



PERMIT GVA1047

Pursuant to
Greater Vancouver Regional District Air Quality Management Bylaw No. 1082, 2008
and BC Environmental Management Act

University of British Columbia

located at
2337 Lower Mall, Vancouver, BC V6T 1Z4


is authorized to discharge air contaminants to the air from
Combined Heating and Power Plant

subject to the requirements in this Permit for the emission sources and works existing or planned on
August 12, 2013.

Contravention of any of these requirements is a violation of the bylaw
and may result in enforcement action.

All previous versions of this Air Quality Management Permit are hereby rescinded and rendered null and void.

Issued: August 03, 2010
Amended: August 12, 2013


Kathy Preston, Ph.D., P.Eng.
Assistant District Director

GREATER VANCOUVER REGIONAL DISTRICT AIR QUALITY MANAGEMENT PERMIT

SECTION 1 – AUTHORIZED EMISSION SOURCES

Authorization to discharge air contaminants from the authorized Emission Sources and Works listed below is subject to the specified terms and conditions.

Approximate locations of the emission sources are shown on the Site Plan in section 4.

EMISSION SOURCE 01: Biomass Belt Dryer discharging through a Stack(s).

MAXIMUM EMISSION FLOW RATE: **1086** m³/min
MAXIMUM ANNUAL OPERATING HOURS: **8000** hrs/yr

MAXIMUM EMISSION QUALITY:

1. 10.4 mg/m³ Total Volatile Organic Compounds
2. 15 mg/m³ Particulate Matter
3. 5% Opacity.
4. Odorous Air Contaminant(s): None past the plant boundary such that pollution has occurred.
5. Particulate: None past the plant boundary such that pollution has occurred.

WORKS AND PROCEDURES:

Good operating practices.

EMISSION SOURCE 02: Steam Boiler discharging through a ESP Exhaust(s).

MAXIMUM EMISSION FLOW RATE: **259** m³/min
MAXIMUM ANNUAL OPERATING HOURS: **8000** hrs/yr
MAXIMUM PRIMARY BURNER INPUT FIRING RATE: **35.65** GJ/hr


MAXIMUM EMISSION QUALITY:

1. 271.7 mg/m³ Nitrogen Oxides
2. 13.65 mg/m³ Total Volatile Organic Compounds
3. 15 mg/m³ Particulate Matter
4. 5% Opacity.
5. Odorous Air Contaminant(s): None past the plant boundary such that pollution occurs

WORKS AND PROCEDURES:

Wood gasifier, syngas oxidizer (with natural gas supplemental fuel) operated at a minimum temperature of 1054 degrees Celsius with a retention time greater than 2 seconds, economizer, steam boiler, 2 stage/field dry electrostatic precipitator, continuous O₂ combustion process monitor and

Issued: August 03, 2010
Amended: August 12, 2013


Kathy Preston, Ph.D., P.Eng.
Assistant District Director

Permit GVA1047

GREATER VANCOUVER REGIONAL DISTRICT AIR QUALITY MANAGEMENT PERMIT

related appurtenances, using good operating procedures. The authorized fuel for the wood gasifier is uncontaminated wood waste (supplemented when required with natural gas).

All concentrations specified in the permit for this emission source fuelled by biomass are referenced at 8 percent oxygen content in stack gas corrected to dry conditions at 20 degrees Celsius and a pressure of 101.325 kilopascals.

The District Director may authorize additional fuel types for limited periods for the purposes of conducting emission tests. The permit holder shall provide at least three weeks written notice prior to the use of any alternate fuel types.

The above "maximum emission quality" and "works and procedures criteria" are exempted from start ups and shut downs of the gasifier and boiler subject to the following conditions:

1. Section 2 Sub-section B shall apply at all times.
2. Start-up, with the exception of refractory re-bricking, shall not exceed 1 hour in duration.
3. The shut down process shall not exceed 1 hour in duration.

EMISSION SOURCE 03: IC Engine discharging through a Stack(s).

