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Ministry of the Environment, Conservation and Parks  
Ministère de l'Environnement, de la Protection de la nature et des Parcs

### AMENDED ENVIRONMENTAL COMPLIANCE APPROVAL

NUMBER 4133-C2LRC9

Issue Date: July 19, 2021

Kirkland Lake Power Corp.  
30 St. Clair Avenue West, 12th Floor  
Toronto, Ontario  
M4V 3A1

**Site Location:** 505 Archer Drive, Kirkland Lake Town, District of Timiskaming.

*You have applied under section 20.2 of Part II.1 of the Environmental Protection Act , R.S.O. 1990, c. E. 19 (Environmental Protection Act) for approval of:*

- three (3) natural gas fired combustion turbines, each rated at 23 megawatts and having a maximum heat input of 266 million kilojoules per hour and complete with a heat recovery steam generator (HRSG), used to drive two (2) steam turbine generators (rated at 25 megawatts and 20 megawatts, respectively). all exhausting into the atmosphere through a common stack, having an exit diameter of 3.90 metres and extending 30.50 metres above grade;
- one (1) natural gas fired combustion turbine, model GE LM2500+, rated at 30 megawatts and equipped with dry low NOx burners with a maximum heat input of 338 million kilojoules per hour, exhausting into the atmosphere through a stack, having an exit diameter of 3.66 metres and extending 15.24 metres above grade;
- three (3) wood fired combustors to produce steam, firing at a total maximum rate of 655 tonnes of *Clean Wood Based Fuels* per day, each equipped with one (1) primary multiclone system and one (1) wet scrubber, all exhausting into the atmosphere through a common stack, having an exit diameter of 1.80 metres and extending 30.50 metres above grade;
- one (1) air cooler, consisting of one condenser cell and equipped with one fan, exhausting into the atmosphere at a volumetric flow rate of 157 cubic metres per second through a stack, having an exit diameter of 5.9 metres and extending 11.2 metres above grade;
- one (1) air cooler, consisting of six condenser cells each equipped with one fan and exhausting into the atmosphere at a volumetric flow rate of 157 cubic metres per second through a stack with an exit diameter of 5.7 metres and extending 9.4 metres above grade;
- one (1) natural gas fired process-heating boiler, having a maximum heat input of 6,330,000 kilojoules per hour, exhausting into the atmosphere through a stack, having an exit diameter of 0.41 metre and extending 8.23 metres above grade;

- one (1) natural gas fired auxiliary boiler, having a maximum heat input of 17,672,185 kilojoules per hour, exhausting into the atmosphere through a stack, having an exit diameter of 0.66 metre and extending 3.05 metres above the roof and 17.05 metres above grade;
- one (1) natural gas fired emergency power generator, having an electrical power rating of 375 kilowatts, exhausting into the atmosphere through a stack, having an exit diameter of 0.2 metre and extending 7.59 metres above grade;

all in accordance with the application for an Environmental Compliance Approval (Air) and all supporting information, dated March 31, 2021, signed by Jim Mulvale of Kirkland Lake Power Corp.

*For the purpose of this environmental compliance approval, the following definitions apply:*

1. "*Acoustic Assessment Report*" means the report, prepared in accordance with *Publication NPC-233* submitted in support of the application, that documents all sources of noise emissions and *Noise Control Measures* present at the *Facility*. "*Acoustic Assessment Report*" also means the Acoustic Assessment Report prepared by AECOM Canada Ltd., dated May 7, 2021 and signed by Atif Bokhari, P.Eng.;
2. "*Approval*" means this Environmental Compliance Approval, including the application and supporting documentation listed above;
3. "*CEM System*" means the continuous monitoring and recording systems used to measure and record the parameters specified in the attached Schedule C;
4. "*Clean Wood Based Fuels*" means the wood based fuels that meet the definition in Regulation 347 of the *EPA* and are not contaminated with salt or leaded paints/coatings;
5. "*Company*" means Kirkland Lake Power Corp., that is responsible for the construction or operation of the *Facility* and includes any successors and assigns in accordance with section 19 of the *EPA*;
6. "*Director*" means a person appointed for the purpose of section 20.3 of the *EPA* by the *Minister* pursuant to section 5 of the *EPA*;
7. "*District Manager*" means the District Manager of the appropriate local district office of the *Ministry*, where the *Facility* is geographically located;
8. "*Emission Summary Table*" means a table described in paragraph 14 of subsection 26 (1) of *O. Reg. 419/05*;

