

Received
January 23, 2024
WV DEP/Div of Air Quality

NSR (45CSR13) APPLICATION FORM



WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF AIR QUALITY

601 57th Street, SE
Charleston, WV 25304
(304) 926-0475
www.dep.wv.gov/daq

**APPLICATION FOR NSR PERMIT
AND
TITLE V PERMIT REVISION
(OPTIONAL)**

PLEASE CHECK ALL THAT APPLY TO **NSR (45CSR13)** (IF KNOWN):

- CONSTRUCTION MODIFICATION RELOCATION
 CLASS I ADMINISTRATIVE UPDATE TEMPORARY
 CLASS II ADMINISTRATIVE UPDATE AFTER-THE-FACT

PLEASE CHECK TYPE OF **45CSR30 (TITLE V)** REVISION (IF ANY):

- ADMINISTRATIVE AMENDMENT MINOR MODIFICATION
 SIGNIFICANT MODIFICATION

IF ANY BOX ABOVE IS CHECKED, INCLUDE TITLE V REVISION INFORMATION AS **ATTACHMENT S** TO THIS APPLICATION

FOR TITLE V FACILITIES ONLY: Please refer to "Title V Revision Guidance" in order to determine your Title V Revision options (Appendix A, "Title V Permit Revision Flowchart") and ability to operate with the changes requested in this Permit Application.

Section I. General

1. Name of applicant (as registered with the WV Secretary of State's Office): Empire Green Generation, LLC		2. Federal Employer ID No. (FEIN): 87-3187526	
3. Name of facility (if different from above): Follansbee Operations		4. The applicant is the: <input type="checkbox"/> OWNER <input type="checkbox"/> OPERATOR <input checked="" type="checkbox"/> BOTH	
5A. Applicant's mailing address: 1400 Main Street, Follansbee, WV 26037		5B. Facility's present physical address: 801 Koppers Rd, Follansbee, WV 26037	
6. West Virginia Business Registration. Is the applicant a resident of the State of West Virginia? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO – If YES, provide a copy of the Certificate of Incorporation/Organization/Limited Partnership (one page) including any name change amendments or other Business Registration Certificate as Attachment A . – If NO, provide a copy of the Certificate of Authority/Authority of L.L.C./Registration (one page) including any name change amendments or other Business Certificate as Attachment A .			
7. If applicant is a subsidiary corporation, please provide the name of parent corporation:			
8. Does the applicant own, lease, have an option to buy or otherwise have control of the <i>proposed site</i> ? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO – If YES, please explain: Own and Operate – If NO, you are not eligible for a permit for this source.			
9. Type of plant or facility (stationary source) to be constructed, modified, relocated, administratively updated or temporarily permitted (e.g., coal preparation plant, primary crusher, etc.): Plastics Recycling By Pyrolysis		10. North American Industry Classification System (NAICS) code for the facility: 562920	
11A. DAQ Plant ID No. (for existing facilities only): 009 – 00141		11B. List all current 45CSR13 and 45CSR30 (Title V) permit numbers associated with this process (for existing facilities only): R13-3555	

All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.

<p>12A.</p> <ul style="list-style-type: none"> For Modifications, Administrative Updates or Temporary permits at an existing facility, please provide directions to the <i>present location</i> of the facility from the nearest state road; For Construction or Relocation permits, please provide directions to the <i>proposed new site location</i> from the nearest state road. Include a MAP as Attachment B. <p>Turn off of WV-2 onto Veterans Drive (0.6 miles). Turn right onto Koppers Road (0.2 miles). Facility location will be on the right.</p>		
12.B. New site address (if applicable):	12C. Nearest city or town: Follansbee	12D. County: Brooke
12.E. UTM Northing (KM): 40.338690	12F. UTM Easting (KM): -80.605429	12G. UTM Zone: 17T
<p>13. Briefly describe the proposed change(s) at the facility: The facility will be recycling plastics via pyrolysis instead of medical waste as originally permitted.</p>		
<p>14A. Provide the date of anticipated installation or change: 1/2/2024</p> <ul style="list-style-type: none"> If this is an After-The-Fact permit application, provide the date upon which the proposed change did happen: / / 		<p>14B. Date of anticipated Start-Up if a permit is granted: 1/2/2024</p>
<p>14C. Provide a Schedule of the planned Installation of/Change to and Start-Up of each of the units proposed in this permit application as Attachment C (if more than one unit is involved).</p>		
<p>15. Provide maximum projected Operating Schedule of activity/activities outlined in this application: Hours Per Day 24 Days Per Week 7 Weeks Per Year 52</p>		
<p>16. Is demolition or physical renovation at an existing facility involved? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO</p>		
<p>17. Risk Management Plans. If this facility is subject to 112(r) of the 1990 CAAA, or will become subject due to proposed changes (for applicability help see www.epa.gov/ceppo), submit your Risk Management Plan (RMP) to U. S. EPA Region III.</p>		
<p>18. Regulatory Discussion. List all Federal and State air pollution control regulations that you believe are applicable to the proposed process (<i>if known</i>). A list of possible applicable requirements is also included in Attachment S of this application (Title V Permit Revision Information). Discuss applicability and proposed demonstration(s) of compliance (<i>if known</i>). Provide this information as Attachment D.</p>		
<p>Section II. Additional attachments and supporting documents.</p>		
<p>19. Include a check payable to WVDEP – Division of Air Quality with the appropriate application fee (per 45CSR22 and 45CSR13).</p>		
<p>20. Include a Table of Contents as the first page of your application package.</p>		
<p>21. Provide a Plot Plan, e.g. scaled map(s) and/or sketch(es) showing the location of the property on which the stationary source(s) is or is to be located as Attachment E (Refer to Plot Plan Guidance) .</p> <ul style="list-style-type: none"> Indicate the location of the nearest occupied structure (e.g. church, school, business, residence). 		
<p>22. Provide a Detailed Process Flow Diagram(s) showing each proposed or modified emissions unit, emission point and control device as Attachment F.</p>		
<p>23. Provide a Process Description as Attachment G.</p> <ul style="list-style-type: none"> Also describe and quantify to the extent possible all changes made to the facility since the last permit review (if applicable). 		
<p>All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.</p>		

24. Provide **Material Safety Data Sheets (MSDS)** for all materials processed, used or produced as **Attachment H**.
 – For chemical processes, provide a MSDS for each compound emitted to the air.