MAXIMUM EMISSION FLOW RATE: **188** m³/min
MAXIMUM ANNUAL OPERATING HOURS: **8000** hrs/yr
MAXIMUM PRIMARY BURNER INPUT FIRING RATE: **28.48** GJ/hr

MAXIMUM EMISSION QUALITY:

1. 115 mg/m³ Nitrogen Oxides
2. 7 mg/m³ Particulate Matter
3. 5% Opacity. Based on a six minute average.


WORKS AND PROCEDURES:

Wood gasifier and syngas treatment equipment including thermal cracking and baghouse filtration, IC engine and related appurtenances. The authorized fuel for the wood gasifier is uncontaminated wood waste (supplemented when required with natural gas).

The District Director may authorize additional fuel types for limited periods for the purposes of conducting emission tests. The permit holder shall provide at least three weeks written notice prior to the use of any alternate fuel types.

The permit holder shall engage the services of a third party to monitor the ambient NOx and particulate matter levels in the roof mounted air intake duct on the adjacent student residence

Issued: August 03, 2010
Amended: August 12, 2013


Kathy Preston, Ph.D., P.Eng.
Assistant District Director


Permit GVA1047

GREATER VANCOUVER REGIONAL DISTRICT AIR QUALITY MANAGEMENT PERMIT

building. Data from this monitoring station shall be provided in real time to operators of the steam boiler and IC engine and if NO_x or particulate emissions are shown to exceed the most stringent ambient air quality objectives the following mitigative strategies shall be taken:

1. Temporarily suspend the operation of the IC engine.
2. Temporarily suspend the operation of the steam boiler.
3. Review fuel supply to ensure it is within design specifications.
4. If necessary, relocate the roof mounted air intake duct for the student residence to the north side of the building.

Issued: August 03, 2010
Amended: August 12, 2013


Kathy Preston, Ph.D., P.Eng.
Assistant District Director

Permit GVA1047

GREATER VANCOUVER REGIONAL DISTRICT AIR QUALITY MANAGEMENT PERMIT

SECTION 2 – GENERAL REQUIREMENTS AND CONDITIONS

A. AMENDMENTS

The terms and conditions of this permit may be amended, as authorized by applicable legislation. New and modified sources must receive authorization prior to start-up.

B. POLLUTION


Notwithstanding any conditions in this permit, no person shall discharge or allow or cause the discharge of any air contaminant so as to cause pollution as defined in the Greater Vancouver Regional District Air Quality Management Bylaw No. 1082, 2008 and the Environmental Management Act.

C. STANDARD CONDITIONS AND DEFINITIONS

Unless otherwise specified, the following applies to this permit:

1. Gaseous volumes are corrected to standard conditions of 20° Celsius & 101.325 kPa with zero percent moisture.
2. Contaminant concentrations from the combustion of specific fuel types are corrected to the following Oxygen content, unless specified otherwise:
 - 3% O₂ for natural gas and fuel oil;
 - 8% O₂ for wood fuel.
 - 15% O₂ for turbines
3. Where compliance testing is required, each contaminant concentration limit in this permit will be assessed for compliance based on a valid test using test methods approved by the District Director.
4. Visual opacity measurements are made at the point of maximum density, nearest the discharge point and exclude the effect of condensed, uncombined water droplets. Compliance determinations are based on a 6 minute average in accordance with the provincial "Source Testing Code for the Visual Measurement of The Opacity of Emissions from Stationary Sources". Continuous Emission Monitor System (CEMS) opacity compliance determinations are based on a one hour average (taken from the top of each hour).
5. If authorized in section 1 of this permit, standby fuel use is restricted to a maximum of 350 hrs/yr and to those periods during which the primary authorized fuel is not available. Fuel oil sulphur content shall not exceed 15 mg/kg and emissions during fuel oil firing shall not exceed 10% Opacity.
6. Definitions in the Environmental Management Act and Air Quality Management Bylaw apply to terminology used in this permit.
7. Threshold Limit Values (TLV) refer to the Time Weighted Average (TWA) exposure limits for substances specified in the American Conference of Governmental Industrial Hygienists Threshold Limit Values handbook, current on the latest date that this permit issuance or amendment came into effect.
8. Sulphur Oxides (SOx) are expressed as Sulphur Dioxide.
9. Nitrogen Oxides (NOx) are expressed as Nitrogen Dioxide.