9. "*Environmental Assessment Act*" means the Environmental Assessment Act, R.S.O. 1990, c.E.18, as amended;
10. "*EPA*" means the Environmental Protection Act, R.S.O. 1990, c.E.19, as amended;
11. "*Equipment*" means the equipment or processes, including all the combustion turbines, boilers, *Wood Combustors* and associated air pollution control equipment, described in the *ESDM Report*, this *Approval* and in the *Schedules* referred to herein and any other equipment or processes;
12. "*Facility*" means the entire operation located on the property where the *Equipment* is located;
13. "*Fuel Flow Rate*" means the flow rate of the fuel, expressed in cubic metres per second at standard temperature and pressure.
14. "*Heat Output*" means the total useful heat energy recovered from the combustion turbine as heat, expressed in megawatts;
15. "*Lower Heating Value*" means the energy released during combustion of the fuel, excluding the latent heat content of the water vapour component of the products of combustion, expressed in megajoules per cubic metre at standard temperature and pressure;
16. "*Manual*" means a document or a set of documents that provide written instructions to staff of the *Company*;
17. "*Minister*" means the Minister of the Environment, Conservation and Parks or such other member of the Executive Council as may be assigned the administration of the *EPA* under the Executive Council Act;
18. "*Ministry*" means the ministry of the *Minister*;
19. "*Turbine*" means the combustion turbine, model GE LM2500+, rated at 30 megawatts, described in the *Company's* application, this *Approval* and in the supporting documentation submitted with the application, to the extent approved by this *Approval*;
20. "*Nitrogen oxides*" means oxides of nitrogen, including nitric oxide (NO) and nitrogen dioxide (NO<sub>2</sub>);
21. "*Noise Control Measures*" means measures to reduce the noise emission from the *Facility* including, but not limited to silencers, acoustic louvres, enclosures, absorptive treatment, plenums and barriers. It also means the noise control measures listed in Appendix C4 of the *Acoustic Assessment Report*;
22. "*O. Reg. 419/05*" means Ontario Regulation 419/05, Air Pollution – Local Air Quality, as amended;

23. "*Point of Impingement*" has the same meaning as in section 2 of *O. Reg. 419/05*;
24. "*Publication NPC-233*" means the *Ministry* Publication NPC-233, "Information to be Submitted for Approval of Stationary Sources of Sound", October, 1995, as amended;
25. "*Publication NPC-300*" means the *Ministry* Publication NPC-300, "Environmental Noise Guideline, Stationary and Transportation Sources – Approval and Planning, Publication NPC-300", August 2013, as amended;
26. "*Shut-down*" means an operating condition during which the operation of a source of contaminant is decreased from normal operating conditions to an inoperative state;
27. "*Start-up*" means an operating condition during which the operation of the *Wood Combustors* is increased from an inoperative state to normal operating conditions;
28. "*Thermal Efficiency*" means the Thermal Efficiency of the *Turbine* calculated according to the formula described in Schedule "B" of this *Approval*;
29. "*Wood Combustors*" means the three (3) wood combustors firing *Clean Wood Based Fuels*, described in the *Company's* application, this *Approval* and in the supporting documentation submitted with the application, to the extent approved by this *Approval*.

*You are hereby notified that this environmental compliance approval is issued to you subject to the terms and conditions outlined below:*

## **TERMS AND CONDITIONS**

### **1. OPERATION AND MAINTENANCE**

1. The *Company* shall ensure that the *Equipment* is properly operated and maintained at all times. The *Company* shall:
  - a. prepare, before commencement of operation of the *Equipment* and update, as necessary, a *Manual* outlining the operating procedures and a maintenance program for the *Equipment*, including:
    - i. routine operating and maintenance procedures in accordance with good engineering practices and as recommended by the *Equipment* suppliers;
    - ii. emergency procedures, including spill clean-up procedures;
    - iii. procedures for any record keeping activities relating to operation and maintenance of the *Equipment*;

iv. all appropriate measures to minimize particulate matter, noise and odorous emissions from all potential sources;

b. implement the recommendations of the *Manual*.

