
- **Scenario 2:** forecast “average case” levels of diesel generation through to 2014. This scenario reflects Yukon Energy"s projections of the most likely highest levels of diesel generation over the 2012-2014 period, given current hydrological conditions and electricity demand predictions.
- **Scenario 3:** hypothetical “worst case” scenario. This scenario reflects Yukon Energy"s projections of the maximum demand that might theoretically need to be met from diesel generation, in the unlikely event that Yukon Energy"s ability to supply demand through hydro generation were to be very seriously constrained as a result of a series of successive drought years culminating in the most extreme drought conditions occurring in 2014. This scenario represents the extreme case of

extraordinarily severe and successive annual drought conditions, which is very unlikely to occur over the term 2012-2014.

Table 2 Summary of Forecasted Diesel Energy Requirements 2012-2014

Facility	Permit Year Diesel Generation (GWhr)								
	2012			2013			2014		
	Scenario 1	Scenario 2	Scenario 3	Scenario 1	Scenario 2	Scenario 3	Scenario 1	Scenario 2	Scenario 3
Mayo	0.03	0	4	0.03	0	4	0.03	0	4
Whitehorse	2.47	11.52	72.96	2.47	15.02	74.47	2.47	19.47	75.83
Faro	0.28	0	15.11	0.28	0	16.77	0.28	0	19.64
Dawson City	2.40	0	8.73	2.40	0	11.20	2.40	0	12.72
TOTAL	**5.17**	**11.52**	**101.21**	**5.17**	**15.02**	**106.85**	**5.17**	**19.47**	**112.60**

Note: For the purposes of comparison, Scenario 1 represents the actual energy produced by diesel generators in 2010. Scenario 2, is the predicted *average* energy requirement to be made up by diesel. Scenario 3 is the maximum case energy requirement to be made up by diesel, which would follow several very dry years, culminating in an extreme drought year in 2014 .

3.2 GENERATION INVENTORY

Yukon Energy maintains diesel generators in Whitehorse, Mayo, Dawson City, and Faro. The largest diesel units are located in Whitehorse, followed by Faro, with Mayo and Dawson City having the smallest generators, which are on average three times smaller than the Whitehorse units, as can be seen in Table 3. The Corporation also has two mobile diesel units. Small, black-start units are also deployed to provide onsite power in the event of power failures. The following table summarizes the Corporation"s generation inventory from all sources excluding the small black start units.

Table 3 Yukon Energy Diesel Generation Inventory

Location	Unit No.	Manufacturer	Name Plate Capacity (kW)
Faro	FD1	Mirrlees	5,150
	FD3	Caterpillar	1,000
	FD5	Caterpillar	1,400
	FD7	Caterpillar	3,000
Dawson	DD1	Caterpillar	800
	DD2	Caterpillar	1,000
	DD3	Caterpillar	1,000
	DD4	Caterpillar	700
	DD5	Caterpillar	1,500
Mayo	MD1	Caterpillar	1,000
	MD2	Caterpillar	1,000
Whitehorse	WD1	Mirrlees	3,920
	WD2	Mirrlees	5,150
	WD3	Mirrlees	5,150
	WD4	EMD	2,500
	WD5	EMD	2,500
	WD6	EMD	2,700
	WD7	Caterpillar	3,300
Mobile Diesels	YM1	Caterpillar	1,400
	YM2	John Deere	150

3.3 WHITEHORSE

3.3.1 Facility Overview

The Whitehorse diesel plant is located at the site of the Corporation"s Whitehorse Rapids Power Development and adjacent the Whitehorse Rapids Dam. The legal description of the property is as follows:

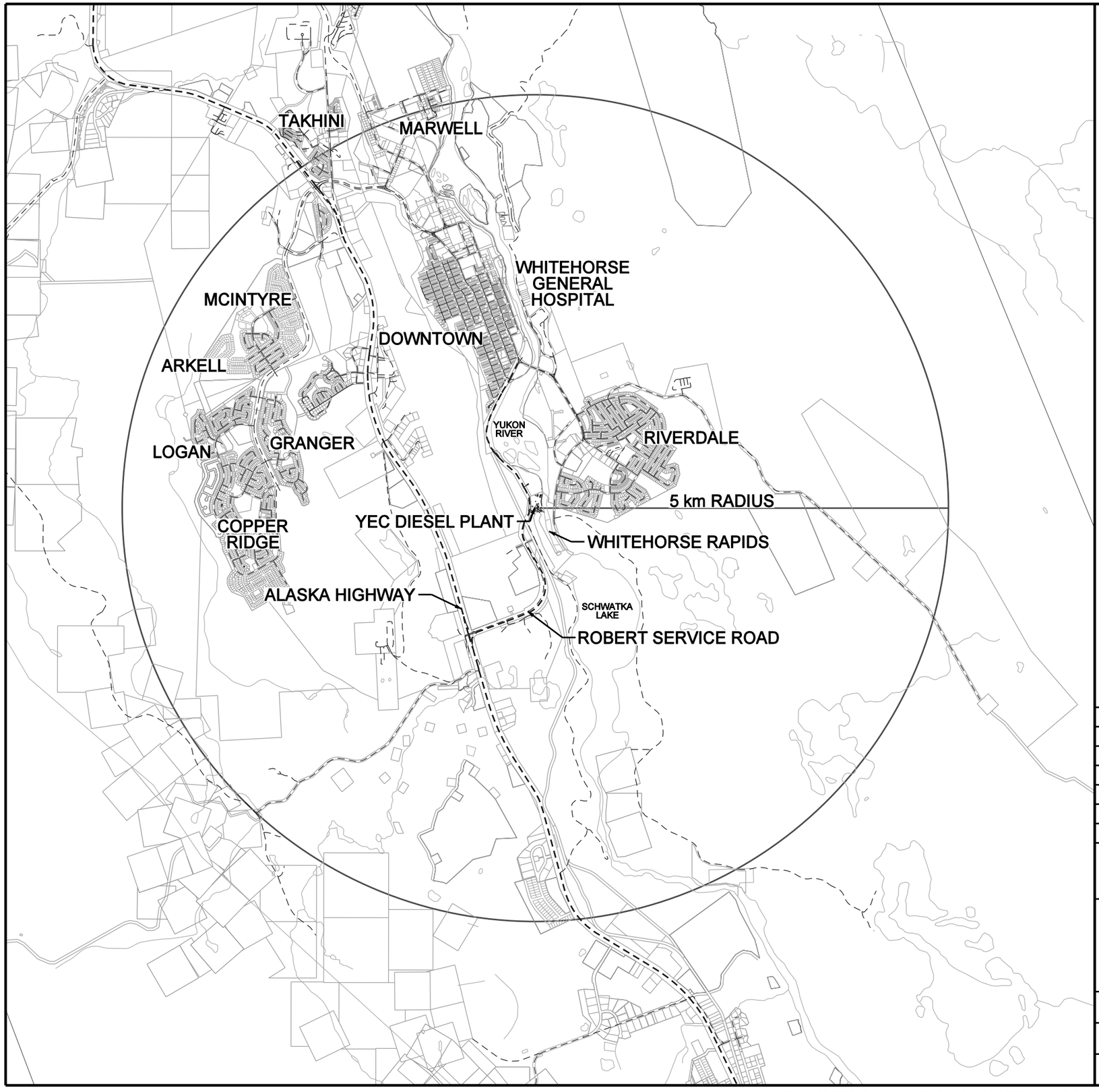
Lot 1022, Quad 105 D/11, Plan 73440 LTO, DCT No. 93Y377 - registered to Yukon Energy Corporation.

Approximate coordinates of the diesel plant:

- UTM Zone 8
- Northing: 6729200.0
- Easting: 497522.99

The diesel plant maintains seven units as described in Table 3.

The following figure provides an overview of the location of the diesel generators relative to the community of Whitehorse.



LEGEND

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UTM Zone 8 NAD83

Scale 1:50,000

1 0.5 0 2 Kilometers

Rev. No.	Date	Description	Approv'd
1	SEPT 4, 2008	INITIAL REVIEW	TR
2	SEPT 19, 2008	FINAL	TR

YUKON ENERGY CORPORATION

2008 AIR EMISSIONS PERMIT RENEWAL APPLICATION SUPPORTING DOCUMENTATION

**FIGURE 1:
OVERVIEW OF YEC WHITEHORSE DIESEL PLANT AREA**

Drawn: C.McGILLIVRAY	Date: SEPTEMBER 2008
Scale: 1:50000	Map Sheet No. 105D11
Revision Number: 2	Dwg Name: FIGURE 1

3.4 DAWSON CITY

3.4.1 Facility Overview

The Dawson City diesel plant is located near the entrance to downtown Dawson City. The legal description of the property is as follows:

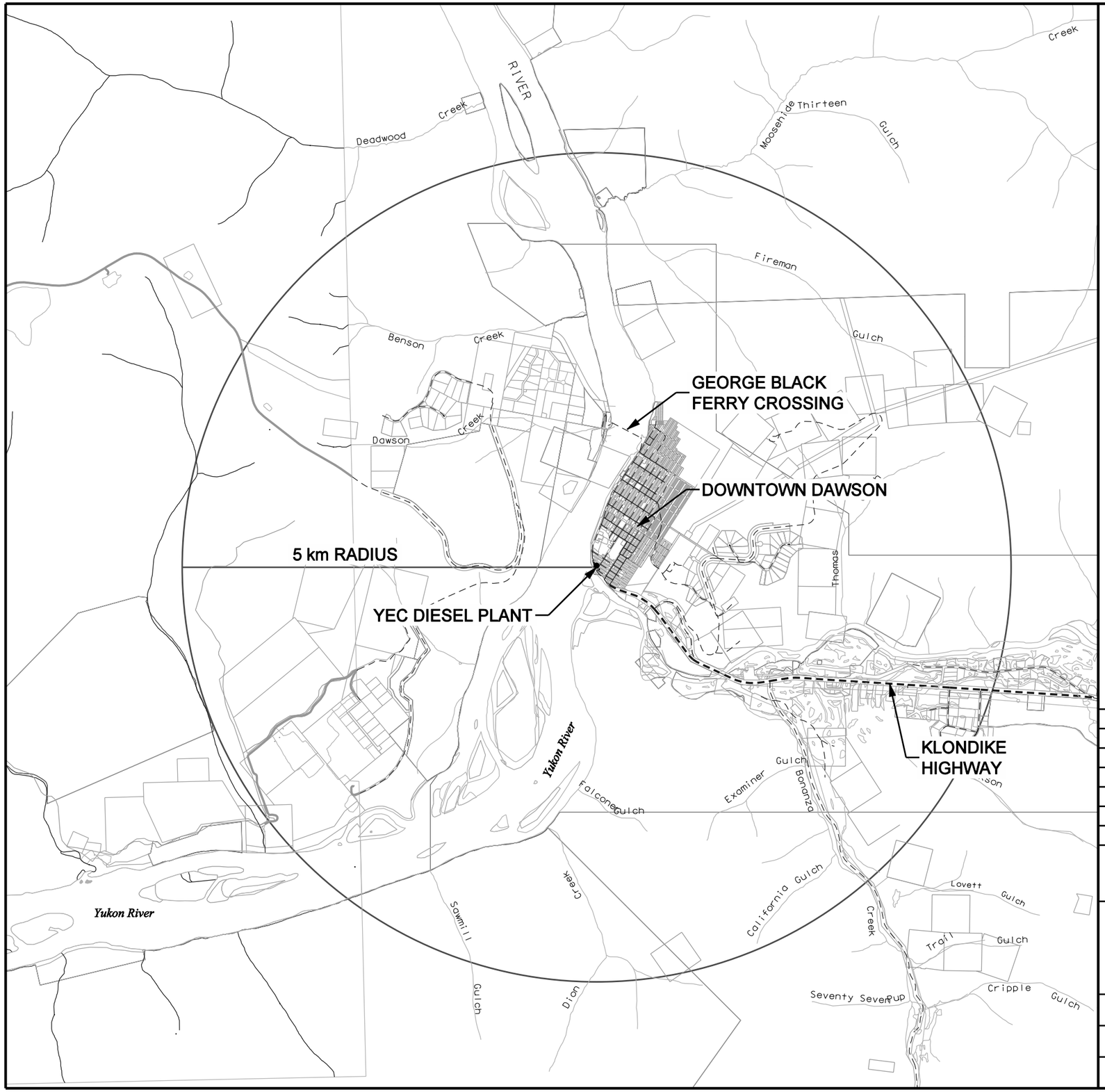
Lots 1 and 2, Block 11, Quad 116B/03, Plan 8395 LTO DCT No. 93Y380 - registered to Yukon Energy Corporation.