25. Fill out the **Emission Units Table** and provide it as **Attachment I**.

26. Fill out the **Emission Points Data Summary Sheet (Table 1 and Table 2)** and provide it as **Attachment J**.

27. Fill out the **Fugitive Emissions Data Summary Sheet** and provide it as **Attachment K**.

28. Check all applicable **Emissions Unit Data Sheets** listed below:

<input checked="" type="checkbox"/> Bulk Liquid Transfer Operations	<input checked="" type="checkbox"/> Haul Road Emissions	<input type="checkbox"/> Quarry
<input checked="" type="checkbox"/> Chemical Processes	<input type="checkbox"/> Hot Mix Asphalt Plant	<input type="checkbox"/> Solid Materials Sizing, Handling and Storage Facilities
<input type="checkbox"/> Concrete Batch Plant	<input type="checkbox"/> Incinerator	<input type="checkbox"/> Storage Tanks
<input type="checkbox"/> Grey Iron and Steel Foundry	<input checked="" type="checkbox"/> Indirect Heat Exchanger	
<input type="checkbox"/> General Emission Unit, specify		

Fill out and provide the **Emissions Unit Data Sheet(s)** as **Attachment L**.

29. Check all applicable **Air Pollution Control Device Sheets** listed below:

<input type="checkbox"/> Absorption Systems	<input type="checkbox"/> Baghouse	<input checked="" type="checkbox"/> Flare
<input type="checkbox"/> Adsorption Systems	<input type="checkbox"/> Condenser	<input type="checkbox"/> Mechanical Collector
<input type="checkbox"/> Afterburner	<input type="checkbox"/> Electrostatic Precipitator	<input checked="" type="checkbox"/> Wet Collecting System
<input type="checkbox"/> Other Collectors, specify		

Fill out and provide the **Air Pollution Control Device Sheet(s)** as **Attachment M**.

30. Provide all **Supporting Emissions Calculations** as **Attachment N**, or attach the calculations directly to the forms listed in Items 28 through 31.

31. **Monitoring, Recordkeeping, Reporting and Testing Plans.** Attach proposed monitoring, recordkeeping, reporting and testing plans in order to demonstrate compliance with the proposed emissions limits and operating parameters in this permit application. Provide this information as **Attachment O**.
 ➤ Please be aware that all permits must be practically enforceable whether or not the applicant chooses to propose such measures. Additionally, the DAQ may not be able to accept all measures proposed by the applicant. If none of these plans are proposed by the applicant, DAQ will develop such plans and include them in the permit.

32. **Public Notice.** At the time that the application is submitted, place a **Class I Legal Advertisement** in a newspaper of general circulation in the area where the source is or will be located (See 45CSR§13-8.3 through 45CSR§13-8.5 and **Example Legal Advertisement** for details). Please submit the **Affidavit of Publication** as **Attachment P** immediately upon receipt.

33. **Business Confidentiality Claims.** Does this application include confidential information (per 45CSR31)?
 YES **NO**
 ➤ If **YES**, identify each segment of information on each page that is submitted as confidential and provide justification for each segment claimed confidential, including the criteria under 45CSR§31-4.1, and in accordance with the DAQ's "**Precautionary Notice – Claims of Confidentiality**" guidance found in the **General Instructions** as **Attachment Q**.

Section III. Certification of Information

34. **Authority/Delegation of Authority.** Only required when someone other than the responsible official signs the application. Check applicable **Authority Form** below:

<input type="checkbox"/> Authority of Corporation or Other Business Entity	<input type="checkbox"/> Authority of Partnership
<input type="checkbox"/> Authority of Governmental Agency	<input checked="" type="checkbox"/> Authority of Limited Partnership

Submit completed and signed **Authority Form** as **Attachment R**.

All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.

35A. **Certification of Information.** To certify this permit application, a Responsible Official (per 45CSR§13-2.22 and 45CSR§30-2.28) or Authorized Representative shall check the appropriate box and sign below.

Certification of Truth, Accuracy, and Completeness

I, the undersigned **Responsible Official** / **Authorized Representative**, hereby certify that all information contained in this application and any supporting documents appended hereto, is true, accurate, and complete based on information and belief after reasonable inquiry I further agree to assume responsibility for the construction, modification and/or relocation and operation of the stationary source described herein in accordance with this application and any amendments thereto, as well as the Department of Environmental Protection, Division of Air Quality permit issued in accordance with this application, along with all applicable rules and regulations of the West Virginia Division of Air Quality and W.Va. Code § 22-5-1 et seq. (State Air Pollution Control Act). If the business or agency changes its Responsible Official or Authorized Representative, the Director of the Division of Air Quality will be notified in writing within 30 days of the official change.

Compliance Certification

Except for requirements identified in the Title V Application for which compliance is not achieved, I, the undersigned hereby certify that, based on information and belief formed after reasonable inquiry, all air contaminant sources identified in this application are in compliance with all applicable requirements.

SIGNATURE Bernard R. Brown DATE: 11/30/2023
(Please use blue ink) (Please use blue ink)

35B. Printed name of signee: Bernard Brown 35C. Title: Chief Operating Officer

35D. E-mail: bbrown@empirede.com 36E. Phone: 681-387-5093 36F. FAX:

36A. Printed name of contact person (if different from above): 36B. Title:

36C. E-mail: 36D. Phone: 36E. FAX:

PLEASE CHECK ALL APPLICABLE ATTACHMENTS INCLUDED WITH THIS PERMIT APPLICATION:

- Attachment A: Business Certificate
- Attachment B: Map(s)
- Attachment C: Installation and Start Up Schedule
- Attachment D: Regulatory Discussion
- Attachment E: Plot Plan
- Attachment F: Detailed Process Flow Diagram(s)
- Attachment G: Process Description
- Attachment H: Material Safety Data Sheets (MSDS)
- Attachment I: Emission Units Table
- Attachment J: Emission Points Data Summary Sheet
- Attachment K: Fugitive Emissions Data Summary Sheet
- Attachment L: Emissions Unit Data Sheet(s)
- Attachment M: Air Pollution Control Device Sheet(s)
- Attachment N: Supporting Emissions Calculations
- Attachment O: Monitoring/Recordkeeping/Reporting/Testing Plans
- Attachment P: Public Notice
- Attachment Q: Business Confidential Claims
- Attachment R: Authority Forms
- Attachment S: Title V Permit Revision Information
- Application Fee

Please mail an original and three (3) copies of the complete permit application with the signature(s) to the DAQ, Permitting Section, at the address listed on the first page of this application. Please DO NOT fax permit applications.

