DILLON CONSULTING

TRITEC DESIGN INC.

Pre-Test Plan – Rapid Organic Converter (ROC) Gasification System

St. Eustache, Manitoba

October 2022 - 22-5021

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Appendices

1.0 Introduction

Dillon Consulting Limited (Dillon) has prepared this Pre Test Plan on behalf of Tritec Design Inc. (Tritec) for submission to Manitoba Environment, Climate and Parks (MECP) for their review and approval. The source testing program is for the Rapid Organic Converter (ROC) gasification system located at the Tritec Concrete site in St. Eustache, Manitoba. The objective of this source testing program is to quantify the in-stack concentrations and emission rates of the subject pollutants during the processing of SRM (specific risk material) from a cattle processing plant per the requirements of its Environment Act Licence No. 3368. This waste stream contains essentially bone, some meat and very little animal fat. This material may contain the prion of mad cow disease. The source testing program will test the emissions performance of the Tritec gasifier with ROC technology and is equipped with an emission control scrubber.

The test contaminants of interest to this testing program include the following:

Semi-volatile organic compounds (SVOCs):

- Dioxins and furans (D&F);
- Polyaromatic hydrocarbons (PAHs);
- Polychlorinated biphenyls (PCBs);
- Chlorophenol (CP); and,
- Chlorobenzene (CB).

Particulate Matter and Metals:

- Total suspended particulate matter;
- Lead;
- Cadmium;
- Arsenic;
- Chromium; and,
- Mercury.

Acid Gases:

- Hydrogen chloride (HCl).

Combustion Gases:

- Oxides of nitrogen (NOx);
- Sulphur dioxide (SO_2);
- Carbon monoxide (CO); and,
- Carbon dioxide (CO_2).

2.0 Source Description

2.1 Process Description

The Tritec ROC is used to convert organic feedstock into a hot gas stream. Significant components of the system include feedstock receiver, feedstock vaporizing processor/primary organics combustion chamber, ash extraction system, secondary combustion chamber, hot gas retention chambers, boiler, stack and emission control scrubber.

The ROC is an induced fan combustor designed to operate from a solid fuel input. A feed auger is used to load solid material into the ROC combustion chamber where combustion air is introduced via air dampeners. As combustion occurs gases are directed to a retention chamber and then are directed to a heat exchanger where energy is extracted. Flue gas is then cooled by mixing with ambient air using damper controls and directed to a wet scrubber for particulate matter removal prior to release to the atmosphere.

2.2 Control Equipment Description

The gasification system is equipped with a wet scrubber system for particulate matter control. Water is used as the scrubbing agent.

2.3 Exhaust Gas Characteristics

The exhaust gases are expected to be well mixed at the point of entry to the vertical exhaust stack. No reverse flow, cyclonic flow or stratified flow conditions are expected to exist in the exhaust stack sampling locations.

The exhaust flow rate and moisture content in the stack is expected to be variable depending on the stack gas temperature which is primarily affected by the amount and temperature of the ambient air introduced to cool the exhaust gas. Tritec's estimate of the stack gas exhaust flow rate and temperature are 1500 cfm (0.71 m^3/s) and 44˚C, respectively.

3.0 Test Program

3.1 Test Matrix

Table 1 provides a Test Matrix for the gasification system source testing program.

Table 1: Gasifier Test Matrix

Sampling Location	No. of Runs	Sample/Type Pollutant	Sample Run Time (min)	Test Method	Analytical Method/Technique	Analytical Laboratory
Gasifier Exhaust	3	D&F, PAHs, PCBs, CP, CB	~200	Env. Canada EPS 1/RM/2	EPS 1/RM/3 GC/MS	Bureau Veritas
	3	PM & metals including Hg	~120	US EPA Method 29	Gravimetric, ICP/MS, GFAAS, CVAAS	Bureau Veritas
	3	HCl	~60	US EPA Method 26A	IC	Bureau Veritas
	3	NOx, SO_2, CO, CO_2, O_2	~60	US EPA Methods 7E, 6C, 10 & 3A	N/A	CEMS

Notes:
GC/MS – gas chromatography, mass spectroscopy
ICP/MS – inductively coupled plasma mass spectroscopy
GFAAS – graphite furnace atomic absorption spectroscopy
CVAAS – cold vapour atomic absorption spectroscopy
IC – ion chromatography
Bureau Veritas – Bureau Veritas Laboratories, Mississauga, ON
CEMS – on-site continuous emission monitors

3.2 Sampling Location

The exhaust stack extends vertically off the top of the scrubber unit. The current exhaust stack is 10-inch in diameter (reduced from prior 20-inch diameter to achieve higher velocities that are better suited for isokinetic sampling), and equipped with two 4-inch diameter sample ports, located 90 degrees apart around the circumference of the stack. The sample ports are located approximately 8 diameters downstream of the top of the scrubber and 7.6 diameters upstream of the stack exit, making the sampling location suitable for isokinetic testing.

The testing platform is completely enclosed and the internal temperature is maintained between 15 to 20°C for the testing. This will allow testing to be conducted in the winter months as needed. There are five (5) electrical outlets, each 120 volts and 15 amp capacity, inside the heated enclosure on the platform.

Appendix B contains photos of the stack configuration and sample ports for the gasifier exhaust.

3.3 Sampling and Analytical Procedures

The source testing program will follow the most recent version of the MECP Report No. 96-07 "Interim Stack Sampling Performance Protocol". Sampling and analytical procedures described in this section for the subject exhaust follow reference test methods from Environment and Climate Change Canada (ECCC) and the US Environmental Protection Agency, as listed in Appendix 1 of the MECP Stack Sampling Performance Protocol.