Approximate coordinates of the diesel plant:

- UTM Zone 7
- Northing: 7104026.7685
- Easting: 576156.199

The diesel plant maintains five units as described in Table 3.

The following figure provides an overview of the location of the diesel generators relative to the community of Dawson City.



LEGEND

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UTM Zone 7 NAD83

Scale 1:50,000

1 0.5 0 | 2 Kilometers

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YUKON ENERGY CORPORATION

2008 AIR EMISSIONS PERMIT RENEWAL APPLICATION SUPPORTING DOCUMENTATION

**FIGURE 2:
OVERVIEW OF YEC DAWSON DIESEL PLANT AREA**

Drawn: C.McGILLIVRAY	Date: SEPTEMBER 2008
Scale: 1:50000	Map Sheet No. 116B3
Revision Number: 2	Dwg Name: FIGURE 2

3.5 MAYO

3.5.1 Facility Overview

The Mayo diesel plant is located adjacent the main community access road approximately 850 m north of the Stewart River. The legal description of the property is as follows:

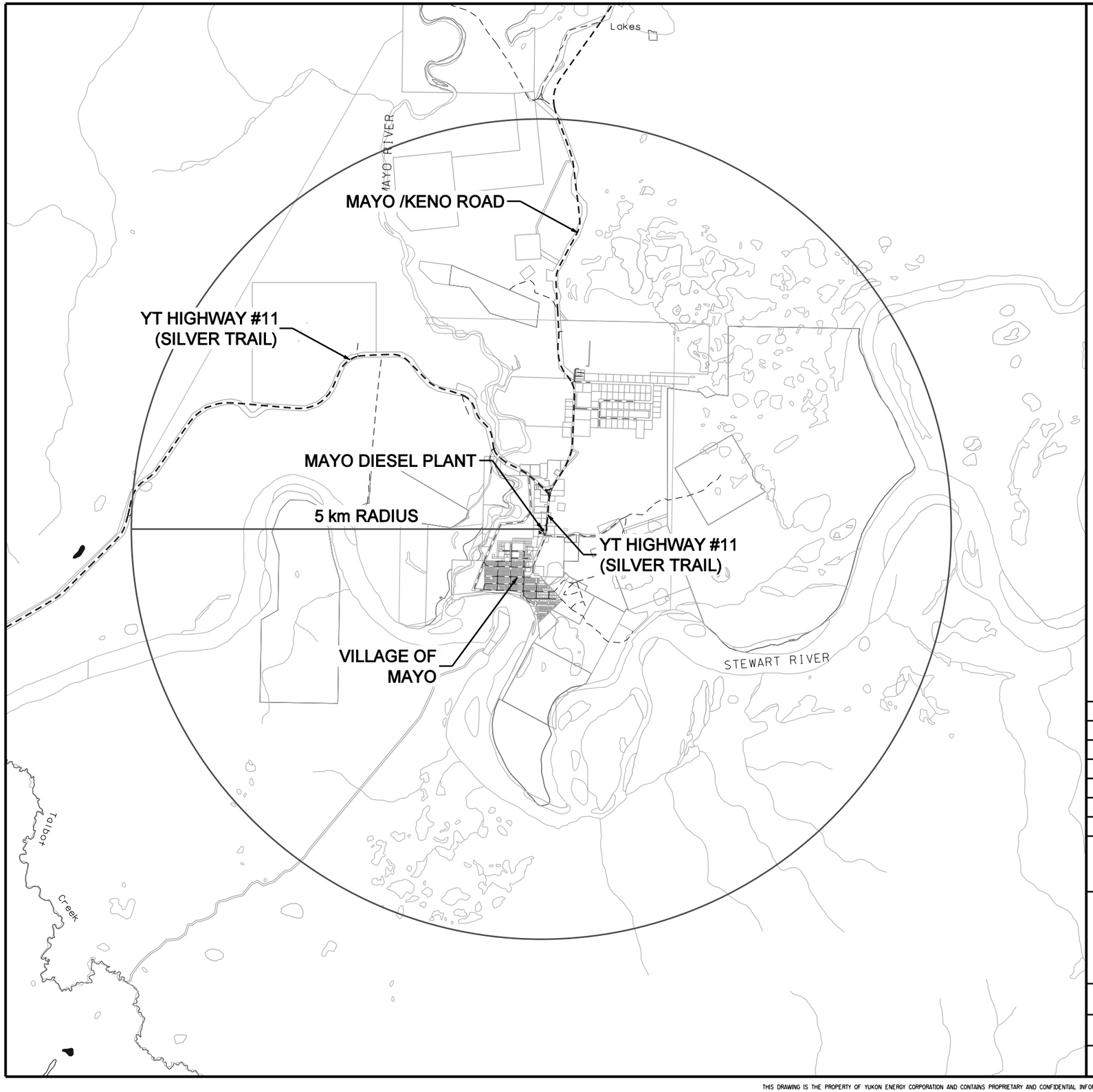
Lot 1000, Quad 105 M/12, Group 1004, Plan 61437 LTO DCT No. 93Y378 - registered to Yukon Energy Corporation.

Approximate coordinates of the diesel plant:

- UTM, Zone 8
- Northing: 7052505.0275
- Easting: 455892.8273

The diesel plant maintains two units as described in Table 3.

The following figure provides an overview of the location of the diesel generators relative to the community of Mayo.



LEGEND

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UTM Zone 8 NAD83

Scale 1:50,000

1 0.5 0 | 2 Kilometers

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1	SEPT 4, 2008	INITIAL REVIEW	TR
2	SEPT 19, 2008	FINAL	TR

YUKON ENERGY CORPORATION

2008 AIR EMISSIONS PERMIT RENEWAL APPLICATION SUPPORTING DOCUMENTATION

**FIGURE 3:
OVERVIEW OF YEC MAYO DIESEL PLANT AREA**

Drawn: C.McGILLIVRAY	Date: SEPTEMBER 2008
Scale: 1:50000	Map Sheet No. 105M12
Revision Number: 2	Dwg Name: FIGURE 3

3.6 FARO

3.6.1 Facility Overview

The Faro diesel plant is located near the entrance to Faro off the mine access road. The legal description of the property is as follows:

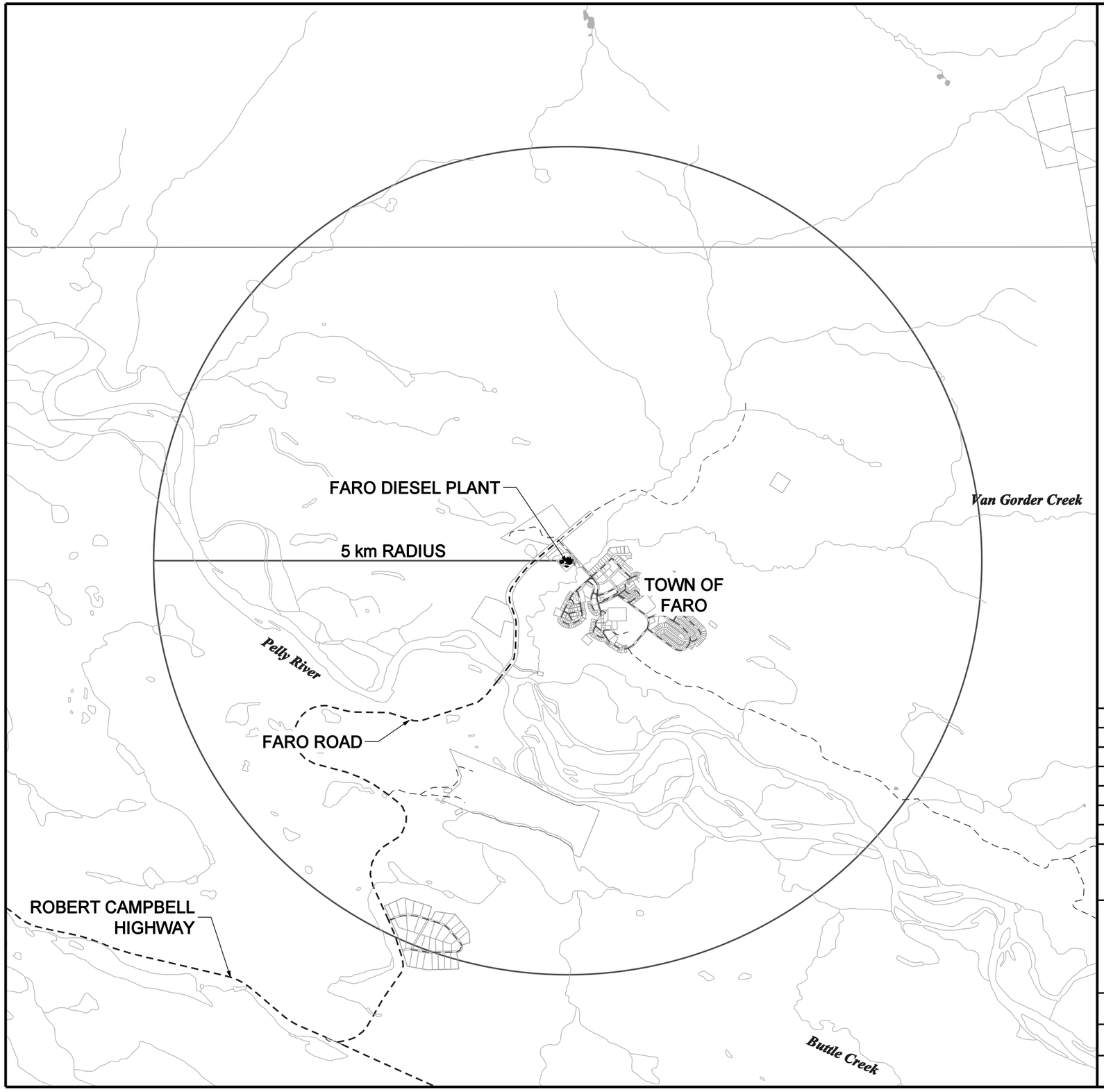
Lot 114, Quad 105 K/03, Plan 49716 LTO DCT No. 93Y377 - registered to Yukon Energy Corporation.

Approximate coordinates of the diesel plant:

- UTM Zone 8
- Northing: 6901266.5646
- Easting: 585174.5418

The diesel plant maintains four units as described in Table 3.

The following figure provides an overview of the location of the diesel generators relative to the community of Faro.



LEGEND

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Scale 1:50,000

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Rev. No.	Date	Description	Approv'd
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YUKON ENERGY CORPORATION

2008 AIR EMISSIONS PERMIT RENEWAL APPLICATION SUPPORTING DOCUMENTATION

**FIGURE 4:
OVERVIEW OF YEC FARO DIESEL PLANT AREA**

Drawn: C.McGILLIVRAY	Date: SEPTEMBER 2008
Scale: 1:50000	Map Sheet No. 105K03
Revision Number: 2	Dwg Name: FIGURE 4

3.7 TYPICAL EMISSIONS CHARACTER

As described in Section 2.1, above, the air quality assessment conducted by SENES in 2008, for the purpose of Yukon Energy"s previous application for renewal of the air emissions permit for its diesel generation facilities, used assumed emission rates for Yukon Energy"s diesel engines, based on published, activity-based emission rates for comparable diesel engines to those Yukon Energy maintains in Whitehorse.