FOR AGENCY USE ONLY – IF THIS IS A TITLE V SOURCE:

- Forward 1 copy of the application to the Title V Permitting Group and:
- For Title V Administrative Amendments:
 - NSR permit writer should notify Title V permit writer of draft permit,
- For Title V Minor Modifications:
 - Title V permit writer should send appropriate notification to EPA and affected states within 5 days of receipt,
 - NSR permit writer should notify Title V permit writer of draft permit.
- For Title V Significant Modifications processed in parallel with NSR Permit revision:
 - NSR permit writer should notify a Title V permit writer of draft permit,
 - Public notice should reference both 45CSR13 and Title V permits,
 - EPA has 45 day review period of a draft permit.

All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.



WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF AIR QUALITY
601 57th Street, SE
Charleston, WV 25304
Phone: (304) 926-0475
www.dep.wv.gov/daq

**PERMIT DETERMINATION FORM
(PDF)**

FOR AGENCY USE ONLY: PLANT I.D. # _____
PDF # _____ PERMIT WRITER: _____

1. NAME OF APPLICANT (AS REGISTERED WITH THE WV SECRETARY OF STATE'S OFFICE): Empire Green Generation, LLC		
2. NAME OF FACILITY (IF DIFFERENT FROM ABOVE): Follansbee Operations		3. NORTH AMERICAN INDUSTRY CLASSIFICATION SYSTEM (NAICS) CODE: <u>562920</u>
4A. MAILING ADDRESS: 1400 Main Street, Follansbee, WV 26037		4B. PHYSICAL ADDRESS: 801 Koppers Rd, Follansbee WV 26037
5A. DIRECTIONS TO FACILITY (PLEASE PROVIDE MAP AS ATTACHMENT A): Turn off of WV-2 onto Veterans Drive (0.6 miles). Turn right onto Koppers Rd (0.2 miles). Facility on the right		
5B. NEAREST ROAD: WV-2	5C. NEAREST CITY OR TOWN: Follansbee, WV	5D. COUNTY: Brooke
5E. UTM NORTHING (KM): 40.338690	5F. UTM EASTING (KM): -80.605429	5G. UTM ZONE: 17T
6A. INDIVIDUAL TO CONTACT IF MORE INFORMATION IS REQUIRED: Bernard Brown		6B. TITLE: Chief Technology Officer
6C. TELEPHONE: 681-387-5903	6D. FAX:	6E. E-MAIL: bbrown@empirede.com
7A. DAQ PLANT I.D. NO. (FOR AN EXISTING FACILITY ONLY): <u>009</u> - <u>00141</u>		7B. PLEASE LIST ALL CURRENT 45CSR13, 45CSR14, 45CSR19 AND/OR TITLE V (45CSR30) PERMIT NUMBERS ASSOCIATED WITH THIS PROCESS (FOR AN EXISTING FACILITY ONLY): R-13-3555
7C. IS THIS PDF BEING SUBMITTED AS THE RESULT OF AN ENFORCEMENT ACTION? IF YES, PLEASE LIST:		
8A. TYPE OF EMISSION SOURCE (CHECK ONE): <input type="checkbox"/> NEW SOURCE <input type="checkbox"/> ADMINISTRATIVE UPDATE <input checked="" type="checkbox"/> MODIFICATION <input type="checkbox"/> OTHER (PLEASE EXPLAIN IN 11B)		8B. IF ADMINISTRATIVE UPDATE, DOES DAQ HAVE THE APPLICANT'S CONSENT TO UPDATE THE EXISTING PERMIT WITH THE INFORMATION CONTAINED HEREIN? <input type="checkbox"/> YES <input type="checkbox"/> NO
9. IS <i>DEMOLITION</i> OR PHYSICAL <i>RENOVATION</i> AT AN EXISTING FACILITY INVOLVED? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO		
10A. DATE OF ANTICIPATED INSTALLATION OR CHANGE: <u>1</u> / <u>15</u> / <u>20</u> <u>24</u>		10B. DATE OF ANTICIPATED START-UP: <u>2</u> / <u>15</u> / <u>20</u> <u>24</u>
11A. PLEASE PROVIDE A DETAILED PROCESS FLOW DIAGRAM SHOWING EACH PROPOSED OR MODIFIED PROCESS EMISSION POINT AS ATTACHMENT B .		
11B. PLEASE PROVIDE A DETAILED PROCESS DESCRIPTION AS ATTACHMENT C .		
12. PLEASE PROVIDE MATERIAL SAFETY DATA SHEETS (MSDS) FOR ALL MATERIALS PROCESSED, USED OR PRODUCED AS ATTACHMENT D . FOR CHEMICAL PROCESSES, PLEASE PROVIDE A MSDS FOR EACH COMPOUND EMITTED TO AIR.		

13A. REGULATED AIR POLLUTANT EMISSIONS:

⇒ **FOR A NEW FACILITY**, PLEASE PROVIDE PLANT WIDE EMISSIONS BASED ON THE POTENTIAL TO EMIT (PTE) FOR THE FOLLOWING AIR POLLUTANTS INCLUDING ALL PROCESSES.

⇒ **FOR AN EXISTING FACILITY**, PLEASE PROVIDE THE PROPOSED CHANGE IN EMISSIONS BASED ON THE PTE OF ALL PROCESS CHANGES FOR THE FOLLOWING AIR POLLUTANTS.

PTE FOR A GIVEN POLLUTANT IS TYPICALLY BEFORE AIR POLLUTION CONTROL DEVICES AND IS COLLECTED BASED ON THE MAXIMUM DESIGN CAPACITY OF PROCESS EQUIPMENT.

POLLUTANT	HOURLY PTE (LB/HR)	YEARLY PTE (TON/YR) (HOURLY PTE MULTIPLIED BY 8760 HR/YR) DIVIDED BY 2000 LB/TON
PM	5.7	25.0
PM₁₀	3.20	14.0
VOCs	5.48	24.0
CO	22.60	99.0
NO_x	5.48	24.0
SO₂	8.90	39.0
Pb	NA	NA
HAPs (AGGREGATE AMOUNT)	0.46	2.0
TAPs (INDIVIDUALLY)*	0.46	2.0
OTHER (INDIVIDUALLY)*	0.17	0.75

* ATTACH ADDITIONAL PAGES AS NEEDED

13B. PLEASE PROVIDE ALL SUPPORTING CALCULATIONS AS ATTACHMENT E.