Issued: August 03, 2010
Amended: August 12, 2013


Kathy Preston, Ph.D., P.Eng.
Assistant District Director

Permit GVA1047

GREATER VANCOUVER REGIONAL DISTRICT AIR QUALITY MANAGEMENT PERMIT

10. The Canadian Council of Ministers of the Environment (CCME) "Environmental Guidelines for Controlling Emissions of Volatile Organic Compounds from Aboveground Storage Tanks (June 1995, CCME-EPC-87E)" shall be adhered to for all applicable tanks unless otherwise stated in this permit.
11. Authorized 'Maximum Annual Operating Hours' of 8760 hrs/yr for an emission source is equivalent to authorization for continuous operation of the emission source for an entire calendar year, including leap years.

D. HEATING, VENTILATION, AIR CONDITIONING AND INTERNAL COMBUSTION ENGINES

Air contaminants discharged from any natural gas-fired heating, ventilation or air conditioning systems for buildings and any internal combustion engines located at the discharge site shall be maintained and operated in a manner prescribed by the manufacturer to ensure good combustion of the fuel with minimum discharge of air contaminants.

E. AUTHORIZED WORKS AND PROCEDURES

Works and procedures, which this permit authorizes to control the discharge of air contaminants, shall be employed during all operating periods of the related facilities. The permit holder shall regularly inspect and maintain all such works in good repair.

The discharge criteria described in this permit are applicable on the issued or amended date of this permit unless specified otherwise. If a date different to the issued or amended date is specified, the existing control works and procedures must be maintained in good operating condition and operated in a manner to minimize emissions.

F. BYPASSES


The discharge of contaminants which have bypassed authorized control works during non-emergency conditions is prohibited unless approval has been obtained in writing from the District Director.

G. EMERGENCY PROCEDURES

In the event of an emergency that prevents compliance with a requirement(s) of this permit, that requirement(s) shall be suspended for such time as the emergency continues or until otherwise directed by the District Director, provided that:

1. Due diligence was exercised in relation to the process, operation or event that caused the emergency and that the emergency occurred notwithstanding this exercise of due diligence; and,
2. The District Director is notified at the first available opportunity of the emergency and of contingency actions invoked or planned to mitigate adverse impacts and restore compliance. Notification shall be made to Metro Vancouver's 24-hour number: 604-436-6777; and,
3. Due diligence is exercised in shutting down related processes and/or taking action to restore compliance in the shortest possible time frame, unless specified otherwise in this permit or by written notice from the District Director.

Issued: August 03, 2010
Amended: August 12, 2013


Kathy Preston, Ph.D., P.Eng.
Assistant District Director

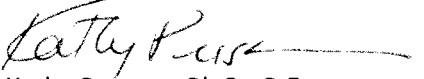
Permit GVA1047

GREATER VANCOUVER REGIONAL DISTRICT AIR QUALITY MANAGEMENT PERMIT

Notwithstanding 1, 2 and 3 above, the District Director may specify contingency actions to be implemented to protect human health and the environment while authorized works and/or standard operating procedures are being restored.

If an emergency situation results in a "spill" as defined in the Environmental Management Act Spill Reporting Regulation, the spill shall also be reported immediately to the Provincial Emergency Program by telephoning 1-800-663-3456.

Issued: August 03, 2010
Amended: August 12, 2013


Kathy Preston, Ph.D., P.Eng.
Assistant District Director

Permit GVA1047

SECTION 3 – REPORTING REQUIREMENTS

A. MONITORING REQUIREMENTS AND REPORTING


Unless otherwise approved by the District Director prior to any sampling or analysis, all measurements shall be performed by an independent agency in accordance with Metro Vancouver Air Emissions Sampling Program Manual of Methods and Standard Operating Procedures and the BC Ministry of Environment Field Sampling Manual, as they may be amended from time to time. Any variance from these procedures must receive prior approval from the District Director.