Further to the mitigation measures recommended by the Designated Offices in the previous assessment, actual measurements (stack emission tests) were conducted to verify the emission rates for Yukon Energy"s diesel facilities, using the largest units in Yukon Energy"s diesel generator fleet, all based in Whitehorse. As a result, SENES has been able to refine the modelling in its updated air quality assessment, by using the actual measured emission rates for Yukon Energy"s diesel facilities, instead of assumed emission rates based on published data for comparable engines.

The SENES report, contained in Appendix B, summarizes the results of the stack testing and resulting emissions characteristics.

3.8 OPERATIONAL RESOURCE USE & WASTE GENERATION

Each diesel plant maintains a permitted bulk fuel supply of ultra low sulphur diesel (50 parts per million), which is the only fuel type used. Fuel storage facilities meet National Fire Code standards and each is permitted by the Yukon Fire Marshall"s Office pursuant to the *Environment Act* and *Fuel Storage Regulations*. Spill containment and response equipment is maintained in appropriate locations and quantities at each site. Routine checks of the facilities are conducted to ensure appropriate containment and operation of the storage systems. Yukon Energy personnel are also trained in spill response. Yukon Energy maintains a policy to externally report any release of hazardous material to land in excess of 500ml (used), five litres (fresh) and, according to regulation, any release to a watercourse, no matter the volume.

In addition to air emissions, other wastes are generated at these facilities. For example waste oil, waste solvents, waste coolants, and used absorbents are all commonly

generated. Pursuant to the requirements of Part 7 of the Environment Act and the Special Waste Regulations, storage and handling of these materials follows Corporation"s Special Waste Permit and industry best practice. All wastes are disposed of annually, or more often, through permitted commercial recycling, reuse, and/or disposal contractors, such as the Yukon Government Special Waste Collection and Disposal Program, permitted waste oil collectors, and approved waste disposal facilities in each community.

3.9 REGULATORY CONTEXT

3.9.1 Regulation under the Public Utilities Act

Yukon Energy"s diesel plants are operated as a critical component of the Corporation"s facilities required to satisfy its obligation to supply electricity service to its customers under the *Public Utilities Act*. As such, the plants are regulated by the Yukon Utilities Board (YUB) both in terms of the requirement for installed capacity, and the ability of Yukon Energy to recover any costs spent on these facilities through electrical rates.

To satisfy Yukon Energy"s obligations, the diesel plants must be designed and installed so as to ensure that the power systems are able to supply utility-grade reliable power to customers. This requires the diesel plants to meet the capacity planning criteria[3] reviewed by the YUB in its review of Yukon Energy"s 20-year Resource Plan 2006-2025, and the consequent recommendations from the YUB to the Minister of Justice dated January 15, 2007.

[3] The criteria adopted by Yukon Energy and set out in the 20 year Resource Plan 2006-2025 are as follows:

1. **WAF and MD System-wide capacity planning criteria:** Each system (WAF and MD) will be planned not to exceed a Loss of Load Expectation (or LOLE) of two hours per year.
2. **Emergency (or "N-1") WAF and MD system capacity planning criteria:** Each grid system (WAF and MD) will be planned to be able to carry the forecast peak winter loads (excluding major industrial loads) under the largest single contingency (known as "N-1"). The N-1 criterion determines system capacity assuming the loss of the system"s single largest generating or transmission-related generation source. In the case of WAF, this is presently the Aishihik transmission line, without which the WAF grid loses ability to access approximately 30 MW of generation.
3. **WAF and MD "community" criteria:** For communities on the WAF or MD grids, any location with a load large enough to justify a diesel unit of about 1 MW or more will be considered as a preferred location for new diesel units if that community does not already have back-up from another source (e.g., having an existing diesel unit). The new diesel units would provide grid support, and in times of line failures would provide local generation for the communities where they are located.

Absent the ability to meet utility standard planning criteria in terms of the quantity of installed diesel on the system, and at the right locations on the system, as well as the ability to operate the diesels as required to the full capability of their rated output, Yukon Energy could experience one or more of the following conditions:

- In **very cold weather conditions**, Yukon Energy would be unable to meet the peak loads of the integrated transmission grid. This would give rise to interruptions of service on substantial components of the power grid, likely during peak load hours (e.g., daytime hours). Further, once such outages occur it becomes very difficult to resume service due to a condition known as „cold load pick-up" where the generation available must be well in excess of the normal average load on a feeder in order to be able to restore service (due, for example, to the fact that after even a brief outage in such weather, basically every furnace fan or heat tape installed on the system will automatically be drawing load when the system is restored).
- In **unplanned system outages**, particularly in winter conditions, Yukon Energy would similarly be unable to supply load. Outages due to this factor could readily be of extended duration, such as the experience of January 29, 2006, where due to a major failure of the power cables at the Aishihik hydro plant, up to 6 WAF diesels operated for 2 days to maintain power to the system. For a further 8 days the WAF system operated in a constrained mode without diesels operating, but needed to be ready to operate at any time. The system was not fully restored to normal status until February 21, more than three weeks after the incident. Diesel generation was similarly used to supply substantial components of the load following the fire at the Whitehorse Rapids hydro plant in October 1997, and to various grid locations during forest fires (when transmission lines are at times required to be de-energized) in recent years.
- During **drought conditions**, even at the current load levels, the diesel units could be required for energy-related reasons to maintain service to load and ensure the hydro plants can maintain their water levels within licenced ranges. For example, diesel generation for this purpose was required in the late winter of 1999 due to the severe drought conditions experienced at Aishihik in 1998. While this can lead to sustained diesel generation, the output is typically at a low level. For example, during the early

part of 1999, the average output of all combined diesel generation on WAF was 3 MW, or less than 10% of the installed diesel capability on WAF.

- In **planned system outages**, such as transmission line maintenance, communities such as Faro and Dawson which are located away from the hydro plants require diesel generation to maintain continuity of service.

If Yukon Energy"s ability to use and operate the diesel generators were to be constrained during the 2012-2014 period in any way that could prevent the Corporation from being able to rely on the facilities to provide a reliable supply of back-up power to customers in accordance with utility standard planning criteria, such constraints could result in one or more of the foregoing situations arising, in which Yukon Energy would be unable to supply customers with power in accordance with its obligations under the *Public Utilities Act*. This would present an obvious and acute risk of harm to human health and safety and public and private infrastructure, particularly during cold winter temperatures.

3.9.2 Legal & Regulatory Constraints under Environment Act and Air Emissions Regulations

Aside from the regulation of Yukon Energy"s diesel facilities by the YUB under the *Public Utilities Act*, Yukon Energy"s use and reliance on its diesel facilities during the 2012-2014 period will be constrained by the terms and conditions of its Air Emissions Permit, as well as the requirements of relevant legislation that applies to the project, including the *Environment Act* and the *Air Emissions Regulations.*

As noted in Part 2.3 above, for the purpose of assessing what, if any, potential effects the renewal of the Permit could have on human health and safety, the Designated Office must assume (as was done, for example, in the Watson Lake Designated Office Evaluation Report on Project Number 2009-0107, at pages 1 and 16) that Yukon Energy will continue to operate its diesel generation facilities in compliance with all relevant legislative and regulatory requirements, and that the decisions bodies and regulators will continue to enforce such requirements, in order to help ensure that no significant adverse effects occur as a result of the operation of the facilities.

In particular, assuming Yukon Energy"s Permit is renewed for the 2012-2014 period on terms and conditions similar to those contained in the existing Permit #60-010 (as amended on July 22, 2011) (see Appendix D), Yukon Energy"s operation of the facilities will continue to be subject to the following requirements under the Permit:

- All associated personnel (employees, contractors or volunteers) are required to be knowledgeable of the terms and conditions of the Permit, and to receive appropriate training for the purposes of carrying out the requirements of the Permit (paragraph 2.3);
- Yukon Energy is required to provide written notice to an environmental protection analyst before any significant change of circumstances at the site, including, without limitation, discontinuation of any regulated activity at the site, or any change of ownership of the site or any of the sources (paragraph 2.4);
- Yukon Energy is required to obtain approval from an environmental protection analyst before adding, modifying, removing or replacing any equipment or components relating to the release, abatement, control or treatment of air emissions, and before any change in location of the source(s) (paragraph 2.5);
- If an inspection reveals that the site or source(s) is in any way not in compliance with the Permit, Yukon Energy is required to repair the damage or take other actions required to bring the site or source(s) into compliance (paragraph 2.6);
- Yukon Energy is required to develop and maintain a fire safety/emergency plan and a current site plan in accordance with the Permit and any requirements established by the Environmental Programs Branch of Environment Yukon; such plans (and any amendments) must be approved by an environmental protection analyst, and Yukon Energy is also required to implement approved plans, and to ensure all associated personnel are familiar with them (paragraphs 3.1 to 3.5);
- Yukon Energy is required to maintain and operate the sources, as well as any stand-alone air pollution control equipment and testing and monitoring equipment, in accordance with manufacturer"s recommendations and best management practices, as necessary to provide optimum control of air contaminant emission during all operating periods (paragraph 4.1);

- Yukon Energy is also required to run the sources at each site in order of highest possible efficiency in the circumstances, except for maintenance or test purposes (paragraph 4.2);
- Yukon Energy is required to ensure that the fuel used by the source(s) conforms to the most recent Canadian federal *Sulphur in Diesel Fuel Regulations* for off-road applications (paragraph 4.3);
- Yukon Energy is prohibited from allowing visible emissions from any source to exceed an opacity of 20% as measured by an environmental protection officer (paragraph 5.1), and must comply with further requirements to notify an environmental protection officer of any measured exceedance within 15 days or such time as may be directed by an environmental protection officer (paragraph 5.3), and to take reasonable measures to reduce opacity of emissions within 5 days of any measured exceedance, or in such time as may be directed by an environmental protection officer (paragraph 5.2);
- Yukon Energy must ensure that particulates collected using emission control equipment are contained so that there is no release of contaminants into the atmosphere or any open body of water (paragraph 5.4);
- Yukon Energy is required to conduct visual inspections and maintenance on all source components as per manufacturer's instructions (paragraph 7.1);
- Yukon Energy is required to contact either an environmental protection officer or the Yukon Spill Report Centre as soon as possible under the circumstances in the event of an unauthorized release or emission, such as fugitive emissions or emissions resulting from burning fuel other than that allowed under the Permit (paragraph 8.1);
- Yukon Energy is required to maintain records for at least three years in a format acceptable to an environmental protection officer, and to make them available on request for inspection by an environmental protection officer, including every plan developed under the Permit, summaries of all inspections carried out under the Permit, notes concerning any spills, leaks or unauthorized emissions, any deficiencies identified in an inspection and how and when they were remedies, and notes concerning any instance where the most efficient source was not used, and the reason for use of the less efficient source (paragraphs 9.1 and 9.2).

Yukon Energy"s operation of the facilities will also continue to be subject to all applicable requirements and prohibitions under the *Environment Act* and *Air Emissions Regulations*, including:

- the general prohibition under section 6 of the *Regulations* against Yukon Energy releasing or allowing the release of any contaminant to such extent or degree as may: (a) cause or be likely to cause irreparable damage to the natural environment; or (b) in the opinion of a health officer, cause actual or imminent harm to public health or safety;
- Yukon Energy"s obligation under section 12(3) of the *Regulations* to provide written notice to the Minister, as soon as is reasonably feasible, of any significant change of circumstances involving the permitted activity;
- the authority of an environmental protection officer under section 12(4) of the *Regulations* to conduct periodic inspections of Yukon Energy"s facilities to ensure compliance with the terms and conditions of the Permit;
- the authority of an environmental protection officer to issue a “hold order” under section 153 of the *Act*, or an “environmental protection order” under section 159 of the *Act*, in any of the circumstances described in those sections;
- the authority of the Minister to issue an “environmental protection order” under section 160 of the *Act*; and
- the overriding authority of the Minister to suspend or cancel the Permit under section 91 of the *Act*, if Yukon Energy contravenes a term or condition or the Permit or a provision of the *Act* or *Regulations*, or if, in the Minister"s opinion, Yukon Energy"s operation of its diesel facilities “has caused or is likely to cause irreparable or costly damage to the natural environment”, or if, on the advice of a health officer, it is the Minister"s opinion that Yukon Energy"s operation or its diesel facilities “has caused or is likely to cause a threat to public health or safety”.