CALCULATE AN HOURLY AND YEARLY PTE OF EACH PROCESS EMISSION POINT (SHOWN IN YOUR DETAILED PROCESS FLOW DIAGRAM) FOR ALL AIR POLLUTANTS LISTED ABOVE INCLUDING INDIVIDUAL HAP'S (LISTED IN SECTION 112[b] OF THE 1990 CAAA), TAP'S (LISTED IN 45CSR27), AND OTHER AIR POLLUTANTS (E.G. POLLUTANTS LISTED IN TABLE 45-13A OF 45CSR13, MINERAL ACIDS PER 45CSR7, ETC.).

14. CERTIFICATION OF DATA

I, Bernard Brown (TYPE NAME) ATTEST THAT ALL THE REPRESENTATIONS CONTAINED IN THIS APPLICATION, OR APPENDED HERETO, ARE TRUE, ACCURATE, AND COMPLETE TO THE BEST OF MY KNOWLEDGE BASED ON INFORMATION AND BELIEF AFTER REASONABLE INQUIRY, AND THAT I AM A **RESPONSIBLE OFFICIAL**** (PRESIDENT, VICE PRESIDENT, SECRETARY OR TREASURER, GENERAL PARTNER OR SOLE PROPRIETOR) OF THE APPLICANT.

SIGNATURE OF RESPONSIBLE OFFICIAL: Bernard R. Brown

TITLE: Chief Technology Officer DATE: 11 / 30 / 2023

THE DEFINITION OF THE PHRASE 'RESPONSIBLE OFFICIAL**' CAN BE FOUND AT 45CSR13, SECTION 2.23.

NOTE: PLEASE CHECK ENCLOSED ATTACHMENTS:

ATTACHMENT A ATTACHMENT B ATTACHMENT C ATTACHMENT D ATTACHMENT E

RECORDS ON ALL CHANGES ARE REQUIRED TO BE KEPT AND MAINTAINED ON-SITE FOR TWO (2) YEARS.

THE PERMIT DETERMINATION FORM WITH THE INSTRUCTIONS CAN BE FOUND ON DAQ'S PERMITTING SECTION WEB SITE:

www.dep.wv.gov/daq

ATTACHMENT A

Business Certificate

City of Follansbee
CITY LICENSE



Follansbee, West Virginia

This is to certify that the undersigned, in pursuance of the authority vested in him by law has this day granted to:

Name of Establishment: **EMPIRE GREEN GENERATION LLC**

Address: **1400 MAIN ST**

FOLLANSBEE WV 26037-1218

Name of Owner: **FRANK ROSSO**

Address: **401 EAST LAS OLAS BLVD SUITE 1400**

FORT LAUDERDALE FL 33301-2218

a license to engage in, conduct or operate the business of, or devices for which license tax has been assessed and paid as shown in license schedule herein.

Date Issued: **28-Jul-2022**

Expiration Date: **30-Jun-2023**

WV Contractors #

PAID

07/28/2022

City of Follansbee

Any automatic device licensed herein is that which is not a gambling device under city ordinance or the laws of the State of West Virginia

LICENSE

No : 288

John G McIntosh

City Manager

DISPLAY IN A CONSPICUOUS PLACE

State of West Virginia



Certificate

I, Mac Warner, Secretary of State of the State of West Virginia, hereby certify that

EMPIRE GREEN GENERATION, LLC

was duly authorized under the laws of this state to transact business in West Virginia as a foreign limited liability company on December 09, 2021.

The company is filed as an at-will company, for an indefinite period.

I further certify that the company has not been revoked or administratively dissolved by the State of West Virginia nor has the West Virginia Secretary of State issued a Certificate of Cancellation or Termination to the company.

Accordingly, I hereby issue this Certificate of Authorization

CERTIFICATE OF AUTHORIZATION

Validation ID:8WV3R_YA3BM



*Given under my hand and the
Great Seal of the State of
West Virginia on this day of*

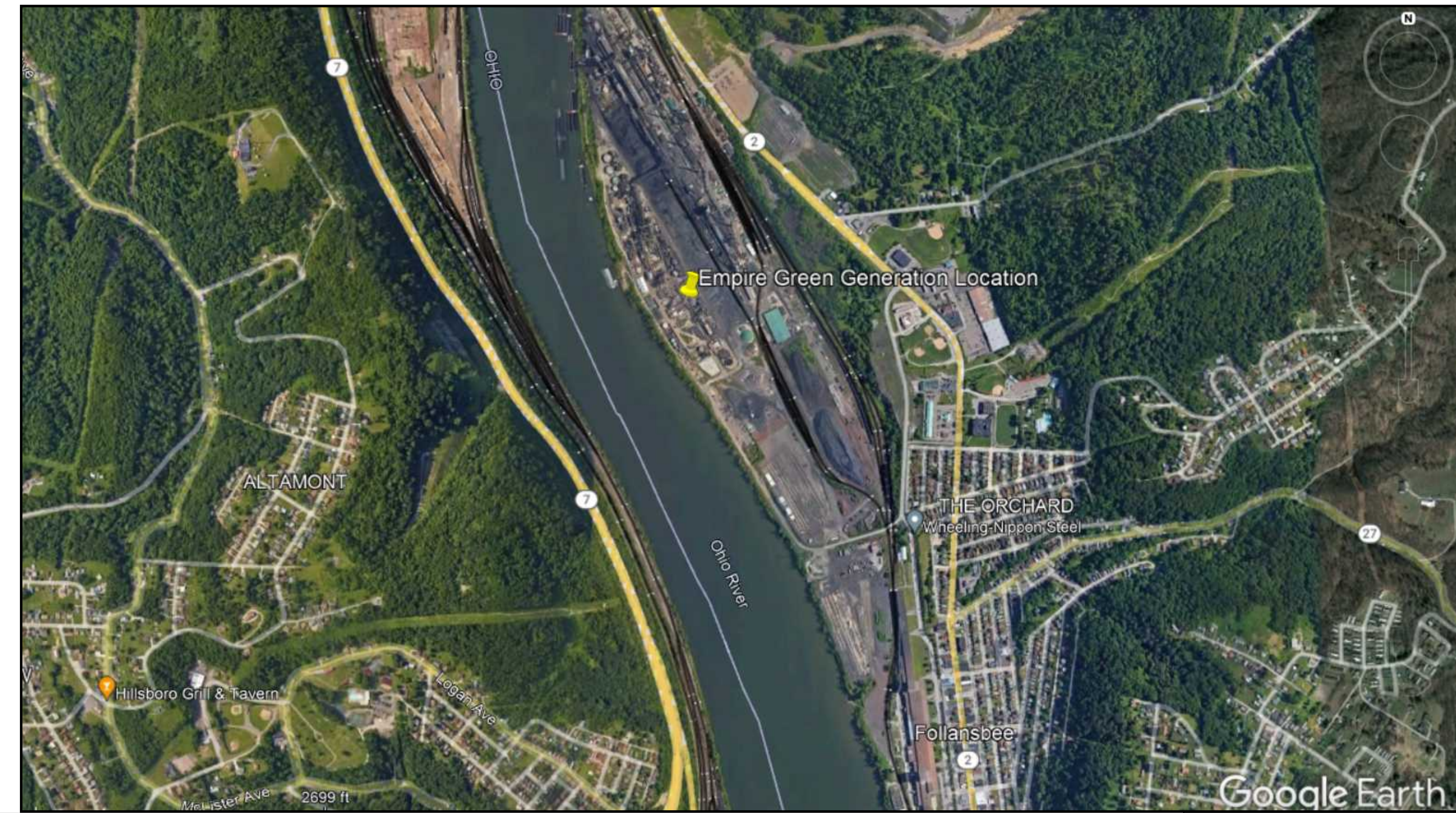
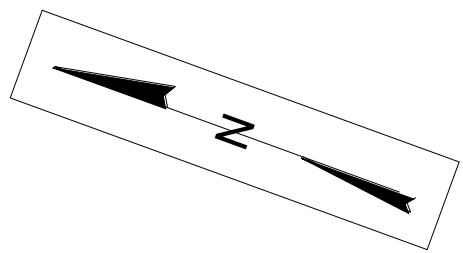
January 07, 2022