Preliminary stack gas velocity, temperature and moisture content measurements/estimates will be used to facilitate isokinetic testing, where required. Modification to sampling approach for small diameter stacks, if applicable per the reference test methods, will be implemented.

3.3.1 EPS **1**/RM/**2**

Sampling for semi-volatile organic compounds, including dioxins and furans (D&F), polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), chlorophenol (CP) and chlorobenzene (CB), will be conducted according to ECCC method EPS 1/RM/2 "Reference Method for Source Testing: Measurement of Releases of Selected Semi-volatile Organic Compounds from Stationary Sources" (June 1989). The sampling train is a modified Method 5 sampling train, consisting of a glass nozzle, a heated glass-lined sample probe, a heated filter, a water-cooled condenser coil and XAD resin trap and an ice-cooled impinger train. Samples will be collected isokinetically. Each sample train (front half and back half) will be recovered and analyzed as a single sample.

This testing method allows for the collection and analysis of a variety of different semi-volatile organic compounds. The sampling glassware will be cleaned and proofed by the analytical laboratory prior to testing to ensure the absence of background contamination. The XAD resin and filters will be spiked with known quantities of target analytes to ensure acceptable analytical recoveries.

3.3.2 US EPA Method **29**

US EPA Method 29 will be employed for the collection of total filterable particulate matter and select metals including mercury. Method 29 has provision for the determination of total suspended particulate matter with the metals. Basically, the filter catch and front half acetone rinse were taken to dryness and gravimetrically analyzed for total particulate matter (similar to US EPA Method 5) prior to acid digestion and analysis for metals.

3.3.3 US EPA Method **26**A

Isokinetic sampling for hydrochloric acid (HCl) emissions will be performed according to US EPA Method 26A "Determination of Hydrogen Halide and Halogen Emissions from Stationary Sources - Isokinetic Method". A standard isokinetic sampling train with heated filter and impinger train containing dilute sulphuric acid in the first two impingers will be used to collect the HCl samples.

3.3.4 US EPA Methods **7**E, **6**C, **10** and **3**A

A continuous emission monitoring (CEM) trailer, equipped with the required sampling equipment, emission monitors, and calibration gas will be mobilized to the site for the combustion gas testing. Sampling for NOx, SO_2 and CO will follow US EPA Methods 7E, 6C and 10, respectively. Determination of O_2 and CO_2 concentrations will follow US EPA Method 3A. Emission monitors will be calibrated using high-purity calibration gas prior to and at the end of each 1-hour test. CEM system performance specifications, as specified in the US EPA reference methodologies, will be confirmed prior to and during testing.

3.3.5 US EPA Methods **1** to **4**

The sampling equipment used to measure the stack gas velocity for the exhausts will meet US EPA Method 2 requirements. A probe assembly containing a calibrated S-type pitot tube and a calibrated thermocouple will be used. An inclined manometer and digital temperature readout will be used to measure the velocity pressure and temperature, respectively. Static pressure measurements will be made using the pitot tube and manometer assembly.

Stack gas composition (O_2 and CO_2 concentrations) will be obtained using continuous emission analyzers. This methodology meets US EPA Method 3A requirements as noted above.

The exhaust stack gas moisture content will measured in conjunction with the various isokinetic testing methods using the condensation train method described in US EPA Method 4.

3.4 Process Sampling Locations

The testing program does not require any process stream sampling. However, the type of feed material will be documented and the volume/mass processed during each test will be measured/estimated by ROC system operators.

3.5 Process Data

The key production rates and system parameters that will be monitored and logged for each test period are as follows:

- Material feed rates per unit of time;
- Feedstock type (description);
- Fuel gas usage, e.g., natural gas or propane, for unit process heating;
- Relevant process parameters such as temperatures, pressures, oxygen level, etc. to document the operating conditions of the unit; and,
- Relevant emission control equipment parameters such as pressure drop and scrubber water flow rate.

4.0 Internal QA/QC Activities

The Dillon QA/QC program for typical source testing campaigns includes:

- Cleaning the sampling equipment;
- Calibration of sampling equipment;
- Manual sampling;
- Sample Recovery;
- QA/QC Samples; and,
- Data Validation and Reporting.

4.1 QA/QC Procedures

4.1.1 Cleaning the Sampling Equipment

Cleaning of the sampling equipment will be performed to ensure that equipment surfaces that are exposed to field samples do not add contaminants thereby providing erroneously high results. For this testing program, sampling equipment cleaning is applicable to the sample probes, nozzles, filter holders and connecting glassware or sample lines. This equipment will be detergent washed, tap water rinsed, DI water rinsed, acetone and hexane rinsed (for SVOC testing) or nitric acid soaked/rinsed (for metals testing) and dried. All SVOC sampling glassware will be laboratory cleaned and proofed prior to use in the field.

4.1.2 Calibration of Sampling Equipment

Dillon sampling trains (dry gas meters/orifices) are calibrated at least every six months and probe/nozzle/thermocouple combinations are calibrated yearly unless they have been damaged and/or show signs of corrosion. Probe nozzles are checked with calipers for dimensional accuracy and probe configurations are calibrated against a standard pitot tube mounted in a wind tunnel. Thermocouples are calibrated against an NBS thermometer using ice, boiling water and hot oil. Finally the balances used to weigh impingers are calibrated against NBS weights.

4.1.3 Manual Sampling

Adherence to accepted sampling methods and techniques is integral to a satisfactory sampling program. ECCC and US EPA published methods are developed to ensure accurate sample collection and analyses. This sampling program will follow reference methodologies without modification. Field and reagents blanks will be prepared as described in the reference methodologies and submitted along with test samples to the analytical laboratory for analysis. At least one set of blank samples per test method will be submitted for this test program.