A minimum of 3 days advance notice must be given prior to taking measurements required by this Monitoring and Sampling Program. Notification must be given to the Metro Vancouver Environmental Regulation & Enforcement Division (phone 604-436-6777, Fax 604-436-6707, email regulationenforcement@metrovancover.org).

Unless otherwise specified, sampling shall be performed under operating conditions representative of the previous 90 calendar days of operation. All field data and calculations must be submitted with monitoring results and they shall be reported in the metric units which are used in this permit. These submissions shall include process data relevant to the operation of the source of the emissions and the performance of the emission control works.

The permit holder shall conduct the following monitoring and sampling and submit electronic reports of the results to the District Director by the dates specified below using a password enabled web based application provided by Metro Vancouver.

SOURCE	DUE DATE	FREQUENCY	REQUIREMENT	PARAMETER(S)	TEST METHOD	REPORT TYPE
03	March 31, 2014	Yearly	Submit a written report detailing the measured discharge rate, concentration of particulate matter and nitrogen oxides in the emissions.	Particulate Matter, Nitrogen Oxides	Metro Vancouver AQ02/02/1.00M, EPA Test Method	Stack



 Kathy Preston, Ph.D., P.Eng.
 Assistant District Director

Issued: August 03, 2010
 Amended: August 12, 2013

Permit GVA1047

GREATER VANCOUVER REGIONAL DISTRICT AIR QUALITY MANAGEMENT PERMIT

SOURCE	DUE DATE	FREQUENCY	REQUIREMENT	PARAMETER(S)	TEST METHOD	REPORT TYPE
02	March 31, 2014	Yearly	<p>All concentrations specified for this emission source fuelled by biomass are referenced at 15% oxygen content in stack gas corrected to dry conditions at 20 degrees Celsius and a pressure of 101.325 kilopascals.</p> <p>Preferred test methods for determination of contaminants are listed in Section 3A. Alternative methodologies may be considered if a draft test plan including rationale and proposed test protocols is submitted to Metro Vancouver at least 31 days prior to conducting the stack test.</p>	Nitrogen Oxides, Total Volatile Organic Compounds, Particulate Matter	EPA Test Method 7E, Metro Vancouver AQ02/02/1.00M, EPA Test Method 25A	Stack



 Kathy Preston, Ph.D., P.Eng.
 Assistant District Director

Issued: August 03, 2010
 Amended: August 12, 2013

Permit GVA1047

GREATER VANCOUVER REGIONAL DISTRICT AIR QUALITY MANAGEMENT PERMIT

SOURCE	DUE DATE	FREQUENCY	REQUIREMENT	PARAMETER(S)	TEST METHOD	REPORT TYPE
01	March 31, 2014	Yearly	<p>contaminants are listed in Section 3A. Alternative methodologies may be considered if a draft test plan including rationale and proposed test protocols is submitted to Metro Vancouver at least 31 days prior to conducting the stack test.</p> <p>Submit a written report detailing the measured discharge rate, concentration of particulate matter and total volatile organic compounds in the emissions.</p> <p>All concentrations specified for this emission source are referenced at 21% oxygen content in stack gas corrected to dry conditions at 20 degrees Celsius and a pressure of 101.325 kilopascals.</p> <p>Preferred test methods for determination of contaminants are listed in Section 3A. Alternative methodologies may be considered if a draft test plan including rationale and proposed test protocols is submitted to Metro Vancouver at least 31 days prior to conducting the stack test.</p>	Particulate Matter, Total Volatile Organic Compounds	Metro Vancouver AQ02/02/1.00M, EPA Test Method 25A	Stack


 Kathy Preston, Ph.D., P.Eng.
 Assistant District Director

Issued: August 03, 2010
 Amended: August 12, 2013

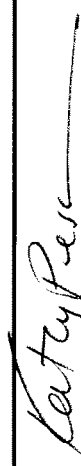
Permit GVA1047

GREATER VANCOUVER REGIONAL DISTRICT AIR QUALITY MANAGEMENT PERMIT

B. INFORMATION REPORTING REQUIREMENTS

The permit holder shall submit electronic reports containing the required information to the District Director by the dates specified below using a password enabled web based application provided by Metro Vancouver.