## 2. WOOD COMBUSTORS.

1. The *Company* shall ensure, that the *Wood Combustors* are designed and operated to comply, at all times, at all times during normal operating conditions, except during start-up and shutdown, with the following operational and performance requirements:
  - a. The half-hour concentration of oxygen in the undiluted gas emitted from the *Wood Combustors*, as measured and recorded by the *CEM System*, shall not be less than 6 per cent by volume on a dry basis;
  - b. The half-hour concentration of carbon monoxide in the undiluted gases emitted from the *Wood Combustors*, as measured and recorded by the *CEM System*, shall have a target level of not more than 100 parts per million by volume, on a dry basis normalized to 11 percent oxygen at a reference temperature of 25 degrees Celsius and a reference pressure of 101.3 kilopascals;
  - c. The in-stack concentration of total suspended particulate matter, in the undiluted gases leaving the the *Wood Combustors*, shall not exceed 90 milligrams per dry cubic metre normalized to 11 percent oxygen at reference temperature of 25 degrees Celsius and a reference pressure of 101.3 kilopascals.
  - d. The operating temperature of the *Wood Combustors* shall not be less than 1,000 degrees Celsius at a residence time of not less than 1 second, as measured in the combustion chamber of the *Wood Combustors*. If it is measured by the *Wood Combustors* "Boiler Flue Gas Probe" immediately after the first bank of steam tubes (8 rows of tubes), as agreed upon between the *Company* and the *Ministry*, it shall not be less than 650 degrees Celsius.
2. The *Company* shall continue to conduct and maintain a program to continuously monitor the concentration of oxygen and carbon monoxide in the undiluted gas emitted from the *Wood Combustors*, and the temperature of the hot combustion gases in the *Wood Combustors*. The *Continuous Monitoring System* shall be equipped with continuous recording devices and shall comply with the requirements outlined in the attached Schedule C.

3. The *Company* shall keep daily records of the following:
  - a. hours of operation of the *Wood Combustors*;
  - b. hourly fuel feed rates to the *Wood Combustors*;
  - c. the type of wood waste fed to the *Wood Combustors*, with confirmation that only *Clean Wood Based Fuels* are burned in the *Wood Combustors*;
  - d. differential pressures across the scrubbers;
  - e. any process or equipment upset/malfunction including:
    - i. nature of the upset/malfunction;
    - ii. time duration of the upset/malfunction;
    - iii. actions taken to minimize any adverse effects resulting from the upset/malfunction.
  - f. The daily records shall be made available for inspection by staff of the *Ministry* upon request. All records shall be maintained for a minimum of two (2) years.

### 3. **COMBUSTION TURBINE**

1. The concentrations of nitrogen oxides and carbon monoxide, in the undiluted flue gases leaving the *Turbine*, shall not be greater than the limits specified in Schedule "A" .
2. The *Thermal Efficiency* of the *Turbine* shall not be less than the thermal efficiency specified in Schedule "A" .

### 4. **NOISE**

1. The *Company* shall:
  - a. at all times, ensure that the noise emissions from the *Facility* comply with the limits set in *Ministry Publication NPC-300*; and
  - b. ensure that the *Noise Control Measures* are properly maintained and continue to provide the acoustical performance outlined in the *Acoustic Assessment Report*.

### 5. **RECORD RETENTION**

The *Company* shall retain, for a minimum of two (2) years from the date of their creation, all records and information related to or resulting from the recording activities required by this *Approval*, and make these records available for review by staff of the *Ministry* upon request. The *Company* shall retain:

- a. all records on the maintenance, repair and inspection of the *Equipment*;

- b. all records of any upset conditions associated with the operation of the *Equipment*; and
- c. all records of any environmental complaints, including:
  - i. a description, time and date of each incident to which the complaint relates;
  - ii. wind direction at the time of the incident to which the complaint relates; and
  - iii. a description of the measures taken to address the cause of the incident to which the complaint relates and to prevent a similar occurrence in the future.

**6. NOTIFICATION OF COMPLAINTS**

The *Company* shall notify the *District Manager*, in writing, of each environmental complaint within two (2) business days of the complaint. The notification shall include:

- a. a description of the nature of the complaint;
- b. the time and date of the incident to which the complaint relates; and
- c. a description of the measures taken to address the cause of the incident to which the complaint relates and to prevent a similar occurrence in the future.

**SCHEDULE A**

**Emission Limits**

Parameter	Limit
Nitrogen Oxides (1)	21.6 g/s
Carbon Monoxide	60 ppmvd
Thermal Efficiency	33 percent

(1) "Nitrogen oxides" means oxides of nitrogen, including nitric oxide (NO) and nitrogen dioxide (NO2).

(2) "ppmv" means parts per million by volume on a dry basis normalized to 15 per cent oxygen.