It should be emphasized that if, during the term of the renewed Permit, a situation arises in which the continuing operation of Yukon Energy"s could ever cause actual or imminent harm to public health or safety because of any change in circumstances or operating

conditions that is not contemplated at this time, the *Environment Act* and *Regulations* will give overriding authority to an environmental protection officer and/or the Minister, in the circumstances specified, to require Yukon Energy to cease operating one or more of the diesel units, or take other action that may be deemed necessary to prevent, remedy or otherwise mitigate that harm.

Other relevant legislative requirements include:

- section 27 of the *Occupational Health Regulations*, which stipulates workers' exposure limits for airborne contaminants, usually based on an 8-hour permissible exposure limit;
- sections 46 to 50 of the *Canadian Environmental Protection Act, 1999*, which speaks to the reporting requirements of the National Pollutant Release Inventory (NPRI);
- Yukon *Special Waste Regulations*;
- Yukon *Contaminated Site Regulations*;
- Yukon *Storage Tank Regulations*.

4.0 ENVIRONMENTAL & SOCIO-ECONOMIC SETTING

4.1 GENERAL

For the purposes of the assessment and its focus on air quality and human health, the human environment is considered to be very similar across each of the four communities in which Yukon Energy maintains diesel generators. It is assumed that there are no material differences among the four communities with respect to common human components such as a population of male, female, child, adult, and elderly persons with a common community health profile, the presence of common community infrastructure such as homes, schools, hospitals or nursing stations, communal recreation areas, etc. It is also assumed that there are no material differences in other socio-economic characteristics.

As noted previously, the key valued component identified for detailed assessment relative to this application is human health and safety. Human health and safety, with regard to the potential effects of diesel generation, is a function of overall ambient air quality (as opposed to emissions from any particular point source). Therefore the focus of this section is on describing the existing environment by describing the likely sources of air emissions in each of the communities.

Prior to 2008, there were no pre-existing air emission inventories available for use in the assessment which SENES conducted for the purpose of Yukon Energy"s previous permit renewal application. Accordingly, individual inventories were developed in 2008 for each community in which Yukon Energy maintains diesel generators. These inventories assisted in developing an understanding of other community air emission sources and their relative contributions to the environment, and continue to be of such assistance in the context of Yukon Energy"s current renewal application.

These inventories provide a backdrop for understanding the role and relationship of individual emission sources within the communities. The actual inventories are presented in the SENES report in Appendix B of the 2008 project proposals and represent an activity based emission inventory for the year 2006, which was chosen as a

sample year due to the availability of data. The overall emissions from the activity within the communities would not significantly differ for 2005 or 2007.

The annual emission tables within the 2008 SENES report summarize approximately 120 unique sources for each community for a series of Common Air Contaminants (CAC) and Greenhouse Gas (GHG) Emissions. Not every community has every emission source, particularly the smaller communities, and adjustments in the inventories were made accordingly.

Of particular note, and as explained further below, it should be emphasized that the relative contribution by Yukon Energy"s facilities to total $PM_{2.5}$ emissions from all sources in each of the four communities is extremely low: < 1% in each community, and only 0.02% in Whitehorse specifically.

4.2 WHITEHORSE

4.2.1 Emissions Inventory

The City of Whitehorse contains the majority of the population within the Yukon and represents the foundation for development of the emission inventories. The airshed boundary identified for the emission inventory uses the boundaries identified in the Official Community Plan, which was available from the City"s web site. The following are points of interest for the 2008 inventory:

- Within the city boundary there is very little agricultural activity both for agricultural land use practices and equipment usage.
- Four point sources have been identified: the Whitehorse General Hospital, the sand and gravel supply in the southern parts of town, the local asphalt batch plant, and the concrete batch plants, in addition to the Yukon Energy generators.
- The highway traffic accounts for vehicles travelling along a 36 km stretch of the Alaska Highway.
- A population of 23,751 was estimated for the inventory year.

- A total of 27,525 flights were recorded between the two airports.
- A total of 24,600 cords of wood were estimated to have been burned during the year.

The following table summarizes the 2006 component contributions to the Whitehorse airshed for some emissions of interest.

Table 4 Summary of Select Component Contributions to Air Emissions in Whitehorse[4]

Source	Particulate Matter ($PM_{2.5}$)	Oxides of Nitrogen (NO_x)	Carbon Dioxide (CO_2)
Yukon Energy Diesel Generators	0.02%	1%	0.1%
Home Heating	84%	26%	57%
Local Vehicle Traffic	0.9%	46%	25%
All Others Sources Combined	15%	27%	18%

4.2.2 Ambient Air Quality

Environment Canada operates an air quality monitoring station in Whitehorse, located at 1091 - 1st Avenue, as part of the National Air Pollution Surveillance (NAPS) network. The most recent 5-year data record includes monitoring for CO, NO, NO_2 and $PM_{2.5}$ for the period 2001-2005. This data was used and analyzed during the air quality assessment and is presented in SENES"s report in Appendix B. (This was the same data used in SENES"s original 2008 study; however, there was no more recent data available for the purposes of the updated air quality assessment.)

The data from the station indicate that, in non-forest fire years (2001-2003), the maximum levels of CO, NO_2 and $PM_{2.5}$ in Whitehorse are well below the ambient air quality standards adopted by Yukon Environment in 2010. In fact, in September 2011,

[4] All figures in Table 3 are approximate.

the World Health Organization rated Whitehorse as the cleanest city in Canada on the basis of an annual average $PM_{2.5}$ level of only 3 µg/m^3.

Data from the station for NO_2 and $PM_{2.5}$ in 2004 and 2005 are anomalously high due to forest fires in the area in those years, and as such are not representative of typical levels of these contaminants in Whitehorse. Accordingly, for the purposes of the assessment, SENES has assumed background concentrations of NO_2 and $PM_{2.5}$ defined as the 98th percentile value average over the 3-year period 2001-2003 (3.8 µg/m^3 for NO_2, and 8 µg/m^3 for $PM_{2.5}$).

4.3 FARO

4.3.1 Emissions Inventory

The Town of Faro contains a small fraction of the population within the Yukon and its inventory utilizes scaled activity from the Whitehorse inventory in situations where local data were not available. The following are points of interest for the 2008 inventory:

- Within the inventory bounds there is very little agricultural activity both for land use activity and agricultural equipment usage.
- There were no significant point sources identified for Faro other than the Yukon Energy power plant.
- The highway traffic accounts for vehicles travelling along a 15 km stretch of the Campbell Highway.
- A population of 388 was estimated for the inventory year.
- A total of 786 flights were recorded at the local airport.
- A total of 367 cords of wood were estimated to have been burned during the year.
- Yukon Energy diesel operations contributed approximately 0.4%, 16%, and 2% of the total community emissions of $PM_{2.5}$, NO_x, and CO_2, respectively.

4.4 MAYO

4.4.1 Emissions Inventory

The Town of Mayo contains a small fraction of the population within the Yukon and its inventory also utilizes scaled activity from the Whitehorse inventory in situations where local data were not available. The following are points of interest for the 2008 inventory:

- Within the inventory bounds there is very little agricultural activity both for land use activity and agricultural equipment usage.
- There were no significant point sources identified for Mayo, other than the Yukon Energy power plant.
- The highway traffic accounts for vehicles along a 25 km stretch of Highway 11.
- A population of 409 was estimated for the inventory year.
- A total of 4,377 flights were recorded at the local airport.
- A total of 470 cords of wood were estimated to have been burned during the year.
- Yukon Energy diesel operations contributed approximately 0.1%, 4%, and 0.3% of the total community emissions of $PM_{2.5}$, NO_x, and CO_2, respectively.

4.5 DAWSON CITY

4.5.1 Emissions Inventory

Dawson City contains a small fraction of the population within the Yukon and its inventory also utilizes scaled activity from the Whitehorse inventory in situations where local data were not available. The following are points of interest for the 2008 inventory:

- Within the inventory bounds, there is very little agricultural activity both for land use activity and agricultural equipment usage.
- A single point source representing sand and gravel supply is included, in addition to the Yukon Energy power plant.

- The highway traffic accounts for vehicles travelling along a 20 km stretch of the Klondike Highway.
- A population of 1,813 was estimated for the inventory year.
- A total of 5,567 flights were recorded at the local airport, located approximately 15 km east of town and are included for comparison to the other communities.
- A total of 2,201 cords of wood were estimated to have been burned during the year.
- Yukon Energy diesel operations contributed approximately 0.3%, 15%, and 2% of the total community emissions of $PM_{2.5}$, NO_x, and CO_2, respectively.

5.0 EFFECTS ASSESSMENT

5.1 GENERAL

The updated air quality effects assessment carried out by SENES, and outlined in its report in Appendix B, includes a thorough and comprehensive dispersion modelling analysis to assess the potential effects within the Whitehorse airshed of four air contaminants produced from the diesel generators: carbon monoxide (CO), sulphur dioxide (SO_2), nitrogen dioxide (NO_2), and respirable particulate matter ($PM_{2.5}$).

The potential effect of Yukon Energy emissions of those contaminants was modelled, analyzed, and assessed based on simulations of three different levels of operation of the Whitehorse diesel facilities, as outlined below.

The updated effects assessment focuses principally on modelling of emissions in the Whitehorse airshed, and comparing them to the ambient air quality standards adopted by the Yukon Government in 2010. As with the original 2008 assessment, the Whitehorse facility was selected because of the availability of suitable meteorological data that was required to conduct the modelling, as well as suitable ambient air quality monitoring data that provides a measure of background concentrations against which to assess the potential impact of Yukon Energy operations. Equivalent data was not available for Mayo, Faro, or Dawson City; in the absence of such data, it is assumed that the results and findings for Whitehorse provide reasonably representative, conservative estimates of the outcomes that could be expected for the smaller diesel plants in the

other three communities, given the likely levels of use of the units in these communities during the three-year term of the renewed Permit.

It should also be noted that by their very nature, the effects of diesel generation emissions on human health result from the cumulative interaction of emissions from Yukon Energy and all other sources of contaminants in the airshed, including community sources such as local vehicular traffic, home heating (using either fuel oil or wood stoves), and other (non-Yukon Energy) industrial activity. Those other sources, which are not within the Corporation"s control, collectively produce the vast majority of contaminants in all four communities (as outlined in Section 4.0 above, and in the air quality inventories prepared by SENES in their 2008 report). Any potential effects on human health would be as a result of overall ambient air quality.

As such, the effects assessment focuses both on:

- the incremental contribution of Yukon Energy emissions to air quality in Whitehorse (excluding background air quality); and
- the cumulative effect of Yukon Energy emissions combined with reasonably contemplated background concentrations of contaminants from other sources, based on actual ambient air quality data observed during a typical three-year period (2001-2003) that is assumed to be reasonably representative of the background levels of contaminants that would normally be expected to occur.

5.2 GENERATION PROFILES

For the purpose of analyzing the potential effects on human health of emissions from the Whitehorse diesel facilities, SENES developed and conducted air dispersion modelling of the three operating scenarios, as follows:

- **Scenario 1:** actual 2010 generation levels by facility.
- **Scenario 2:** forecast “average case” levels of diesel generation through to 2014. This scenario reflects Yukon Energy"s projections of the most likely highest levels of diesel generation over the 2012-2014 period, given current hydrological conditions and electricity demand predictions.