4.1.4 Sample Recovery

Sample recovery involves the breaking down of sampling trains into their components, the emptying of impingers, removal of filters, rinsing of probes etc. It is essential that exacting care be taken at this step to ensure the impinger solutions and filters are transferred to sample containers quantitatively, liquid levels are marked and that the entire procedure is carried out in an atmosphere free of contamination.

All sampling trains will be recovered according to the techniques provided in the reference methodologies as applicable. A lab trailer will be mobilized to the site and used for the sampling train preparation and recoveries.

4.1.5 QA/QC Samples

During or at the end of the sampling program, field samples of sorbent tubes, filters and/or impinger filling solutions are collected as blanks and submitted for analysis to ensure low background contaminant concentrations in the media/reagents/filters. One set of blank samples will be submitted for this test program.

4.1.6 QA/QC Check Lists

No QA/QC checklists will be employed during this sampling program.

4.1.7 **QA/QC Checks of Data Reduction**

Dillon's procedure for assuring accurate transfer of raw data and accuracy of calculations includes the following:

- Comparison of all data values between raw data sheets and spreadsheets;
- Manual check of one complete data set per testing methodology to ensure calculations are consistent with electronic spreadsheet calculations; and,
- Comparison of data with expected contaminant concentrations, if available.

4.1.8 **Sample Identification and Custody**

- Samples will be recovered into appropriate containers, preserved (if necessary) and stored under proper conditions (as per method), packaged and delivered to the analytical laboratories by Dillon personnel.
- Liquid levels will be marked on all sample containers.
- Sample identification labels on each container.
- Chain-of-custody forms.

5.0 Reporting and Data Reduction Requirements

5.1 Report Format

The Table of Contents for the report will be as follows:

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5.2 Data Reduction and Summary

The following tabular formats (or variation that includes the same minimum information) will be used to summarize the emission data for each test contaminant.

Table 2: Summary Table Format of Emission Data

Emission Source	Test No.	Sample Date & Time	Stack Gas Temp. (˚C)	Moisture Content (% by vol.)	Stack Gas Flow Rate (m^3/s)	Conc. (mg/m^3)	Emission Rate (g/s)	Emission Rate (g/Unit of Feedstock)
Source No. 1	1							
	2							
	3							
	Avg.							

6.0 Test Schedule

This sampling program is scheduled to be completed over a 4 to 5 day period by one 3-person sampling team. Dave Diemer, P.Eng., Project Manager will be responsible for test schedule and co-ordinating testing staff and activities. The on-site testing team will be comprised of Dillon staff from its Winnipeg and/or Ontario offices and Dillon's sub-consultant Valley Environmental Services (VES). The testing is tentatively planned to be completed in the first quarter of 2023, pending approval of this Test Plan.

A preliminary schedule is proposed as follows:

Date	Test/travel
Day 1	Safety orientation; Trailer positioning & test site set-up; Preliminary testing; HCl Test #1 (time permitting)
Day 2	SVOC Test #1, SVOC Test #2, gases
Day 3	SVOC Test #3, PM/metals Test #1, gases
Day 4	PM/metals Test #2, PM/metals Test #3;
Day 5	HCl Test #2, HCl Test #3, tear down & demobilize.

Appendix A

Environment Act Licence # 3368

Manitoba
Conservation and Climate
Environmental Approvals Branch
1007 Century St
Winnipeg MB R3H 0W4
T 204 945-8321 F 204 945-5229
www.gov.mb.ca/sd

File No.: 5960.10

December 24, 2021

Jamie Dufresen
President
Tritec Design Inc.
Box 58
Elie Manitoba, Canada R0H 0H0

Dear Jamie Dufresen:

Re: Environment Act Licence No. 3368

Enclosed is Environment Act Licence No. 3368, issued to Tritec Design Inc. for the continued operation of the development being a rapid organic converter (ROC) gasification research and development facility at 18 Main Street in the town of St Eustache, Rural Municipality of Cartier, Manitoba.

In addition to the enclosed Licence requirements, please be informed that all other applicable federal, provincial and municipal regulations and by-laws must be complied with. A conditional use agreement with the R.M. of Cartier is required for the continued operation of the development. A Notice of Alteration must be filed with the Director for approval prior to any alteration to the Development as licensed.

Should you have any questions on this matter, please contact Nada Suresh, Regional Supervisor, Environmental Compliance and Enforcement Branch, at Nada.Suresh@gov.mb.ca or 204-945-8214.

Pursuant to Section 27 of The Environment Act, this licensing decision may be appealed by any person who is affected by the issuance of this licence to the Minister of Conservation and Climate within 30 days of the date of the licence.