EMISSION SOURCE	DUE DATE	FREQUENCY	REQUIREMENT	REPORT TYPE
02, 03	March 31, 2014	Yearly	Written report providing details of the types and amounts of fuel burned in the preceding calendar year.	Fuel Use
03	March 31, 2014	Yearly	Written report summarizing frequency and results of all inspections and maintenance carried out on the baghouse(s). The report shall also include any actions, taken or proposed, to solve identified problems.	Baghouse
01, 02, 03	March 31, 2014	Yearly	Written report providing details of the total number of hours and days operated in the preceding calendar year. Detailed records are to be maintained in a written bound log or other format approved by the District Director and made available for inspection by Metro Vancouver staff for a minimum period of three years.	Operating Period
02	March 31, 2014	Yearly	Written report summarizing the inspection and maintenance program conducted during the previous calendar year on the electrostatic precipitator described in Section 1 of this Permit.	Information - Other
02, 03	March 31, 2014	Yearly	Written report detailing results of the NOx and particulate monitoring carried out at the roof mounted air intake duct on the student residence building adjacent to the biomass gasification facility. The report shall include	Information - Other


 Kathy Preston, Ph.D., P.Eng.
 Assistant District Director

Issued: August 03, 2010
 Amended: August 12, 2013

Permit GVA1047

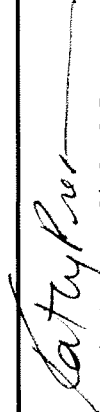
GREATER VANCOUVER REGIONAL DISTRICT AIR QUALITY MANAGEMENT PERMIT

01, 02, 03	March 31, 2014	Once	<p>all information related to calibration and maintenance of the continuous monitors plus a summary of the data collected.</p> <p>Provide a written report analyzing one year of ambient monitoring data collected when the facility was operating normally. Monitoring data shall be compared to dispersion model results and to the Metro Vancouver objectives for one-hour and annual average NO2 as well as 24-hour and annual average PM2.5. (Note that the 24-hour PM2.5 objective is based on a rolling average.) If the results of the dispersion model submitted with the original application are used for this assessment then the stack, emission and building parameters assumed for the previous modeling should be compared to actual parameters (as built or monitored using CEMS) and shown to be more conservative. The report may also include recommendations, with justification, for removing the requirement to monitor ambient NO2 and PM2.5 continuously.</p>	Information - Other
------------	----------------	------	--	------------------------

C. AMENDED OR ADDITIONAL REQUIREMENTS

Based on the results of the monitoring program, including the stack sampling results or any other information, the District Director may:

1. Amend the monitoring and reporting requirement of any of the information required by this Permit including plans, programs and studies.
2. Require additional investigations, tests, surveys or studies.