Mac Warner

Secretary of State

ATTACHMENT B

Maps



**EMPIRE GREEN GENERATION, LLC
FOLLANSBEE, WV
SITE MAP AND LAYOUT**

ATTACHMENT C

Installation and Startup Schedule

ATTACHMENT C: INSTALLATION AND START UP SCHEDULE

Unit	Start of Installation	Approximate Start of Operations
900 & 1000 (Thermal Oxidizer and Stack Exhaust)	October 2022	February 2024

ATTACHMENT D

Regulatory Discussion

1.1 West Virginia State Requirements

The Facility will be a minor source of emissions under the NSR Program as well as the Title V Operating Permit program under §45CSR30. However, the potential uncontrolled emissions for the Facility will exceed the permitting threshold of 6 pounds per hour (lb/hr) and/or 144 pounds per day (lb/day) in accordance with WVDEP §45CSR13-2.24. Accordingly, Empire Green Generation, LLC is submitting this application for a minor source permit to install and operate.

In addition to regulations, state regulations that pertain to this Facility are listed in Table 1-1. Titles shown in capital letters in the table are permits, notifications, and/or reports that will be needed for construction and operation of the Facility.

Federal authority is delegated to the State of West Virginia, and all permit applications will be submitted to West Virginia Department of Environmental Protection (WVDEP). The following list of air permits is applicable to the proposed facility:

Table 1-1 West Virginia DEP Applicable Regulations

Rule	Description
45CSR02	Control of visible and particulate emissions from stationary sources
45CSR08	Ambient Air Quality Standards
45CSR10	General emission limit provisions for sulfur dioxide
45CSR11	Prevention Of Air Pollution Emergency Episodes
45CSR13	Permits-to-Install New Sources and Permit-to-Install and Operate Program
45CSR17	Restrictions of emissions of fugitive dust
45CSR21	Control of emissions of VOCs from stationary sources

1.1.1 Permit Applicability

Air pollution control regulations have been established by the WVDEP for air emissions associated with stationary sources and fugitive emissions resulting from material transfer activities.

To determine permit applicability for the Facility's emission sources, the Potential-to-Emit (PTE) emissions have been presented in Attachment J and Permit Determination Form, the proposed Facility will be considered a minor source with potential uncontrolled PM emissions greater than 25 tons per year (tpy) and less than major source thresholds. Therefore, the Facility will need to obtain a permit to construct and operate. Applicable federal regulations present in Table 1-2 below.

Table 1-2 Federal Applicable Regulations

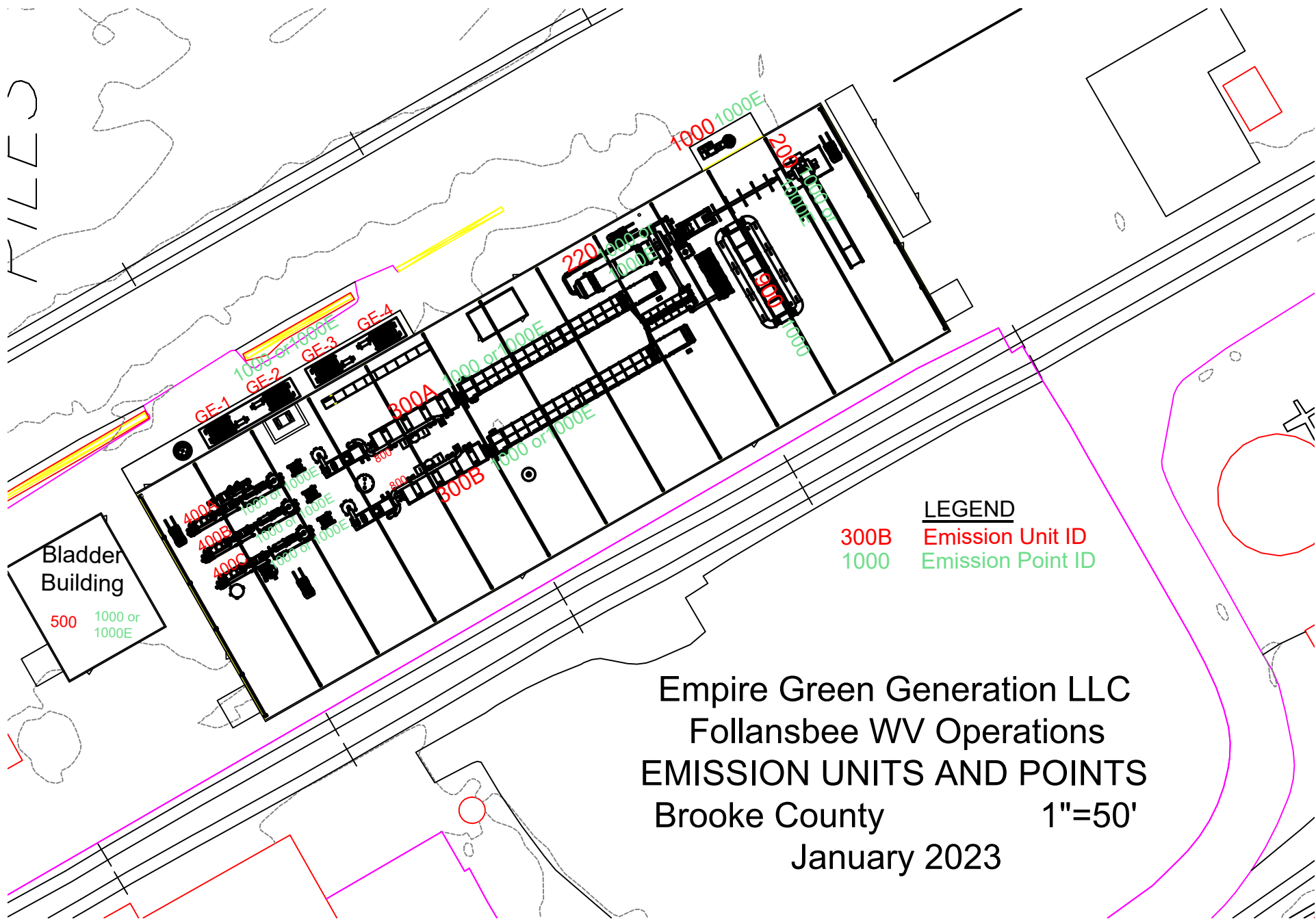
Rule	Description
40 CFR Part 63 Subpart JJJJ	Standards of Performance for Stationary Spark Ignition Internal Combustion Engines
40 CFR 60 Subpart A	General Provisions
40 CFR 60.18	General control device and work practice requirements