Sincerely,

Original Signed by
Siobhan Burland Ross

for Laura Pyles
Acting Director

c. Kristal Harman, Yvonne Hawryliuk, Nada Suresh - Environmental Compliance and Enforcement
Siobhan Burland Ross, Eshetu Beshada - Environmental Approvals
Public Registry

THE ENVIRONMENT ACT
LOI SUR L'ENVIRONNEMENT

Manitoba

LICENCE

File No.: 5960.10

Licence No. / Licence N°: 3368
Issue Date / Date de délivrance : Dec 24, 2021

In accordance with The Environment Act (C.C.S.M. c. E125) / Conformément à la Loi sur l'environnement (C.P.L.M. c. E125)

Pursuant to Section 10(1) / Conformément au Paragraphe 10(1)

THIS LICENCE IS ISSUED TO: / CETTE LICENCE EST DONNÉE À:

TRITEC DESIGN INC.; "the Licensee"

for the continued operation of a rapid organic converter (ROC) gasification research and development facility at 18 Main Street in the town of St Eustache, Rural Municipality of Cartier, in accordance with the Environment Act Proposal dated June 9, 2021, additional information provided on September 8, 2021, and subject to the following specifications, limits, terms, and conditions:

DEFINITIONS

In this Licence;

"accredited laboratory" means an analytical facility accredited by the Standards Council of Canada (SCC), or accredited by another accrediting agency recognized by Manitoba Conservation and Climate to be equivalent to the SCC, or be able to demonstrate, upon request, that it has the quality assurance/quality control (QA/QC) procedures in place equivalent to accreditation based on the international standard ISO/IEC 17025, or otherwise approved by the Director;

"affected area" means a geographical area, excluding the property of the Development;

"approved" means approved by the Director or assigned Environment Officer in writing;

"approved facility" means a facility operating in accordance with the requirements of The Environment Act and the regulations thereunder;

"Closure Plan" means a plan indicating the actions to be taken for the closure of the Development;

"dangerous good" means a product, substance or organism as defined in The Dangerous Goods Handling and Transportation Act, or any amendments thereto;

"day" means a calendar day unless otherwise indicated;

"Director" means an employee so designated pursuant to The Environment Act;

"Environment Officer" means an employee so designated pursuant to The Environment Act;

"fugitive emissions" means particulate matter escaping from sources within the Development into the atmosphere other than through any of the emission stacks or vents;

"hazardous waste" means a product, substance or organism as defined in The Dangerous Goods Handling and Transportation Act, or any amendments thereto;

"noise nuisance" means an unwanted sound, in an affected area, which is annoying, troublesome, or disagreeable to a person:

a) residing in an affected area;
b) working in an affected area; or
c) present at a location in an affected area which is normally open to members of the public;

if the unwanted sound

d) is the subject of at least 5 written complaints, received by the Director in a form satisfactory to the Director and within a 90-day period, from 5 different persons falling within clauses a), b), or c), who do not live in the same household; or
e) is the subject of at least one written complaint, received by the Director in a form satisfactory to the Director, from a person falling within clauses a), b), or c) and the Director is of the opinion that if the unwanted sound had occurred in a more densely populated area there would have been at least 5 written complaints received within a 90-day period, from 5 different persons who do not live in the same household;

"odour nuisance" means a continuous or repeated odour, smell or aroma, in an affected area, which is offensive, obnoxious, troublesome, annoying, unpleasant, or disagreeable to a person:

a) residing in an affected area;
b) working in an affected area; or
c) present at a location in an affected area which is normally open to members of the public;

if the odour, smell or aroma

d) is the subject of at least 5 written complaints, received by the Director in a form satisfactory to the Director and within a 90-day period, from 5 different persons falling within clauses a), b), or c), who do not live in the same household; or
e) is the subject of at least one written complaint, received by the Director in a form satisfactory to the Director, from a person falling within clauses a), b), or c) and the Director is of the opinion that if the odour, smell or aroma had occurred in a more densely populated area there would have been at least 5 written complaints received within a 90-day period, from 5 different persons who do not live in the same household;

"**opacity**" means the degree to which emissions reduce the transmission of light and obscure the view of an object in the background;

"particulate matter" means any finely divided liquid or solid matter other than water droplets;

"**particulate residue**" means that part or portion of an atmospheric emission which is deposited onto a surface;

"**point source**" means any point of emission from a Development where pollutants are emitted to the atmosphere by means of a stack;

"pollutant" means a pollutant as defined in The Environment Act;

"Post-Closure Plan" means a plan indicating the actions to be taken for the care, maintenance, and monitoring of the Development after closure, that will prevent, mitigate, or minimize the threat to public health and the environment;

"QA/QC" means quality assurance/quality control;

"solid waste" means solid waste as defined in the Waste Management Facilities Regulation, or any future amendments thereto, respecting waste disposal grounds;

"stack" means a duct, pipe, chimney, vent, opening or other structure through which pollutants are emitted to the atmosphere;

"Standard Methods for the Examination of Water and Wastewater" means the most recent edition of Standard Methods for the Examination of Water and Wastewater published jointly by the American Public Health Association, the American Waterworks Association and the Water Environment Federation;

“Tier 1” means a trial period that runs for one to two hours at a time;

“Tier 2” means a trial period that runs for one to two weeks at a time;

“Tier 3” means a trial period that runs for more than two weeks at full capacity of the gasification plant; and

"**wastewater**" means any liquid containing a pollutant as defined in The Environment Act, associated with or resulting from the Development which is discharged into the environment.

GENERAL TERMS AND CONDITIONS

This Section of the Licence contains terms and conditions intended to provide guidance to the Licensee in implementing practices to ensure that the environment is maintained in such a manner as to sustain a high quality of life, including social and economic development, recreation and leisure for present and future Manitobans.

1. The Licensee shall at all times maintain a copy of this licence at the Development or at the premises from which the Development's operations are managed.

2. The Licensee shall implement a high standard of equipment maintenance and good housekeeping and operational practices with respect to the Development, at all times.

3. The Licensee shall reduce the production and dissemination of wastes by initiating and maintaining waste reduction and waste recycling programs.

4. The Licensee shall submit all information required to be provided to the Director or Environment Officer under this Licence, in written and electronic format, in such form (including number of copies) and of such content as may be required by the Director or Environment Officer, and each submission shall be clearly labelled with the Licence Number and File Number associated with this Licence.