**SCHEDULE B**

***Thermal Efficiency Verification***

The *Company* shall, as a minimum:

1. Determine the following parameters:
  - a. Power Output (megawatts)
  - b. Heat Output (megawatts)
  - c. Fuel Flow Rate (in cubic metres per second at standard temperature and pressure, or kilograms per second)
  - d. Lower Heating Value of the Fuel (megajoules per cubic metre)
  - e. Ambient air temperature (degree of Celsius)
  - f. Barometric pressure (kilopascal)
  - g. Relative humidity (per cent)
  - h. Date, time and duration of test.
2. Calculate the *Thermal Efficiency* of the combustion turbine according to the following formula:
  - Thermal Efficiency = (Power Output + Heat Output) x 100% / (Fuel Flow Rate x Lower Heating Value).
3. Prepare a summary of the results of the *Thermal Efficiency* testing no later than three (3) months after completing the test. The summary shall indicate the *Thermal Efficiency* of the combustion turbine and include all parameters described above in (1).
4. If the measured *Thermal Efficiency* is less than the anticipated *Thermal Efficiency* specified in Schedule "A" of this *Approval* (with a tolerance of 0.05 multiplied by the anticipated *Thermal Efficiency*), notify the *Ministry* so that the concentration limits specified in Schedule A of this *Approval* can be revised accordingly.
5. *Thermal Efficiency* testing should be conducted at maximum rating or at the maximum load achievable at the time of testing and shall employ an average time of not less than three hours.

## **SCHEDULE C**

### **CONTINUOUS MONITORING SYSTEM**

#### **PARAMETER: Temperature**

#### **LOCATION:**

The sample point for the continuous temperature monitoring and recording system shall be installed at a location where the measurements are representative of the minimum temperature of the undiluted gases leaving the combustion chamber of the *Wood*



Combustors.

## PERFORMANCE:

The Continuous Temperature Monitoring system shall meet the following minimum performance specifications for the following parameters.

PARAMETERS	SPECIFICATION
Type	shielded "K" type thermocouple, or equivalent
Accuracy	± 5 degrees Celsius
Response Time (95%)	60 sec. (max)

## RECORDER:

The recorder must be capable of registering continuously the measurement of the monitoring system without a significant loss of accuracy and with a time resolution of 5 minutes or better.

## RELIABILITY:

The monitor shall be operated and maintained so that accurate data is obtained during a minimum of 90 percent of the time on a monthly basis, when the Equipment is in operation.

## PARAMETER: Oxygen

## INSTALLATION:

The Continuous Oxygen Monitor shall be installed at an accessible location where the measurements are representative of the actual concentration of oxygen in the undiluted gases leaving the *Wood Combustors* and shall meet the following installation specifications.

PARAMETERS	SPECIFICATION
Range (percentage)	0 to 20 or 0 to 25
Calibration Gas Ports	close to the sample point

## PERFORMANCE:

The Continuous Oxygen Monitor shall meet the following minimum performance specifications for the following parameters.

PARAMETERS	SPECIFICATION
Relative Accuracy	+/- 10 percent
Calibration Error (percent of actual concentration)	5 maximum
Zero drift (2-hour) (percent oxygen)	0.4 maximum
Zero drift (24-hour) (percent oxygen)	0.5 maximum
Calibration drift (2-hour) (percent oxygen)	0.4 maximum
Span Calibration Drift (24-hour) (percent oxygen)	0.5 maximum
Response Time (minutes to 95 percent response to a step change)	5 maximum
Operational Test Period (hours)	168 hours minimum without corrective maintenance

**CALIBRATION:**

The monitor shall be calibrated daily, to ensure that it meets the specifications quoted above, during all periods of the operation of the Equipment. The results of all calibrations shall be recorded at the time of calibration.

**DATA RECORDER:**

The data recorder must be capable of registering continuously the measurement of the monitor with an accuracy of 0.5 percent of a full scale reading or better and with a time resolution of 15 minutes or better.

**RELIABILITY:**

The monitor shall be operated and maintained so that accurate data is obtained during a minimum of 90 percent of the time on a monthly basis when the Equipment is in operation.

**PARAMETER:** Carbon Monoxide

**INSTALLATION:**

The Continuous Carbon Monoxide Monitor shall be installed at an accessible location where the measurements are representative of the actual concentration of carbon monoxide in the undiluted gases leaving the *Wood Combustors* and shall meet the following installation specifications.

PARAMETERS	SPECIFICATION
Range (parts per million, ppm)	0 to 1,000

Calibration Gas Ports	close to the sample point
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**PERFORMANCE:**

The Continuous Carbon Monoxides Monitor shall meet the following minimum performance specifications for the following parameters.