 Kathy Preston, Ph.D., P.Eng.
 Assistant District Director

Issued: August 03, 2010
 Amended: August 12, 2013

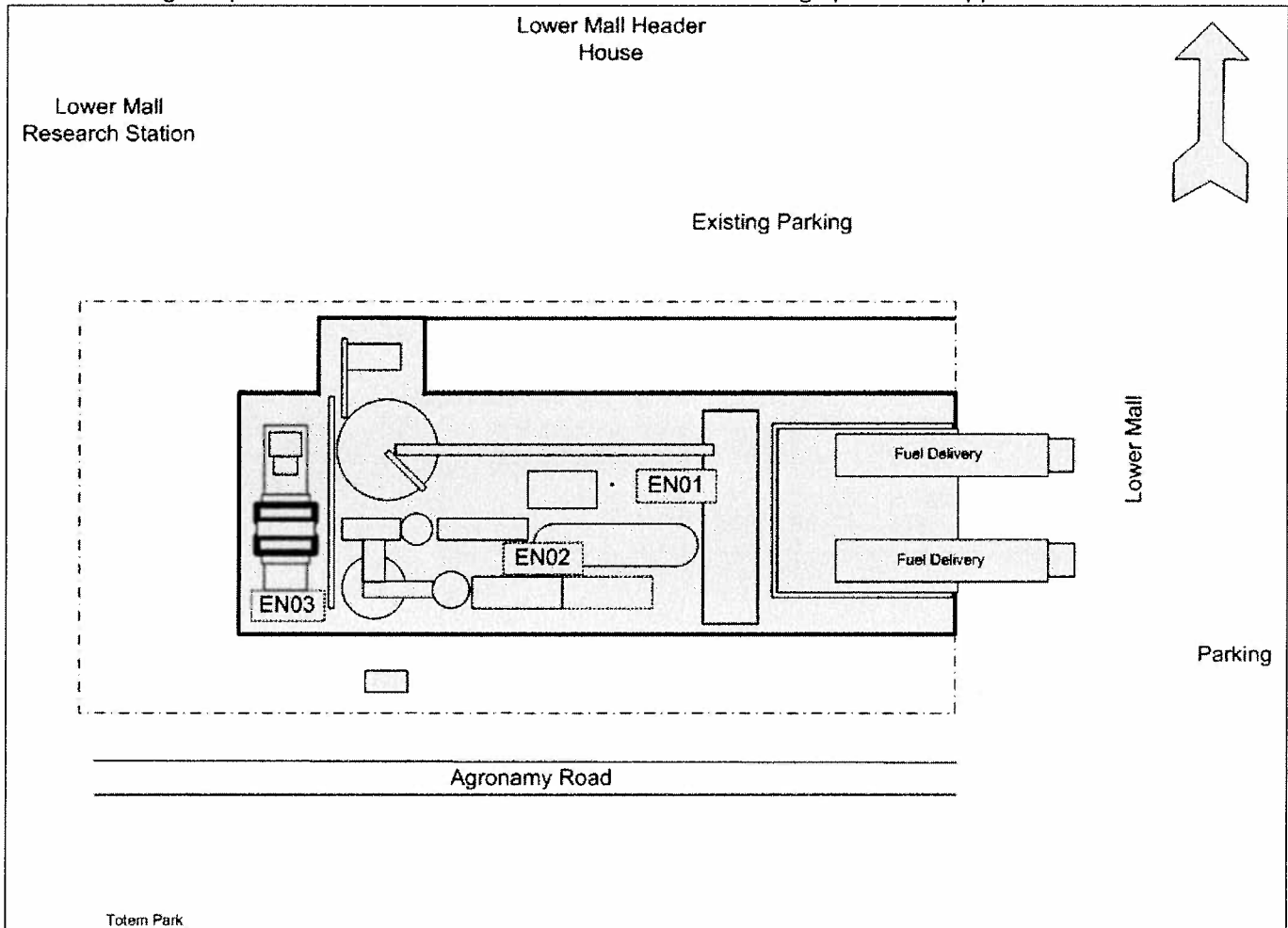
Permit GVA1047

GREATER VANCOUVER REGIONAL DISTRICT AIR QUALITY MANAGEMENT PERMIT

SECTION 4 – SITE PLAN

LEGAL DESCRIPTION OF DISCHARGE SITE: Parcel Identifier: 015-891-909, District Lot 3044 Group 1 New Westminster District Except Firstly; Part on plan 6147, Secondly; Part on plan 9301, Thirdly: Part on plan BCP6556, Fourthly: Part on plan BCP23719

The following site plan is not to scale and the locations of the discharge points are approximate.



Issued: August 03, 2010
Amended: August 12, 2013

Kathy Preston
Kathy Preston, Ph.D., P.Eng.
Assistant District Director

Permit GVA1047