- **Scenario 3:** hypothetical "worst case" scenario. This scenario reflects Yukon Energy"s projections of the maximum demand that might theoretically need to be met from diesel generation, in the unlikely event that Yukon Energy"s ability to supply demand through hydro generation were to be very seriously constrained as a result of a series of successive drought years culminating in the most extreme drought conditions occurring in 2014. This scenario represents the extreme case of extraordinarily severe drought conditions, which is very unlikely to occur over the term 2012-2014.

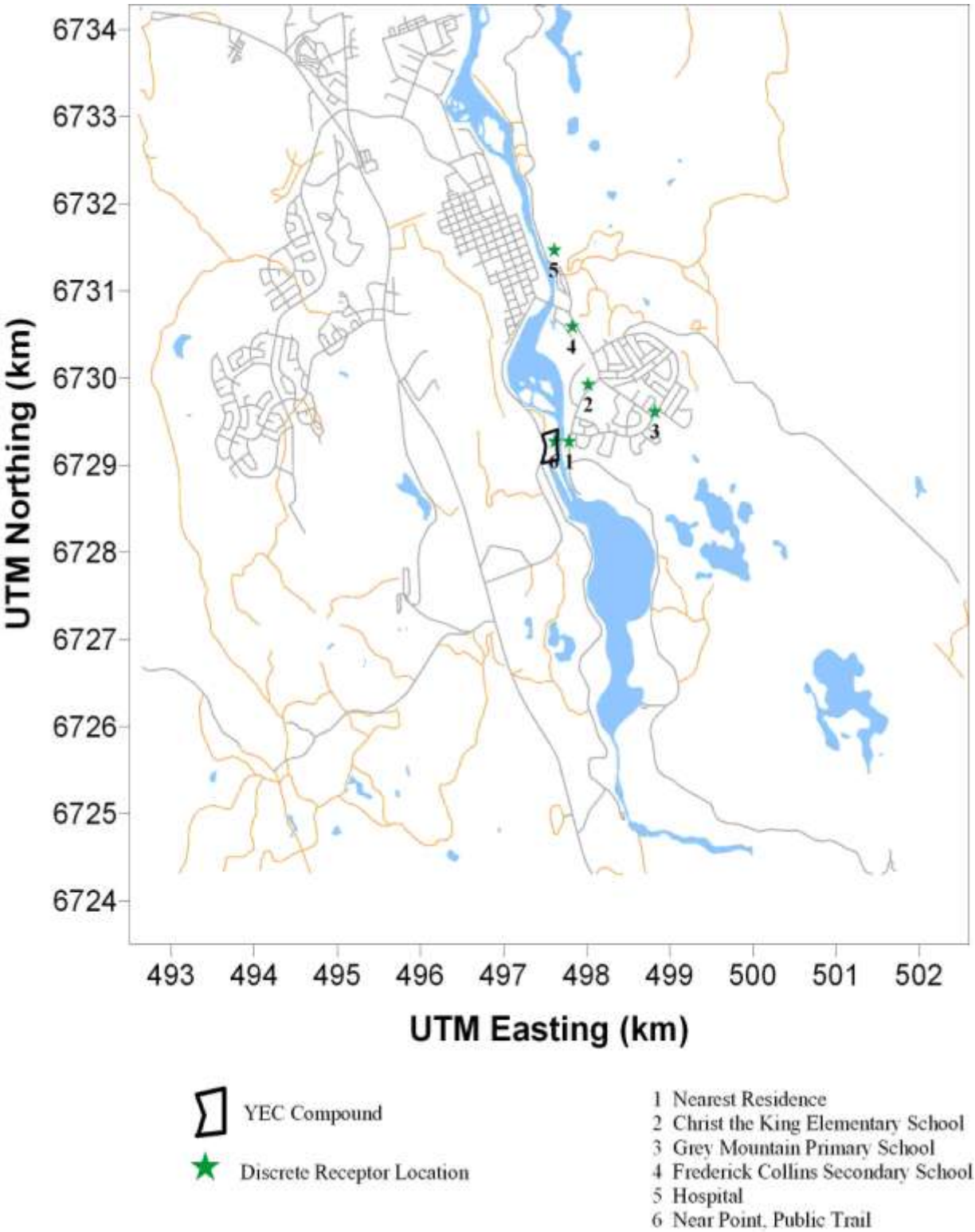
5.3 REPRESENTATIVE RECEPTOR SITES

Estimates of ambient air quality concentrations were produced on a regular grid every 20 metres within 200 metres of the diesel plant, every 50 metres between 200 metres and 500 metres from the plant and then every 200 metres for the remainder of the study area. In addition, six discrete receptor locations were used. Discrete receptors are commonly used in air quality assessments to look at the full distribution of predicted ambient concentrations at locations considered particularly sensitive to air contaminants, such as homes, schools and hospitals.

The six sensitive receptors chosen were as follows and are presented in Figure 5, below (approximate distance from the plant shown in brackets):

1. nearest residence to the power plant, located on the east side of the Yukon River (240 m);
2. Christ the King Elementary School (840 m);
3. Grey Mountain Primary School (1.3 km);
4. Frederick H. Collins Secondary School (1.4 km);
5. the Whitehorse General Hospital (2.2 km); and,
6. the Whitehorse plant property eastern fence line near the Yukon River (75 m).

Figure 5 Inner Modelling Domain and Discrete Receptor Locations



5.4 POTENTIAL HEALTH EFFECTS & APPLICABLE ENVIRONMENTAL STANDARDS

The screening-level human health risk assessment conducted by SENES and outlined in its report considers predicted concentrations of CO, SO_2, NO_2 and $PM_{2.5}$ in the actual and hypothetical operating scenarios modelled under each of Scenarios 1, 2 and 3, at each of the six selected receptor sites and at the "maximum point of impingement" (Max POI)[5], and the resulting risk (if any) to human health.

The predicted total ambient concentration of each contaminant depends on the combination of the predicted concentration arising from Yukon Energy"s operation of its diesel facilities plus the expected background concentration of the contaminant arising from other sources, including other community emission sources, such as local vehicular traffic, home heating (using either fuel oil or wood stoves), and other (non-Yukon Energy) industrial activity. Background concentrations of contaminants such as NO_2 and $PM_{2.5}$ may also vary significantly as a result of natural variations in baseline conditions not within Yukon Energy"s control (i.e., forest fires), causing an increased presence of those contaminants in the airshed, when those events might occur.

The Yukon Ambient Air Quality Standards, adopted by the Yukon Government in 2010, now represent an established and recognized environmental norm that provides an appropriate and sound basis against which to assess the potential "significance" of any potential adverse health effects arising from CO, SO_2, NO_2 and $PM_{2.5}$ emissions from Yukon Energy"s facilities, for the purpose of section 56(1) of *YESAA*, in conjunction with any other effect attributes that are relevant to the "significance" analysis, such as extent, duration, frequency, and in particular, the likelihood of any effect occuring.

With respect to $PM_{2.5}$, such other effect attributes include the very low extent to which Yukon Energy"s diesel facilities actually contribute to total concentrations of $PM_{2.5}$ relative to other community sources of $PM_{2.5}$ emissions, or natural variations in baseline conditions resulting from forest fires, which are not within the Corporation"s control and against which it cannot reasonably be expected to mitigate.

[5] The Max POI includes any point in the modelling domain outside the property line of the facility where the highest concentration of the contaminant is predicted to occur.

5.5 EFFECTS SUMMARY

5.5.1 Beneficial Effect of Yukon Energy's Diesel Facilities

Yukon Energy"s diesel generation facilities have an obvious beneficial effect on human health and safety, given Yukon Energy"s reliance on those facilities for back-up power generation capacity. The diesel facilities are essential to the Corporation"s ability to provide a reliable supply of electricity to customers on those occasions when Yukon Energy is unable to satisfy total customer demand through hydro generation alone; i.e. in emergency situations, as well as during periods of planned maintenance, or when demand otherwise outstrips hydro supply as a result of peaking demand during cold winter temperatures.

If Yukon Energy were not able to use and rely on its diesel generation facilities to provide a reliable supply of back-up power to customers in these circumstances, this would put both infrastructure and human health and safety at very serious risk, particularly during the cold winter months.

5.5.2 Potential Effects Resulting from Combustion Gas Emissions (CO, SO_2, and NO_2)

SENES"s analysis demonstrates that, based on application of the Yukon ambient air quality standards, there are no potential adverse health effects from CO, SO_2, or NO_2 emissions from Yukon Energy"s diesel facilities.

In particular, SENES"s modeling demonstrates that the cumulative effect of CO, SO_2 and NO_2 emissions from Yukon Energy"s diesel facilities, in combination with background concentrations of those contaminants, would not result in the ambient air quality standards for CO, SO_2 or NO_2 being exceeded anywhere in Whitehorse, at any time, in any Scenario, including even under the extreme (and very unlikely) “worst case” operating conditions represented by Scenario 3.

5.5.3 Potential Effects Resulting from Particulate Matter Emissions ($PM_{2.5}$)

It also follows from SENES"s modeling and analyses that, based on application of the Yukon ambient air quality standards, PM2.5 emissions from Yukon Energy"s diesel facilities similarly are not expected to have any significant adverse effects within the meaning of section 56(1) of YESAA.

In particular, SENES"s modeling shows that Yukon Energy"s incremental contribution to air quality in Whitehorse (excluding background air quality) would remain well within the Yukon $PM_{2.5}$ standard, at all times, at all locations in Whitehorse, whether based on Yukon Energy"s actual diesel operations in 2010 (Scenario 1), or projections of the most likely levels of diesel generation reasonably anticipated over the 2012-2014 period (Scenario 2).

Even under the extreme (and very unlikely) “worst case” operating conditions represented by Scenario 3, Yukon Energy"s incremental contribution to air quality in Whitehorse would remain within the Yukon $PM_{2.5}$ standard everywhere in Whitehorse, except, on two days of the year only, at the Max POI on the western edge of the Yukon Energy facility property line (where members of the public are not likely to be present except for very brief periods of exposure), as a result of building downwash effects on the plumes from the facility. Other than that, Yukon Energy"s incremental contribution to ambient air quality levels at all locations in Whitehorse would remain within the limits of the Yukon $PM_{2.5}$ standard, at all times, even in the unlikely “worst case” scenario.

In fact, the incremental contribution of Yukon Energy emissions to ambient $PM_{2.5}$ levels in most areas of Whitehorse would remain at or below about 2 $\mu g/m^3$ (less than 7% of the Yukon $PM_{2.5}$ standard) even under the modelled “worst case” operating conditions.

As regards the cumulative effect of Yukon Energy emissions in combination with an assumed background $PM_{2.5}$ concentration of 8.0 $\mu g/m^3$:

- this still would not result in the Yukon $PM_{2.5}$ standard being exceeded anywhere in Whitehorse, at any time, based on actual diesel operations in 2010 (Scenario 1);

- under the most likely levels of diesel generation anticipated over the 2012-2014 period (Scenario 2), the cumulative effect of Yukon Energy emissions in combination with expected background $PM_{2.5}$ concentration from all other sources would only result in the Yukon $PM_{2.5}$ standard being exceeded on one day of the year, at the Max POI on Yukon Energy property only (and not at any other locations in Whitehorse); and
- even under the extreme (and very unlikely) "worst case" operating conditions modeled in Scenario 3, the cumulative effect of Yukon Energy emissions in combination with expected background $PM_{2.5}$ concentration from all other sources would only result in the Yukon $PM_{2.5}$ standard being exceeded on up to seven days of the year, and, again, at the Max POI on Yukon Energy property only (and not at any other locations in Whitehorse).