5. In addition to any of the limits, terms and conditions specified in this Licence, the Licensee shall, upon the request of the Director:
   a) sample, monitor, analyze and/or investigate specific areas of concern regarding any segment, component or aspect of pollutant storage, containment, treatment, handling, disposal or emission systems, for such pollutants or ambient quality, aquatic toxicity, leachate characteristics and discharge or emission rates, for such duration and at such frequencies as may be specified;
   b) determine the environmental impact associated with the release of any pollutant(s) from the Development;
   c) conduct specific investigations in response to the data gathered during environmental monitoring programs; or
   d) provide the Director, within such time as may be specified, with such reports, drawings, specifications, analytical data, descriptions of sampling and analytical procedures being used, bioassay data, flow rate measurements and such other information as may from time to time be requested.

6. The Licensee shall, unless otherwise specified in this Licence:
   a) carry out all preservations and analyses on liquid samples in accordance with the methods prescribed in the most current edition of Standard Methods for the Examination of Water and Wastewater or in accordance with equivalent preservation and analytical methodologies approved by the Director;
   b) carry out all sampling of, and preservation and analyses on, soil and air samples in accordance with methodologies approved by the Director;
   c) have all analytical determinations undertaken by an accredited laboratory; and
   d) report the results to the Director, in writing and in an electronic format acceptable to the Director, within 60 days of the samples being taken.

7. The Licensee shall immediately cease the gasification operation upon the request of an Environment Officer.

8. The Licensee shall designate an employee, within 14 days of the date of issuance of this Licence, as the Licensee's Environmental Coordinator, whose job description will include assisting the Licensee in complying with the limits, terms and conditions in this Licence and assisting Senior Management of the Licensee to manage environmental issues at the

Development. The name of the Environmental Coordinator shall be submitted in writing to the Director or Environment Officer within 14 days of appointment and any subsequent appointment.

SPECIFICATIONS, LIMITS, TERMS, AND CONDITIONS

Respecting Feedstock Receipt and Storage

9. The Licensee shall not store more than five tonnes of any specific waste material at any given time during the Tier 1 testing period, unless approved by the Director.

10. The Licensee shall not store more than 10 tonnes of any specific waste material at any given time during the Tier 2 testing period, unless approved by the Director.

11. The Licensee shall limit any specific waste material stored at the facility to a maximum of 15 days' processing capacity of the gasification plant when performing the Tier 3 testing, unless approved by the Director.

12. The Licensee shall not store at any time more than five railroad ties or telephone posts at the Development.

13. The Licensee shall, within 90 days of the issuance of this Licence, submit a waste management plan for Director's approval on how to store or accumulate the proposed waste at the Development which is intended for processing.

14. The Licensee shall not store any feedstock material within 100 metres of a surface watercourse, surface water body, spring, or well without containment mechanisms to the satisfaction of an Environment Officer.

15. The Licensee shall not accept biomedical waste at the Development at any time.

16. The Licensee shall not allow litter beyond the property boundaries of the Development resulting from the transportation, storage, or processing of feedstock material at the Development.

17. The Licensee shall remove any feedstock material which has been improperly deposited at the Development or along any roadway allowances or ditches within 20 metres of the property boundaries fronting or adjacent to the Development within 24 hours or a time approved by an Environment Officer.

18. The Licensee shall dispose of any material found unsuitable for processing in the gasification plant in accordance with clause 63 of this Licence.

Respecting Feedstock Material Recordkeeping

19. The Licensee shall account for and record all feedstock material received at the Development on a 24 hour basis and shall maintain the most recent 24 months of records

at the development. The record shall identify for each day that feedstock material is received:
a) the type of feedstock material received;
b) the source of the feedstock material received;
c) the date of receipt of the feedstock material; and
d) the gross mass of the feedstock material received in kilograms.

20. The Licensee shall account for and record all feedstock material gasified at the Development on a 24 hour basis and shall maintain the most recent 24 months of records at the development. The record shall identify for each day that feedstock material is processed:
    a) the type of feedstock material processed;
    b) the source of the feedstock material processed;
    c) the date and duration in hours of processing of the feedstock material; and
    d) the gross mass of the feedstock material gasified in kilograms.

21. The Licensee shall submit to the Director, upon written request of the Director, monthly summaries of the information required by Clauses 19 and 20 of this Licence by the last day of the following month.

Respecting Feedstock Material Processing

22. The Licensee shall notify the Environment Officer at least five working days before switching the gasification process from Tier 1 to Tier 2 and from Tier 2 to Tier 3.

23. The Licensee shall not process more than two railroad ties or telephone posts at a time and not process more than five railroad ties or telephone posts during a one-week test.

24. The Licensee shall not incorporate the use of any fossil fuels in the processing of feedstock materials and in the general operation of the ROC plant except for a pre-heating purpose.

Respecting Animal Mortalities Processing

25. The Licensee shall provide a notice of use of the Development to dispose of livestock mortalities to the Environment Officer and the Rural Municipality. The notice shall include the following:
    a) the reason for use,
    b) the planned dates of use,
    c) the source(s) of mortalities,
    d) estimated volumes of mortalities, and
    e) contact information for a person working at the site and a person transporting mortalities to the site.

26. In the event the mortalities processed have a disease that may be communicated to other livestock or wildlife, the Licensee shall notify the Director of Wildlife.

27. The Licensee shall comply with the Reportable Diseases Regulation or any future amendment thereof, and transport mortalities to the Development in a manner acceptable to the Director of Wildlife.