1.1.2 Criteria For Fuel

Processing the plastic feed stock is not viewed as a waste disposal through incineration, the plastics are being used as a fuel to create a syngas. The process for producing the syngas is through pyrolysis which is classified as an advanced recycling in West Virginia’s House Bill 4048.

ATTACHMENT E

Plot Plan

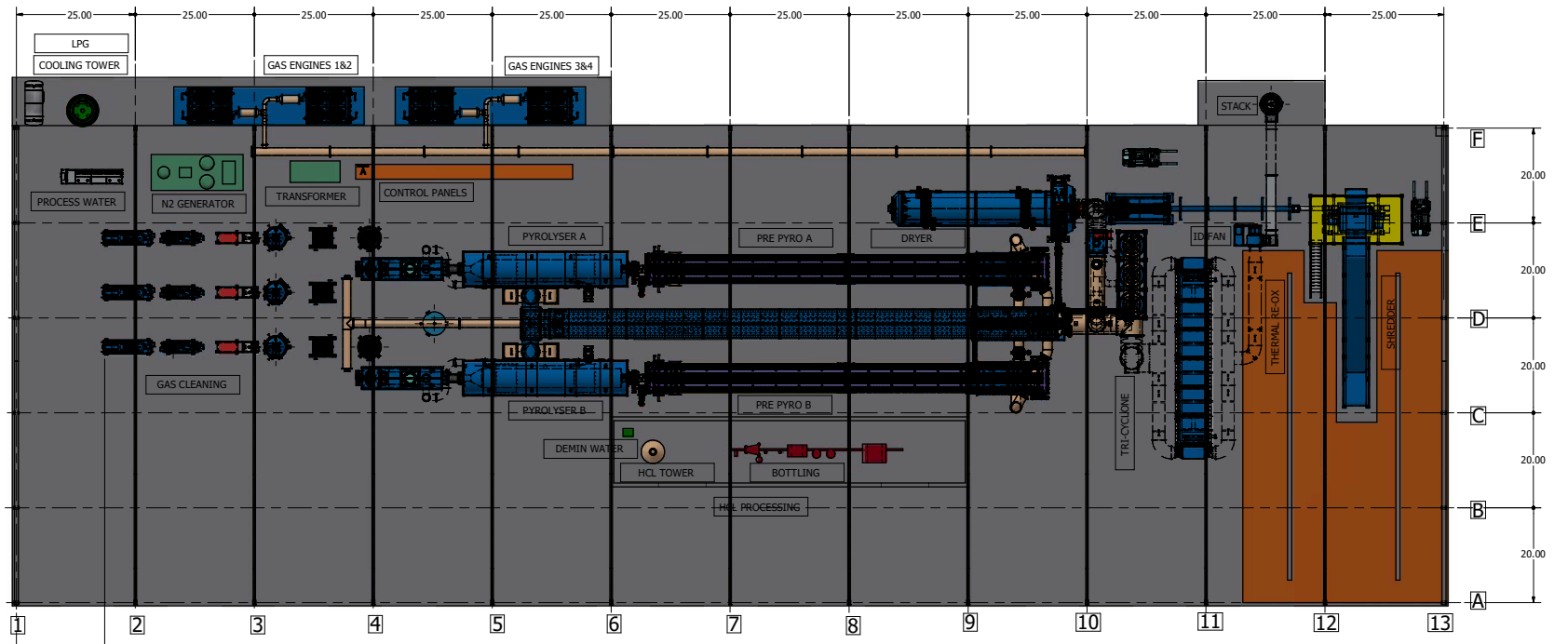


Empire Green Generation LLC
 Follansbee WV Operations
EMISSION UNITS AND POINTS
 Brooke County 1"=50'
 January 2023

ATTACHMENT F

Process Flow Diagram

THIS DRAWING FOR INFORMATION ONLY
UNLESS STAMPED OTHERWISE



1141-000-001 PLANT LAYOUT PLAN

ISSUED FOR INFORMATION
Technotherm
SUPERIOR THERMAL TECHNOLOGY

1141-008 2022.08.17

REV NO	DATE	DESCRIPTION	DESIGN	CHKD
C	2022.08.17	ISSUED FOR INFORMATION	TS	HK
B	2022.08.28	ISSUED FOR INFORMATION	TS	HK
A	2022.08.28	ISSUED FOR INFORMATION	TS	HK

DESIGNED BY	TS	DATE	2022.08.17
APPROVED	TS	DATE	2022.08.17
CHEMICAL ENGINEER	APPROVED	DATE	
PROJECT ENGINEER	APPROVED	DATE	
CHIEF ENGINEER	APPROVED	DATE	