Indeed, it is contemplated that $PM_{2.5}$ concentrations would remain at background levels (8.0 $\mu g/m^3$) for 155 days of the year, even in severe drought conditions with maximum load operations on the diesel generators as modelled in Scenario 3.

In the circumstances, these hypothetical impacts cannot reasonably be considered "significant" potential adverse effects for the purposes of section 56(1) of *YESAA*, particularly having regard to:

- the mitigation measures proposed by Yukon Energy (as referenced in Section 2.3 above), together with the other legal and regulatory constraints on Yukon Energy"s operation of its facilities (as outlined in Section 3.9.2 above), which, taken together, must be considered adequate to eliminate, reduce or control any such, potential adverse effects of the project;[6]

[6] Any other conclusion would be inconsistent with the approach adopted by the Watson Lake Designated Office in its September 8, 2009 Evaluation Report on Project Number 2009-0107 (YECL Air Emissions Permit Renewal – Watson Lake, YT), in reviewing the Yukon Electrical Company Ltd."s application to renew the air emissions permit for the diesel generator station it operates continuously, on a full-time basis (24-hours per day, 365 days per year) as the primary power source in Watson Lake (see Section 2.3 above).

- the very unlikely nature of the "worst case" conditions modeled in Scenario 3, which assumes a series of successive drought years culminating in the most extreme drought conditions occurring in 2014; and
- the predominant attributes of the potential effect, namely effect extent, effect duration, effect frequency, and most importantly, the likelihood of the potential effect occurring.

5.6 SIGNIFICANCE CONCLUSIONS

Having regard to the foregoing review of the potential effects of Yukon Energy"s diesel generation facilities on human health and safety, it must be concluded that no significant adverse effects to human health and safety within the meaning of section 56(1) of *YESAA* are reasonably anticipated to result from Yukon Energy"s continuing operation of the diesel units under a renewed Permit, during the 2012-2014 period.

Accordingly, Yukon Energy requests that the Designated Office issue a recommendation to the Yukon Government under section 56(1)(a) of *YESAA* to allow the renewal of Yukon Energy"s Air Emissions Permit to proceed, on the basis that Yukon Energy"s continuing operation of the diesel units during the 2012-2014 term of the renewed Permit, in compliance with the terms of the renewed Permit and the requirements of the *Environment Act* and *Air Emissions Regulations*, will not have significant adverse environmental or socio-economic effects in or outside the Yukon.

6.0 ACKNOWLEDGEMENT AND CERTIFICATION

The information submitted in this Project Proposal is required for the purpose of conducting an evaluation under the *Yukon Environmental and Socio-economic Assessment Act.*

I acknowledge that, pursuant to sections 119 and 120 of the *Act*, a copy of this Project Proposal will be placed on a public register and be available to any member of the public to review. I understand that misrepresenting or omitting information required for the evaluation may cause delays in the evaluation or render the recommendations invalid.

I certify that the information provided is true and correct to the best of my knowledge and belief.

October 25, 2011

Travis Ritchie, P.Biol. CCEP
Manager – Environment, Assessment & Licencing

Date

YESAB
Yukon Environmental and Socio-economic Assessment Board

Jan 09, 2012 YOR Ref. No.: 2011-0246-032-1

Decision Document
YESAB Project Number: 2011-0246
Project Title: Air Emissions Permit Renewal - Faro

To correct previous Decision Document which had incorrect proponent name

Yukon
Government

Yukon Environmental & Socioeconomic Assessment Act
Decision Document

This document meets the requirements of a Decision Document as set out in the *Yukon Environmental & Socioeconomic Assessment Act*.

Decision Document Issued By

YG Decision Body:	**Department of Environment**
Other Decision Body:	N/A
First Nation Decision Body(ies):	N/A

Project

Project Name : YEC Air Emissions Permit Renewal 2011 – Faro	**YESAA File Number**: 2011-0246
Proponent Name:	Yukon Energy Corporation
Project Scope: Yukon Energy Corporation (YEC), is applying for the renewal of their Air Emissions Permit to continue operating its existing diesel-fired electricity generating station in the community of Faro. The generator serves as a secondary energy supply to supplement the transmission grid and as an emergency back-up power source.	

Other Decision Bodies

Other Decision Body Consultation:	N/A
Consolidated Decision Document:	☐ N/A X No ☐ Yes

Decision

Pursuant to YESAA s. 75, 76 and 80, the decision body has considered the YESAA assessment of this project and:	
x	a) Accept the following recommendation (inserted below): The Watson Lake Designated Office, pursuant to section 56(1)(a) of the *Yukon Environmental and Socio-economic Assessment Act* (YESAA), recommends to the decision bodies that the project be allowed to proceed, as it has determined that the project will not have significant adverse environmental or socio-economic effects in or outside Yukon.
	b) Rejects the following recommendation (inserted below) for the following reason(s):
	c) Vary the recommendations (inserted below) as follows for the reason(s) specified:

Dates

Project Recommendation Issued: December 30, 2011	**Decision Document Issued**: January 3, 2012

Recommendation Received From

Yukon
Government

Designated Office	X	Location: Watson Lake
Executive Committee		
Panel		a) Panel of the YESAB
		b) CEAA Panel
		c) Joint Panel (YESAB and other assessment body)

Authority
By signing below, the Decision Bodies have exercised their authority as per YESAA s. 75 or s. 76 to issue a decision document on this project.

Yukon Government
Name: Kevin McDonnell Position: Director, Environmental Programs Branch

Signature: Date: January 9, 2012
Original signed by [Delegated YG Decision Body]

Copies Forwarded to (as required by YESAA s. 81)):

☐	Other Decision Bodies	
X	Project Proponent	Yukon Energy Corporation
X	Development Assessment Branch	Executive Council Office
X	YESAB Designated Office	Watson Lake
☐	YESAB Executive Committee	[when applicable]
☐	Minister Environment (Canada)	[when applicable]

Yukon
Government

Yukon Environmental & Socioeconomic Assessment Act
Decision Document

This document meets the requirements of a Decision Document as set out in the *Yukon Environmental & Socioeconomic Assessment Act*.

Decision Document Issued By

YG Decision Body:	**Department of Environment**
Other Decision Body:	N/A
First Nation Decision Body(ies):	N/A

Project

Project Name : YEC Air Emissions Permit Renewal 2011 – Whitehorse Rapids Generating Station	**YESAA File Number:** 2011-0241
Proponent Name:	Yukon Energy Corporation

Project Scope:

The purpose of the proposed project is to renew Yukon Energy Corporation's (YEC) Air Emissions Permit in order to maintain the ability to operate its diesel generating facilities. The principle activity is the continued operation of 7 diesel generators located at the site of the Whitehorse Rapids Power Development adjacent to the Whitehorse Rapids Dam in Whitehorse. The operation of the diesel generators occurs to supplement electricity to the Whitehorse Aishihik Faro (WAF) Grid to meet peak demands, to meet demands as a result of emergency conditions and as a result of routine maintenance. The operational life of the generators is greater than 3 years however the scope of the project assessment will include the maximum term of the Air Emissions Permit which is 3 years.

Other Decision Bodies

Other Decision Body Consultation:	N/A
Consolidated Decision Document:	☐ N/A X No ☐ Yes

Decision

Pursuant to YESAA s. 75, 76 and 80, the decision body has considered the YESAA assessment of this project and:

	a) Accept the following recommendation (inserted below):
	b) Rejects the following recommendation (inserted below) for the following reason(s):
x	c) Vary the recommendations (inserted below) as follows for the reason(s) specified: The Whitehorse Designated Office, pursuant to section 56(1) b of the *Yukon Environmental and Socio-economic Assessment Act* (*YESAA*), recommends to the decision bodies that the project be allowed to proceed, subject to specified terms and conditions, as it has determined that the project will have significant adverse environmental or socio-economic effects in or outside Yukon that can be mitigated by those terms and conditions.

Yukon
Government

The following terms and conditions are varied by removal:

1. Upon permit renewal, the proponent shall develop and implement an air quality monitoring program for the criteria air contaminants (CO, NOx, SO2, PM, PM2.5). The purpose of the monitoring will be to validate the projections of the October 20, 2011 Air Quality Assessment Update in Support of Permit Renewal for Diesel Generator Operations prepared for proponent by SENES Consultants Limited and guide the implementation of measures to prevent the occurrence of significant adverse effects from the project on air quality. This program shall be developed in consultation with and to the satisfaction of Yukon Government.

Rationale:

A fundamental tenet of the use of modeling to predict air quality effects is that once the inputs to a model (and the model itself) are demonstrated to be appropriate, there should be no need for monitoring to confirm the model results (unless circumstances change). There is little utility in completing a modeling exercise if one cannot trust the results coming from the model. In this case, the model used by the proponent's consultant is acceptable to Environment Yukon and the department is satisfied that it was used correctly. Further, the projections of the emissions from the stacks of the Whitehorse diesel generators were validated by the stack testing completed on these units in 2011, the results of which demonstrated that the first air dispersion model (completed using emission factors) was conservative in its assumptions. With regard to the background (ambient) air quality data used as an input to the model to enable the estimation of overall air quality, this input was based on actual ambient air quality data, corrected for unusual events (i.e. forest fires), and so does not require validation. Given this, Environment Yukon is satisfied that the modeled pollutant concentrations are an acceptable substitute for monitoring to determine the impact of the project on ambient air quality.

Environment Yukon acknowledges that the actual future run times of the generators may vary from the projections used in the model and that therefore, there is potential that the modeled results may not accurately forecast actual air quality. However there are two issues with the recommendation as framed. The first is that monitoring is not "preventative" in nature; by the time a monitoring event measures pollutant concentrations above a standard (i.e. representing a significant adverse effect), and the data is analyzed and reported, the conditions which caused the exceedance may no longer exist. Second, and perhaps more significantly, monitoring conducted to determine significant adverse effects to air quality from the project would need to take place at the maximum points of impingement i.e. close to the project site. If it was the assessor's intent that the proponent conduct air quality monitoring for the benefit of their employees only, this recommendation might be appropriate. If, on the other hand, the assessor intended that this monitoring be conducted to provide an accurate picture of the ambient air quality to which most people in Whitehorse are exposed, monitors should be located more centrally. However, given that the proponent is one of many contributors to ambient air quality in Whitehorse, it would be intrinsically unfair to require them to undertake ambient monitoring while all other contributors are assigned no share of the responsibility.

That all said, it should be noted that Environment Yukon does not necessarily disagree with the fundamental basis of this recommendation i.e. that ambient air quality monitoring data be gathered in order to support public awareness of air quality effects. However, in order for such a program to be relevant and useful, it must consider contributions – and potentially require actions - from point and dispersed sources and from individuals and industry. To this end, Environment Yukon is participating in discussions regarding a national, comprehensive, air quality management system. As this system has not been finalized it is not yet possible to provide specific information as to how or when it may be implemented in Yukon. However it is expected that this system will provide a path forward to address the issues raised by the assessor in relation to this project, as discussed above.

Yukon
Government

2. Upon permit renewal, the proponent shall develop and implement a plan to reduce the level of diesel energy production at the Whitehorse Rapids facility when:
   a. hydroelectric generation is insufficient to meet energy demands; and
   b. results of the ongoing monitoring set out in Mitigation 1 indicate that levels of the criteria air contaminants reach 83% of the values identified in the Yukon Ambient Air Quality Standards.

   Diesel use in Whitehorse shall be reduced to a level of energy production and associated emissions that will ensure the Yukon Ambient Air Quality Standards will not be exceeded.
   This plan shall include avoidance, where possible of timing planned maintenance or "exercising" of diesel units during periods outlined in b.
   This plan will be developed in consultation with and to the satisfaction of Yukon Government.