28. The Licensee shall maintain the following records. Records of use shall be maintained for not less than 10 years and made available to the Environment Officer, the Director of Animal Diseases and the Director of Wildlife upon request:
    a) daily number of livestock mortalities delivered to the site,
    b) numbers of loads of animal mortalities delivered, and
    c) source(s) of animal mortalities delivered.

Respecting the Determination of Processing/Gasification Rates

29. The Licensee shall determine a normal rate and a maximum rate for the processing of feedstock material not later than 60 days after the commencement of the Tier 3 operation of the ROC plant at the Development.

30. The Licensee shall submit to the Director the rates determined by Clause 29 of this Licence, showing all data and calculations as to how these rates were determined. The rates shall be stated in kilograms or tonnes of feedstock material processed as:
    a) a monthly average;
    b) a daily and hourly average as calculated from the monthly average; and
    c) a maximum hourly.

31. The Licensee shall, following Tier 3 testing and prior to converting the research and development facility into a permanent gasification facility to process wastes at the site, submit a new and complete Environment Act Proposal to the director for consideration under Section 10(1) of The Environment Act.

Respecting Ash Management

32. The Licensee shall sample a representative portion of ash generated at the facility:
    a) a minimum of once per month for the first six months for each feedstock material processed after commencement of processing feedstock material at the Development; and
    b) quarterly thereafter for each type of feedstock, unless otherwise required by the Director.

33. The Licensee shall have the ash samples collected pursuant to Clause 32 of this Licence analysed by an accredited laboratory to determine:
    a) toxicity in accordance with the most recent edition of Environment Canada, Environmental Protection Service test method EPS l/RMll, *"Biological Test Method: Acute Lethality Test Using Daphnia spp.* "; and
    b) leachate characteristics for compounds listed in the Schedule C Hazardous Waste Regulation and, in addition, for copper, nickel, and zinc concentration.

34. The Licensee shall submit a report of the analyses conducted pursuant to Clause 33 of this Licence to the Director within 15 days of receipt.

35. The Licensee shall store ash at the site in a manner that prevents fugitive dust emissions from being generated and prevents the ash from contaminating surface water and soil.

36. The Licensee shall dispose of the ash generated at the Development that is characterized as a hazardous waste in a manner acceptable to the Director.

37. The Licensee shall dispose of ash only at approved waste disposal grounds, unless otherwise approved by the Director.

38. The Licensee shall determine and record the mass and volume of all ash generated at the Development on a weekly basis and shall maintain the most recent 24 months of records at the Development.

Respecting Air Emissions – Limits

39. The Licensee shall not emit particulate matter from the Development such that:
    a) particulate matter:
        i. exceeds 0.23 grams per dry standard cubic metre calculated at 25 degrees Celsius and 760 millimetres of mercury, corrected to 12 percent carbon dioxide for processes involving combustion, from any point source of the Development;
        ii. exhibits a visible plume with an opacity of greater than five per cent at any point beyond the property line of the Development; or
        iii. results in the deposition of visible particulate residue at any time beyond the property line of the Development; or
    b) opacity from any point source of the Development equals or exceeds:
        i. 20 percent as the average of any 24 consecutive opacity observations taken at 15 second intervals;
        ii. 20 percent for more than 16 individual opacity observations within any 1 hour period; or
        iii. 40 percent for any individual opacity observation.

40. The Licensee shall not cause or permit an odour nuisance to be created as a result of the construction, operation, or alteration of the Development, and shall take such steps as the Director may require to eliminate or mitigate an odour nuisance.

41. The Licensee shall not cause or permit a noise nuisance to be created as a result of the construction, operation, or alteration of the development, and shall take such steps as the Director may require to eliminate or mitigate a noise nuisance.

Respecting Air Pollution Control Equipment

42. The Licensee shall direct all air streams that contain a pollutant(s) of concern to the Director to a pollution control device which has been designed for and demonstrated to be capable of reducing, altering, eliminating or otherwise treating the pollutant(s).

43. The Licensee shall prepare, within 90 days of the issuance of this Licence, and maintain the following manuals which shall be kept at the Development and available for review upon request by an Environment Officer:
    a) a standard operating procedural manual and a maintenance schedule for each air emission pollution control device based on the manufacturer's specifications and recommendations;

b) an updated standard operating procedural manual and a maintenance procedure for each air emission pollution control device within 120 days of the addition, elimination or change regarding any air emission control device; and
c) a copy of the manufacturer's operational and maintenance manual.

44. The Licensee shall not operate any process directing an emission to an air pollution control device at the Development unless:
    a) the operating and maintenance measures and status of the device are in full compliance with the procedures and timetables as per Clause 43;
    b) all emissions from the process are directed to the fully operational air pollution control device;
    c) all discharges of treated emissions from the air pollution control devices are immediately directed to a stack;
    d) the emissions do not contain concentrations of pollutants which:
        i. are in violation of any other applicable legal instrument including an Act, Regulation or by-law; or
        ii. otherwise create a significant negative environmental or health impact in the affected area.

45. The Licensee shall maintain a log of the most recent 24 month period to record any downtime of an air pollution control device due to either the breakdown or maintenance of that air pollution control device. The log shall be kept at the Development and shall be available upon request for inspection by an Environment Officer. The log shall record, at minimum, the following information:
    a) identification of the air pollution control device and the process(es) it serves;
    b) time/date of log entry;
    c) nature of event;
    d) time and duration of event;
    e) action taken;
    f) the accumulated downtime of this air pollution control device for the events for each calendar year; and
    g) approval by the Environmental Coordinator.

46. The Licensee shall handle, store and dispose of all pollutants collected by the air pollution control equipment in a manner suitable to their characterization as type of waste or dangerous good.