Technotherm
SUPERIOR THERMAL TECHNOLOGY

1141 - MEDICAL WASTE TO ENERGY
PLANT LAYOUT
GENERAL ARRANGEMENT

SIZE	SCALE	SHEET No.	REV
A1	AS SHOWN	1 of 1	C

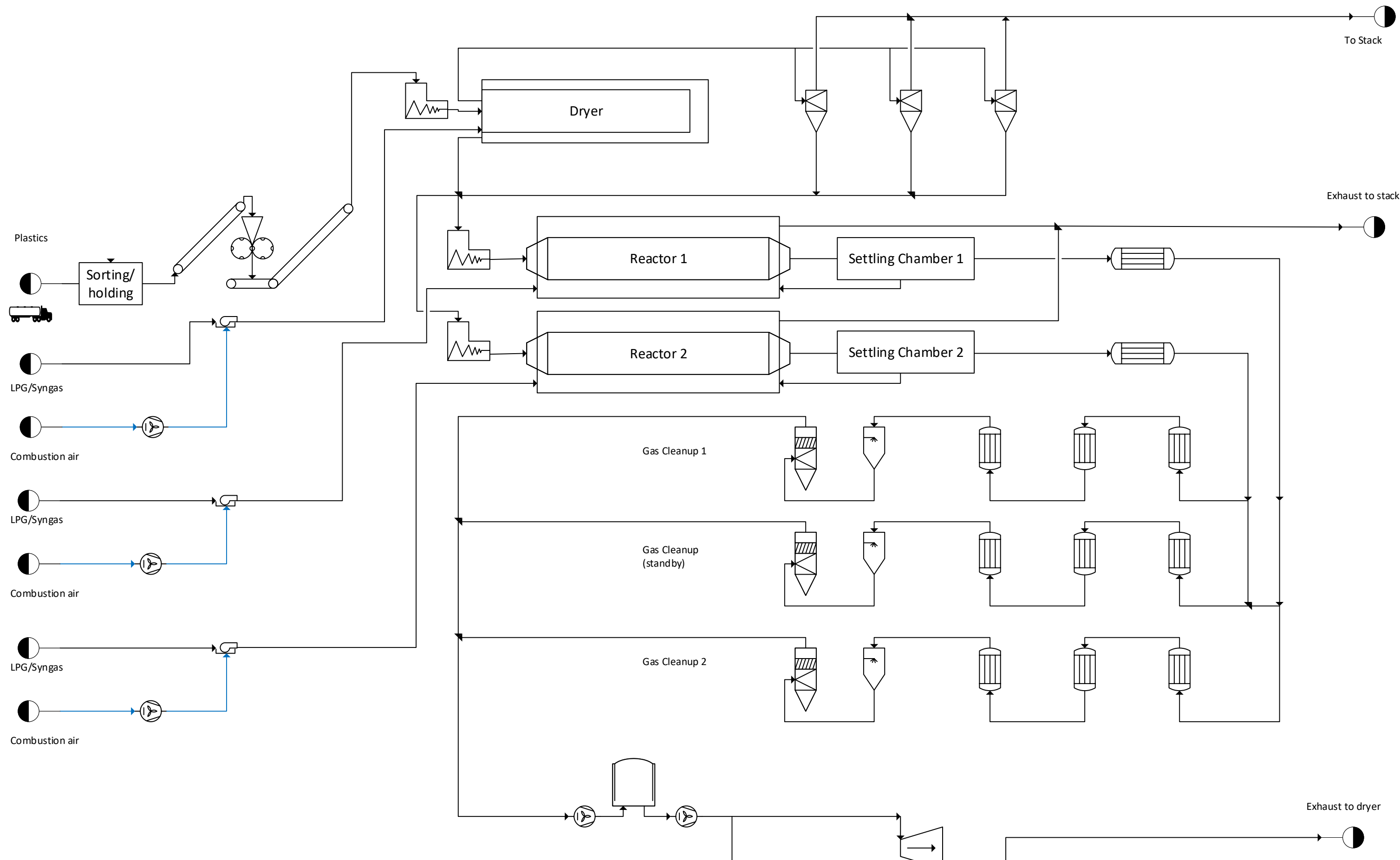
THE PROCESS SHOWN IN THIS DRAWING IS THE INTELLECTUAL PROPERTY OF SUPEROTHERM (PTY) LTD IN TECHNOTHERM SOUTH AFRICA. PROTECTED BY SOUTH AFRICAN COPYRIGHT ACT 1978.

TERMS AND CONDITIONS

- THIS DRAWING (PAPER OR PDF) IS TO BE SHARED AND NOT REPRODUCED OR EXEMPTED TO ANY THIRD PARTY WITHOUT PERMISSION IN WRITING BY SUPEROTHERM (PTY) LTD IN TECHNOTHERM.
- ALL INFORMATION PROVIDED HEREIN IS CONFIDENTIAL AND NOT TO BE DISCLOSED TO ANY OTHER PARTY WITHOUT THE WRITTEN PERMISSION OF SUPEROTHERM (PTY) LTD IN TECHNOTHERM.
- THIS DRAWING IS PROVIDED AS A SERVICE TO OUR CLIENTS AND IS NOT TO BE USED FOR ANY OTHER PURPOSE WITHOUT THE WRITTEN PERMISSION OF SUPEROTHERM (PTY) LTD IN TECHNOTHERM.
- ALL INFORMATION PROVIDED HEREIN IS CONFIDENTIAL AND NOT TO BE DISCLOSED TO ANY OTHER PARTY WITHOUT THE WRITTEN PERMISSION OF SUPEROTHERM (PTY) LTD IN TECHNOTHERM.