Rationale:

The issues with the ongoing monitoring recommended in Mitigation #1 have been discussed above. It is conceivable that the threshold recommended by the assessor could be met or exceeded as a result of the cumulative impact of emissions from a number of sources, including the Whitehorse diesel generators. As ambient air quality monitors are not able to differentiate between contributions from different sources, it would be inappropriate to require action from one particular source and no others in the event this threshold (or any other) is reached. Further, it is simply not possible to ensure that the Yukon Ambient Air Quality Standards will never be exceeded, no matter what actions the proponent might take. Additionally, Environment Yukon's understanding is that, depending on the circumstances, it may not be technically/operationally possible for the proponent to reduce the amount of electricity produced in Whitehorse while continuing to meet their legal responsibility to provide electricity to their customers.

In any event, Environment Yukon understands that the proponent is already investigating means of producing electricity other than by burning diesel, so it is expected that the plan recommended by the assessor will be developed.

3. During emergency circumstances when diesel generation is required and when Yukon Air Quality Standards are or are likely to be exceeded, the proponent shall notify the public via television, radio, internet and any other means deemed appropriate with regards to:
   a. measures they can take to limit their exposure to impaired air quality and reduce their own activities that may contribute to cumulative air quality; and
   b. when the impaired air quality conditions have ended.

Rationale:

This recommendation essentially calls for the proponent to establish an Air Quality Health Advisory system. This type of system, where established in other jurisdictions, is not the responsibility of one (or even many) source operators but rather, government or some other independent air quality agency (e.g. local air quality advisory boards). This is because, as discussed above, there are many contributors to air quality in an airshed, including industrial sources (which may or may not be permitted under regulations) and individuals (via home heating and vehicle emissions), and it would be intrinsically unfair to assign responsibility for such a system to a single proponent.

However, once again it should be noted that Environment Yukon does not disagree with the basis of the recommendation. The department is working with a number of other agencies to explore the potential to establish an Air Quality Health Advisory system for Whitehorse, in conjunction with the new national air quality management system mentioned above.

Yukon Government

Dates

Project Recommendation Issued:	**Decision Document Issued:**
December 30, 2011	January 27, 2012

Recommendation Received From

Designated Office	X	Location: Whitehorse
Executive Committee		
Panel		a) Panel of the YESAB
		b) CEAA Panel
		c) Joint Panel (YESAB and other assessment body)

Authority

By signing below, the Decision Bodies have exercised their authority as per YESAA s. 75 or s. 76 to issue a decision document on this project.

Yukon Government

Name: Kevin McDonnell Position: Director, Environmental Programs Branch

Signature: _____ Date: Jan 27/12

Original signed by [Delegated YG Decision Body]

Copies Forwarded to (as required by YESAA s. 81)):

☐	Other Decision Bodies	_____
X	Project Proponent	Yukon Energy Corporation
X	Development Assessment Branch	Executive Council Office
X	YESAB Designated Office	Whitehorse
☐	YESAB Executive Committee	[when applicable]_____
☐	Minister Environment (Canada)	[when applicable]_____

Yukon
Environment

Permit No: 60-010

AIR EMISSIONS PERMIT

Issued Pursuant to
the *Environment Act* and the *Air Emissions Regulations*

Permittee: Yukon Energy Corporation

Mailing Address: Box 5920, Whitehorse, Yukon, Y1A 6S7

Site Locations: Diesel Generating Plants at:
- Dawson
- Faro
- Mayo
- Whitehorse

Authorized Representative: Travis Ritchie
Phone/Fax: (867) 393-5350 / (867) 393-5322
Email: travis.ritchie@yec.yk.ca

Effective Date: February 27, 2012

Expiry Date: December 31, 2014

Scope of Authorization: In accordance with your application, you are authorized to operate electricity generating equipment at the above site locations (the "site(s)"), as set out in the terms and conditions of this permit.

Dated this 17th day of February, 2012

Director, Environmental Programs Branch
Environment Yukon

DEPARTMENT OF ENVIRONMENT
ENVIRONMENTAL PROGRAMS
Whitehorse, Yukon
Certified true copy of original
Date: 27 Feb 12 Initials: JKM

PART 1: DEFINITIONS

1. In this permit,

"Act" means the *Environment Act*, R.S.Y. 2002, c. 76;

"approved plan" means a plan that is submitted by the permittee and approved by an environmental protection analyst under this permit and includes any terms and conditions specified by the environmental protection analyst in the approval;

"associated personnel" means all employees, contractors and volunteers involved in the permitted activities;

"Branch" means the Environmental Programs Branch, Environment Yukon;

"emission factor" means the mass emission of a pollutant per unit of energy produced in either grams per kilowatt-hour (g/kWh) or kilograms per megawatt-hour (kg/MWh);

"emission rate" means the average rate in grams per second (g/s) or kilograms/hour (kg/h) at which a pollutant is emitted from a source, determined either:

i) as estimated based on emission factors derived from published literature regarding sources of similar type and age (estimated emission rates); or

ii) as derived from measured data obtained from manual stack testing carried out by the permittee (measured emission rates);

"environmental protection analyst" means an employee of the Branch so designated by the Minister of Environment under the Act;

"environmental protection officer" means an employee of the Government of Yukon so designated by the Minister of Environment under the Act;

"office" means the office of the permittee located in Yukon;

"Regulations" means the *Air Emissions Regulations*, O.I.C. 1998/207;

"site boundaries" means the legal boundaries of the property, the cleared area of the property, or the portion of land that the permittee is authorized to use for this activity, whichever is smallest;

"source" means a fuel-fired electricity generator which has a maximum nameplate capacity equal to or more than 1.0 megavolt-ampere;

"stack testing" means emission tests conducted on source stacks, carried out by experienced environmental professionals, in accordance with generally-accepted industry standards; and,

"total annual emissions" means the emissions derived by multiplying emission factors or measured emission rates for each source by the previous three-year average total energy production for that source.

2. Any term not defined in this permit that is defined in the Act or the Regulations has the same meaning as in the Act or the Regulations.

PART 2: GENERAL

1. No condition of this permit limits the applicability of any other law or bylaw.

2. The permittee shall ensure that all activities authorized by this permit occur on property that the permittee has the right to enter upon and use for that purpose.

3. The permittee shall ensure that all associated personnel:
   a) have access to a copy of this permit;
   b) are knowledgeable of the terms and conditions of this permit; and
   c) receive the appropriate training for the purposes of carrying out the requirements of this permit.

4. The permittee shall provide notice in writing to an environmental protection analyst prior to any significant change of circumstances at the site, including without limitation:
   a) discontinuation of any regulated activity at the site;
   b) change of ownership of the site or any of the sources; and
   c) change to the mailing address or phone number of the permittee.

5. The permittee shall obtain approval from an environmental protection analyst prior to:
   a) any addition, modification, removal or replacement of any equipment or components related to the release, abatement, control or treatment of air emissions; or
   b) any change in location of the source(s).

6. Where conflicts exist between this permit, the permit application or any plans, this permit shall prevail.

7. If an inspection reveals that the site or source(s) is in any way not in compliance with this permit, the permittee shall repair the damage or take other actions as required to bring the site or source(s) into compliance.

8. For clarity, all obligations of the permittee under this permit survive the expiry date to the extent that each is not superceded by one or more conditions in a subsequent permit.

PART 3: OPERATION AND MAINTENANCE

1. In accordance with the manufacturer's recommendations and best management practices, the permittee shall maintain and operate the sources, any stand-alone air pollution control equipment, and testing and monitoring equipment as necessary to provide optimum control of air contaminant emissions during all operating periods.

2. Except for maintenance or test purposes, the permittee shall run the sources at each site in order of highest possible efficiency under the circumstances.

3. The permittee shall ensure that the fuel used by the source(s) conforms to the most recent Canadian federal *Sulphur in Diesel Fuel Regulations* for off-road applications.

4. The permittee shall submit to an environmental protection analyst a list of all generators normally located at each site and the capacity of each, by April 30, 2012.

PART 4: RELEASE OF CONTAMINANTS

1. The visible emissions from any source shall not exceed an opacity of 20% as measured by an environmental protection officer.

2. In the event that the opacity of emissions from any source exceeds the criterion established in Part 4.1 of this permit, the permittee shall take measures to reduce the opacity of the emissions below that criterion as directed by an environmental protection officer.

3. The permittee shall ensure that particulates collected using emission control equipment are contained so that there is no release of contaminants to the atmosphere or into an open body of water.

PART 5: TESTING & MODELLING

1. The permittee shall complete and submit a dispersion model for the Dawson YEC facility that includes, but is not limited to, site-specific characteristics of the emission sources, building, receptors, terrain and meteorology, and submit a report to an environmental protection analyst by September 30, 2012.

2. The permittee shall carry out manual stack testing for NO_2, SO_2, $PM_{2.5}$ or CO on any diesel generator that has exceeded 3% of its annual potential to emit in the previous calendar year, if, in that same calendar year, the total operating time of all the generators at that site exceeded 3% of their total annual potential to emit.

3. If a stack test is required in any year at any site, the permittee shall submit to an environmental protection analyst by September 30 of that year:
   a. a report showing the emission rates for NO_2, SO_2, $PM_{2.5}$ or CO for each source at the site as measured by the stack test; and
   b. a site-specific air dispersion model for that community; or
   c. an updated air dispersion model (if a site-specific model has already been submitted and approved for that site within the past three years).

4. The site-specific air dispersion model for the site submitted under Part 5.3(b) or 5.3(c) shall contain the same information as required in Part 6.2 and shall replace all applicable assumptions in any previous model with relevant emissions data.

5. If a dispersion model developed in accordance with Part 5.3(b) or 5.3(c) shows that any of the Yukon Ambient Air Quality Standards for NO_2, SO_2, $PM_{2.5}$, or CO would be exceeded at the site boundaries under a normal operating scenario, the permittee shall submit a plan to reduce emissions from the source(s) to an environmental protection analyst for approval by December 31 of the year the stack test was completed.

6. If the permittee is required to submit a plan under Part 5.5, the permittee shall:
   a. perform another stack test, and
   b. submit the same information required under Part 5.3(a) and 5.3(c) from the second stack test to an environmental protection analyst by June 30 of the year following the year the initial stack test was completed,

   to confirm that all of the Yukon Ambient Air Quality Standards for NO_2, SO_2, $PM_{2.5}$, and CO are then being met.

7. Any site-specific air dispersion modelling required in this permit shall be based on local meteorological data to the extent possible and shall take into consideration:
   a. the specific characteristics of the source (e.g. age, condition, usage, etc.);
   b. the local terrain and geography;
   c. the types, sensitivity and distance of receptors within the area potentially impacted by the source; and
   d. all applicable building and stack effects that may influence the results.

   The permittee shall obtain written authorization from an environmental protection analyst prior to incorporating non-site-specific data or information in the site-specific model.

8. The permittee shall carry out any air dispersion modelling required by this permit in accordance with the document entitled "*Guidelines for Air Quality Dispersion Modelling in British Columbia*", as updated from time to time. The permittee shall obtain written authorization from an environmental protection analyst prior to deviating from the models, methods or procedures described in that document.

PART 6: REPORTING

1. The permittee shall submit to an environmental protection analyst a report which identifies:
   a. the total annual operating hours for all sources at the site;
   b. an estimated percentage of those hours where each source was operated but where no electricity was produced;
   c. the estimated or measured emission rates for NO_2, SO_2, $PM_{2.5}$, and CO from each source at the site, and the published emission factors used to derive the emission rates if estimated or the data used to derive the emission rates if measured;
   d. the estimated total annual emissions of NO_2, SO_2, $PM_{2.5}$, and CO from each source at the site, including the calculation used to determine those results; and,
   e. that all applicable maintenance was done on all sources at the site in accordance with the manufacturer's instructions and recommendations,

   by March 31 of the year following the year to which the report pertains.