Respecting Air Emission Sampling and Analysis

47. The Licensee shall submit a stack sampling plan for the Director's approval before starting Tier 3 gasification process and implement the approved plan in accordance with the approved plan.

48. The Licensee, upon written request from the Director, shall provide a stack or stacks including all necessary sampling facilities for the sampling of air emissions at the Development. The stack or stacks shall be provided:
    a) at a location(s) and within a time frame satisfactory to the Director; and

b) to the specifications and in accordance with the most recent version of Manitoba Conservation and Climate Guideline, “Guideline for Stack Sampling Facilities”, unless otherwise approved by the Director.

49. The Licensee, upon written request from the Director, shall submit a detailed plan which is acceptable to and approved by the Director, for the sampling and analysis of potential air pollutants, released as stationary point and fugitive emissions, including any compounds determined by the Director. The plan shall identify the rationale for the sampling, the ways and means by which the sampling program will be implemented including any special measures or methods which would be necessitated by influencing factors such as unfavourable weather conditions, the need for large or additional sample volumes, the need for multiple sampling runs, the methods used for the sampling and the analysis for each compound, the detection level to be attained, a comprehensive QA/QC program, and other items as may be identified by the Director.

50. The Licensee shall perform all stack sampling in accordance with the most recent version of Manitoba Conservation and Climate Report No. 96-07, “Interim Stack Sampling Performance Protocol”, unless otherwise approved by the Director.

51. The Licensee shall arrange the scheduling of the sampling program submitted pursuant to Clause 49 of this Licence such that a representative of Manitoba Conservation and Climate is available to monitor and audit the implementation of the sampling program.

52. The Licensee shall complete the sampling of emissions according to the approved plan submitted pursuant to Clause 49 of this Licence, within a timeframe to be determined by the Director.

53. The Licensee shall submit a report, for the approval of the Director, on the completed sampling and analysis plan approved pursuant to Clause 49 of this Licence, within 60 days of the receipt of the analytical results of that sampling plan. The report shall contain at minimum:
    a) the raw data collected;
    b) a discussion of the sampling and analytical portions of the program including any anomalies of sampling and analysis; and
    c) a discussion of the significance of the data gathered with specific attention to:
        i. the significance for potential acute and chronic impacts to health or environment from exposure to concentrations of the compounds detected;
        ii. the need for risk assessment of the impact of emissions;
        iii. the need for the establishment of ambient air monitoring stations;
        iv. the need for dispersion modeling of emissions;
        v. results and conclusions of the QA/QC program; and
        vi. other issues as may be determined by the Director.

54. The Licensee, upon the written request of and in a timeframe stipulated by the Director, shall comply with any air emission or ambient air quality criteria specified by the Director for any pollutant of concern to the Director which has been identified pursuant to Clause 5, 39, 42, or 53 of this Licence.

Respecting Air Dispersion Modelling of Emissions

55. The Licensee shall submit, upon the request and for the approval of the Director, a proposal for the air dispersion modelling of all emissions from the Development such that any health, environmental or nuisance impact is assessed.

56. The Licensee shall submit, within a time frame stipulated by the Director, a report discussing the results of the air dispersion modelling performed in accordance with the proposal approved pursuant to Clause 55 of this Licence.

Respecting Chemical Storage and Spill Containment

57. The Licensee shall provide containment for all vessels containing chemicals in each area of the Development where the chemicals are stored, loaded, transferred, used or otherwise handled, in compliance with the current Manitoba Fire Code Regulation, or any future amendment thereof, such that any product leakage or spillage and any contaminated liquid generated is contained within the Development and contamination of groundwater and surface water is prevented.

58. The Licensee shall, in a manner approved by the Director, remove and dispose of all spilled dangerous goods.

59. The Licensee shall not install any chemical storage within 100 metres of a surface watercourse, surface water body, spring, or well without containment mechanisms acceptable to the Director.

60. The Licensee shall equip the facility with spill cleanup equipment and supplies.

Respecting Dangerous Goods and Hazardous Wastes

61. The Licensee shall comply with all the applicable requirements of:
    a) The Storage and Handling of Petroleum Products and Allied Products Regulation;
    b) The Dangerous Goods Handling and Transportation Act, and regulations issued thereunder, respecting the handling, transport, storage and disposal of any dangerous goods brought onto or generated at the Development; and
    c) the Office of the Fire Commissioner – Province of Manitoba.

Respecting Wastewater

62. The Licensee shall discharge any wastewater generated into a wastewater collection system approved by the Director.

Respecting Solid Waste

63. The Licensee shall dispose of all solid waste generated at the Development, which is not recycled, only to a waste disposal ground operating under the authority of a permit issued pursuant to the Waste Management Facilities Regulation or any future amendment thereof, or a Licence issued pursuant to The Environment Act.

64. The Licensee shall remove, up on the request of the Environment Officer or Director, any solid waste accumulated on site and dispose pursuant to Clause 63 of this Licence.

Respecting Emergencies

65. The Licensee shall, in the case of physical or mechanical equipment breakdown or process upset where such breakdown or process upset results or may result in the release of a pollutant in an amount or concentration, or at a level or rate of release, that causes or may cause a significant adverse effect, immediately report the event by calling the 24-hour environmental accident reporting line at 204-944-4888 (toll-free 1-855-944-4888). The report shall indicate the nature of the event, the time and estimated duration of the event and the reason for the event.