PARAMETERS	SPECIFICATION
Relative Accuracy	+/- 10 percent
Calibration Error (percent of actual concentration)	5 maximum
Zero drift (2-hour) (percent CO)	4 maximum
Zero drift (24-hour) (percent CO)	5 maximum
Calibration drift (2-hour) (percent CO)	4 maximum
Span Calibration Drift (24-hour) (percent CO)	5 maximum
Response Time (minutes to 95 percent response to a step change)	5 maximum
Operational Test Period (hours)	168 hours minimum without corrective maintenance

**CALIBRATION:**

The monitor shall be calibrated daily, to ensure that it meets the drift limits specified above, during the periods of the operation of the Equipment. The results of all calibrations shall be recorded at the time of calibration.

**DATA RECORDER:**

The data recorder must be capable of registering continuously the measurement of the monitor with an accuracy of 0.5 percent of a full scale reading or better and with a time resolution of 15 minutes or better.

**RELIABILITY:**

The monitor shall be operated and maintained so that accurate data is obtained during a minimum of 90 percent of the time on a monthly basis, when the Equipment is in operation.

*The reasons for the imposition of these terms and conditions are as follows:*

1. Condition No. 1 is included to emphasize that the *Equipment* must be maintained and operated according to a procedure that will result in compliance with the *EPA*,

the Regulations and this *Approval*.

2. Condition No. 2, 3 and 4 are included to require the *Company* to provide the minimum performance and operational requirements considered necessary to prevent an adverse effect resulting from the operation of the *Equipment* and the *Facility*.
3. Condition No. 5 is included to require the *Company* to keep records and to provide information to the Ministry so that compliance with the *EPA*, the regulations and this *Approval* can be verified.
4. Condition No. 6 is included to require the *Company* to notify staff of the *Ministry* so as to assist the *Ministry* with the review of the site's compliance.

**Upon issuance of the environmental compliance approval, I hereby revoke Approval No(s). 1065-5YYKE6 issued on May 30, 2004.**

*In accordance with Section 139 of the Environmental Protection Act, you may by written Notice served upon me, the Environmental Review Tribunal and in accordance with Section 47 of the Environmental Bill of Rights, 1993, the Minister of the Environment, Conservation and Parks, within 15 days after receipt of this Notice, require a hearing by the Tribunal. The Minister of the Environment, Conservation and Parks will place notice of your appeal on the Environmental Registry. Section 142 of the Environmental Protection Act provides that the Notice requiring the hearing shall state:*

- a. The portions of the environmental compliance approval or each term or condition in the environmental compliance approval in respect of which the hearing is required, and;
- b. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

*Pursuant to subsection 139(3) of the Environmental Protection Act, a hearing may not be required with respect to any terms and conditions in this environmental compliance approval, if the terms and conditions are substantially the same as those contained in an approval that is amended or revoked by this environmental compliance approval.*

*The Notice should also include:*

1. The name of the appellant;
2. The address of the appellant;
3. The environmental compliance approval number;
4. The date of the environmental compliance approval;
5. The name of the Director, and;
6. The municipality or municipalities within which the project is to be engaged in.

*And the Notice should be signed and dated by the appellant.*

*This Notice must be served upon:*

The Secretary\*  
Environmental Review Tribunal  
655 Bay Street, Suite 1500  
Toronto, Ontario  
M5G 1E5

AND The Minister of the Environment,  
Conservation and Parks  
777 Bay Street, 5th Floor  
Toronto, Ontario  
M7A 2J3

AND The Director appointed for the purposes of  
Part II.1 of the Environmental Protection Act  
Ministry of the Environment, Conservation  
and Parks  
135 St. Clair Avenue West, 1st Floor  
Toronto, Ontario  
M4V 1P5

**\* Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349, Fax: (416) 326-5370 or [www.ert.gov.on.ca](http://www.ert.gov.on.ca)**

*This instrument is subject to Section 38 of the Environmental Bill of Rights, 1993, that allows residents of Ontario to seek leave to appeal the decision on this instrument. Residents of Ontario may seek leave to appeal within 15 days from the date this decision is placed on the Environmental Registry. By accessing the Environmental Registry at <https://ero.ontario.ca/>, you can determine when the leave to appeal period ends.*

*The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.*

DATED AT TORONTO this 19th day of July, 2021

Neryed Ragbar, P.Eng.  
Director  
appointed for the purposes of Part  
II.1 of the *Environmental  
Protection Act*

QN/  
c: District Manager, MECP Timmins  
Danielle Arsenault, AECOM Canada Ltd.