2. For any year that dispersion modelling is required, the permittee shall submit to an environmental protection analyst, by September 30 of that year, an air dispersion modelling report which fully describes the dispersion modelling completed for the sources at the site, including but not limited to:
   a. the ambient air quality at the site boundaries when the sources at the site are operating under steady-state conditions and as normally required to meet the demand for electricity from that site (i.e. a normal operating scenario);

b. the ambient air quality at the site boundaries when all of the sources at the site are operating under steady-state conditions and at 100% capacity (i.e. a worst-case scenario);
c. the estimated or measured emission rates of NO_2, SO_2, $PM_{2.5}$, and CO from each source at the site, and the published emission factors used to derive those emission rates, if estimated;
d. the estimated total annual emissions of NO_2, SO_2, $PM_{2.5}$ and CO from each source at the site, including the calculation used to determine those results;
e. estimated emission rates from the sources at which the model predicts that the Yukon Ambient Air Quality Standards would be exceeded at the site boundaries for NO_2, SO_2, $PM_{2.5}$, and CO under the modelled normal operating scenario; and
f. any assumptions or data used in the development of the model.

PART 7: INSPECTIONS

1. The permittee shall conduct visual inspections and maintenance on all source components as per the manufacturer's instructions.

PART 8: UNAUTHORIZED EMISSIONS

1. The permittee shall contact either an environmental protection officer or the 24-hour Yukon Spill Report Centre (**867-667–7244**) as soon as possible under the circumstances in the event of an unauthorized release or emission, such as fugitive emissions or emissions resulting from burning fuel other than that allowed for under this permit.

PART 9: RECORDS

1. The permittee shall keep all records required under this permit in a format acceptable to an environmental protection officer for a minimum of three years and make them available for inspection by an environmental protection officer upon request.

2. The permittee shall keep the following records at the office:
   a) a copy of each report and plan developed under this permit, and any amendments to and approvals (if applicable) of each report and plan;
   b) summaries of all inspections carried out under this permit (including the name of the person conducting the inspection, the date of each inspection, any observations recorded during the inspection, actions taken as a result of those observations, and the date each action was taken);
   c) notes concerning any spills, leaks or unauthorized emissions occurring at the site, including substance involved, estimated quantity, date of observation of the spill or leak, spill reports made and clean-up procedures implemented;
   d) any and all deficiencies remedied in accordance with Part 2.7, and how and when they were remedied; and
   e) notes concerning any instance where the most efficient source was not used in accordance with Part 3.2 and the reason for use of the less efficient source.

Yukon Government

Yukon Environmental & Socio-economic Assessment Act

Decision Document

This document meets the Yukon government's requirements as a Decision Body as set out in the *Yukon Environmental & Socio-economic Assessment Act*.

Other Decision Bodies
Not Applicable

Project

Project Name Whitehorse Diesel - Natural Gas Conversion Project

YESAB File Number 2013-0115

Proponent Name Yukon Energy Corporation

Project Description
The Project consists of the construction and operation of a new natural gas-powered, reciprocating engine-driven generating station and associated liquefied natural gas (LNG) transfer, storage and vapourization facilities on a site adjacent to YEC's largest hydroelectric facility, the Whitehorse Rapids Generating Station (WRGS). The Project will occupy approximately 0.9 ha of Government of Yukon lands and 0.6 ha of White Pass and Yukon Route Railway Company (WPYR) lands (railway right-of-way) along Robert Service Way within the Whitehorse city limits. The land is zoned 'Public Utilities' in the 2010 Whitehorse Official Community Plan and the Whitehorse Zoning Bylaw. Areas within YEC's existing WRGS property will also be affected by the Project, with activities such as the installation of new pipe and distribution line connections, and the decommissioning of two diesel units. The Project lies within the traditional territories of the Kwanlin Dün First Nation (KDFN) and theTa'an Kwäch'än Council (TKC).
The new power station, when fully developed, will contain three 4.3754 MW GE Jenbacher JMC 624 natural gas-fired, reciprocating engine, modular generation units (natural gas generators). Initially, only two generators will be installed in the new power station. These will replace two existing generators at the end of their life cycle with a total capacity of 8 MW (9.1 MW nameplate rating), located in the Whitehorse Thermal Generating Station (WTGS). The third modular generator will be installed in the new power station in a few years' time when there is sufficient demand for the power.

Other Decision Bodies

Consolidated Decision Document Not Applicable

First Nations Consultation

A. Consultation under YESAA section 74(2) Not Applicable

B. First Nations Consultation - General
The Yukon government (YG) Development Assessment Branch officials initiated consultation with Kwanlin Dün First Nation (KDFN) and Ta'an Kwäch'an Council (TKC) upon the submission of the project proposal to the Yukon Environmental and Socio-economic Assessment Board (YESAB). Yukon government encouraged KDFN and TKC to participate in the screening under the Yukon Environmental and Socio-economic Assessment Act (YESAA). KDFN and TKC had opportunities to provide comments and views to YESAB on the adequacy of the project proposal during the adequacy stage, on the complete project proposal during the seeking views and information stage and on the draft screening report and recommendation. In addition to these opportunities provided through YESAA, Yukon government invited each First Nation to identify to Yukon government any

adverse effects on rights under its respective Final Agreements that may arise out of the proposed project. Yukon government officials engaged with officials from KDFN and TKC throughout the assessment process in face to face meetings, phone conversations, and written correspondence.

KDFN did not identify specific concerns regarding adverse effects on treaty rights; however, KDFN did raise concerns regarding safety and adverse effects on environmental and human health. These concerns were raised through direct conversations between our officials and during the public comment period of the YESAB assessment process.

TKC identified concerns regarding the potential for adverse effects on treaty rights which include the potential for effect on future development and use of TKC settlement parcel C-28B. TKC also identified potential effects on the environment, human health and cost effectiveness of the project and hydraulic fractured gas on the environment. These concerns were raised through direct conversations between our officials, during the adequacy review and the public comment period of the YESAB assessment and decision-making process.

The YESAB Executive Committee determined that significant adverse environmental and socio-economic effects on values that both KDFN and TKC identified can be mitigated by recommended terms and conditions, regulatory requirements and proponent commitments.

The YESAB Executive Committee did not include natural gas extraction, processing and liquefaction in the scope of the Projects as they determined that these activities occur outside of Yukon, and thus, are beyond the authority of the Executive Committee to consider.

As Decision Body, I have considered the concerns identified by KDFN and TKC and have reviewed how they were addressed in the Final Screening Report. I accept the Executive Committee's determination that the effects on values identified by KDFN and TKC can be mitigated by recommended terms and conditions, regulatory requirements and proponent commitments.

Decision

Rationale for Decision

As the Decision Body, I have given full and fair consideration to the information provided with the recommendation in accordance with section 74(1) of YESAA and I have decided to accept the recommendation pursuant to section 76(1)a. This decision document is premised on the mitigation measures proposed by the proponent listed in Appendix C of the Final Screening Report being implemented along with the terms and conditions listed below.

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Term	Term & condition	Status	Reason
1	YESAB: The Proponent shall work with the appropriate regulators to develop a monitoring program for air emissions. At a minimum, the following constituents will be monitored: CO, VOCs, NOx,SO2 and PM.	Agree	--
2	YESAB: The Proponent shall include in the monitoring program GHG emissions (e.g. CO2, CH4, N2O) as identified by the appropriate regulator.	Agree	--
3	YESAB: The Proponent shall, in collaboration with the Fire Marshal's Office, develop a comprehensive plan for responding to an LNG accident anywhere along the transportation route through Yukon.	Agree	--
4	YESAB: The Proponent shall carry out a safety analysis specific to the portion of Robert Service Way where LNG transport trucks will enter and depart from the project site. This analysis will identify credible risks to traffic safety posed by LNG transport trucks in this area and reasonable safety measures to address those risks. The Proponent shall provide the safety analysis for review and approval by the appropriate regulator. The Proponent shall implement safety measures as required by the appropriate regulator.	Agree	--
5	YESAB: "The Proponent shall conduct a risk analysis of all potential hazards associated with the transfer, storage and handling of LNG and natural gas at the power station. The analysis shall address all potential risks to personnel and to the public, including: a. Tissue contact with LNG or extremely cold LNG vapour. b. Asphyxiation from exposure to high concentrations of natural gas in the vapour cloud. c. Risk to personnel and the public associated with a vapour cloud fire. d. Risk to personnel and the public associated with a pool fire. e. Risk of a multiple containment failure. f. Risk of thermal impacts on storage tanks. This analysis should address: i. potential failure of the outer tank due to reduction in strength; ii. rapid insulation failure following failure of the outer tank; iii. heating of the inner tank, impingement on the vapour space, and possibility of boiling liquid/expanding vapour exceeding pressure relief capacity; and iv. structural failure of inner tank support following failure of outer tank. g. Risks associated with venting gas. The Proponent shall provide the risk analysis for review and approval by the appropriate regulator. If risks are identified,	Agree	--

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Term	Term & condition	Status	Reason
	the Proponent shall implement best engineering design and/or best operational practices that are required by the appropriate regulator."		
6	YESAB: The Proponent shall perform a sensitivity analysis to test the effect of assumptions about air temperature, relative humidity, wind speed and direction, and atmospheric stability in relation to their vapour cloud dispersion model and thermal radiation analysis with respect to pool fires. The Proponent shall, as directed by the appropriate regulator, adapt the plant layout, impoundment location and configuration, associated trenches and vapour fence based on new information provided by the sensitivity analysis.	Agree	--
7	YESAB: The Proponent shall conduct a Hazard and Operability review (HAZOP) with Safety Integrity Level verification to ensure that the function of the safety systems implemented in this design will be available at all times, and therefore meet the integrity level required for safe operation of the facility.	Agree	--
8	YESAB: The Proponent shall provide specific LNG and natural gas training to its personnel and shall ensure that all non-company personnel have received appropriate training before they are allowed on the site.	Agree	--
9	YESAB: The Proponent shall coordinate with CANUTEC to calculate evacuation distances for a large LNG spill and LNG fire in relation to the maximum capacity of LNG at their facility and in relation to credible hazard scenarios. The Proponent shall communicate the results to the City of Whitehorse Fire Department and Yukon Fire Marshal's Office.	Agree	--
10	YESAB: The Proponent shall coordinate with emergency response providers to develop an emergencies communications plan that encompasses the maximum evacuation zone that would 1) proactively educate residents, businesses and facilities to the LNG product stored and utilized on-site, the types of accidents that could occur and incident response actions; and 2) provide emergency instructions to area residents, businesses and facilities (i.e. such as evacuation or shelter in place instructions) during an emergency incident at the project site. The emergencies communications plan shall form part of the safety program required by regulation.	Agree	--
11	YESAB: The Proponent shall configure access roads and the vapour fence to maintain as much of a natural buffer as possible. Where possible, new shrubs/trees shall be planted	Agree	--

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Term	Term & condition	Status	Reason
	amongst the existing vegetation.		
12	YESAB: The Proponent shall erect a visual barrier to improve aesthetics of the project site.	Agree	--
13	YESAB: The Proponent shall work in collaboration with the City of Whitehorse to identify the most appropriate method of installation for power distribution lines connecting the existing substation to the proposed new substation.	Agree	--

Date

Project Recommendation Issued 2014-06-10

Recommendation Received From

YESAB Executive Committee

Authority

By signing below, the Yukon government has exercised its authority as per YESAA s.75 or s.76 to issue a decision document on this project.

Name Joe MacGillivray

Position Deputy Minister, Executive Council Office

Phone 867-667-5866

Email Joe.MacGillivray@gov.yk.ca

Signature

Date July 7/14

Distribution

Project Proponent	Yes
Other Decision Bodies	Yes
DAP Branch, Executive Council Office	Yes
YESAB Designated Office	No
YESAB Executive Committee	Yes
Minister Environment (Canada)	No
Yukon Surface Rights Board	No
Yukon Water Board	Yes

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Land Use Planning Commission	No
Independent Regulatory Agency	No
Other Body/Person as Required	No