66. The Licensee shall, following the reporting of an event pursuant to Clause 65:
    a) identify the repairs required to the mechanical equipment;
    b) undertake all repairs to minimize unauthorized discharges of a pollutant;
    c) complete the repairs in accordance with any written instructions of the Director; and
    d) submit a report to the Director about the causes of breakdown and measures taken, within one week of the repairs being done.

67. The Licensee shall prepare and maintain an emergency response contingency plan in accordance with the Canadian Centre for Occupational Health and Safety “Emergency Response Planning Guide” or other emergency planning guidelines acceptable to the Director.

Closure and Post-Closure

68. Within one year prior to imminent closure of the Development, the Licensee shall submit, for the approval of the Director, a formal detailed Closure and Post-Closure Plan for the Development.

69. The Licensee shall implement and maintain the approved Closure and Post-Closure Plan.

REVIEW AND REVOCATION

A. If, in the opinion of the Director, the Licensee has exceeded or is exceeding or has or is failing to meet the specifications, limits, terms or conditions set out in this Licence, the Director may, temporarily or permanently, revoke this Licence.

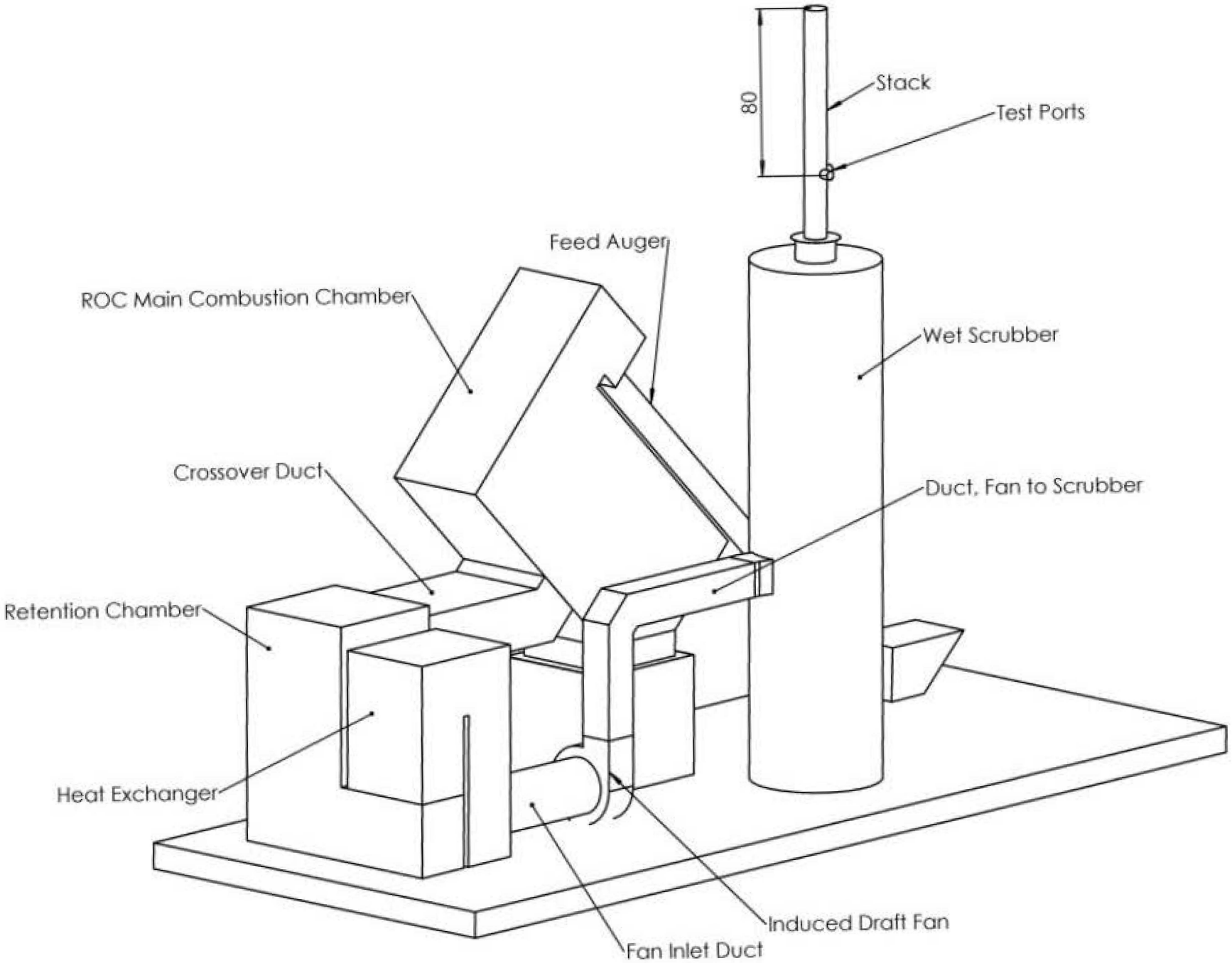
B. If, in the opinion of the Director, new evidence warrants a change in the specifications, limits, terms or conditions set out in this Licence, the Director may require the filing of a new proposal pursuant to Section 11 of The Environment Act or request the filing of a Notice of Alteration.

Original Signed by
Siobhan Burland Ross

for Laura Pyles
Acting Director

Appendix B

Exhaust Stack Photos


80
Stack
Test Ports
Feed Auger
ROC Main Combustion Chamber
Wet Scrubber
Crossover Duct
Duct, Fan to Scrubber
Retention Chamber
Heat Exchanger
Induced Draft Fan
Fan Inlet Duct


INCHES
centimeters
26FT/8m
CRESCENT
Lufkin
CME
P.R.APP.D
254Tc

Photo: The ROC in operation Feb 17, 2021.