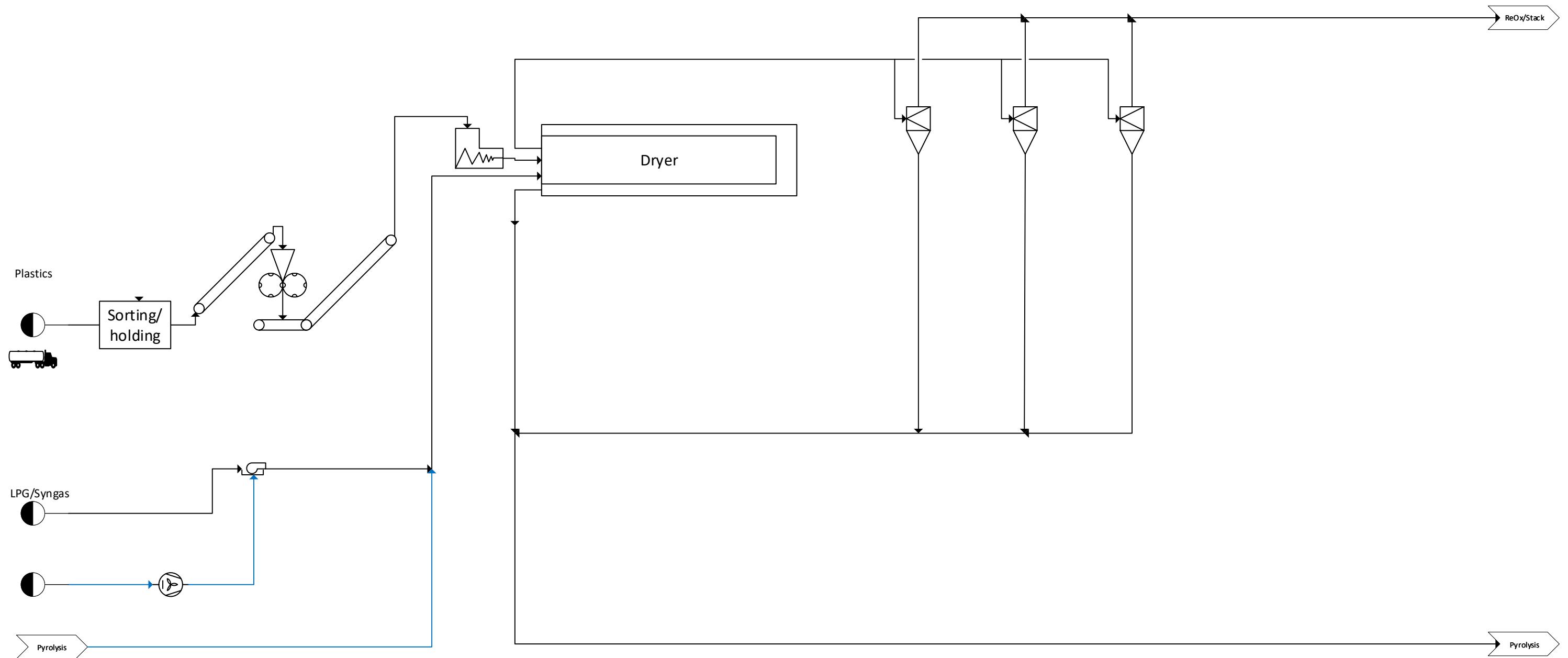
SUPEROTHERM (PTY) LTD IN TECHNOTHERM SOUTH AFRICA
 1141 - MEDICAL WASTE TO ENERGY
 NEW BRIDGE INDUSTRIAL PARK
 24 HENRIE STREET
 UNIT 7 & 8
 NEW BRIDGE
 ALBERTON, 1440


email: info@technotherm.co.za
www.technotherm.co.za



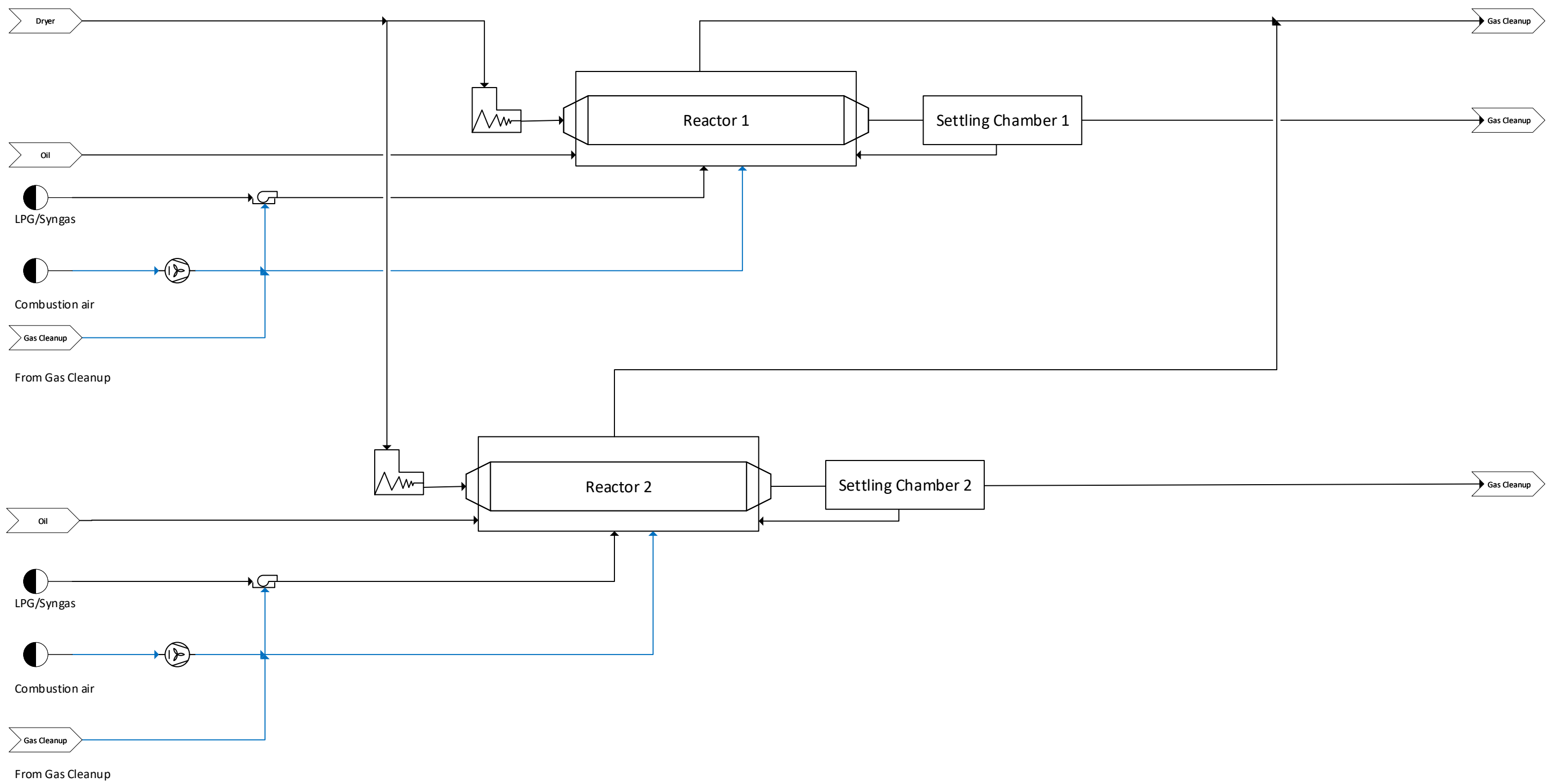
Designed by	N. Kennedy	Technotherm
Date	March 2019	
Drawn by	N. Kennedy	1131-Recycle, RI-BFD
Date	March 2019	
Checked by	J. Irwin	1131-000-002 REV-A SHT 1 of 6
Date	March 2019	

DRYER

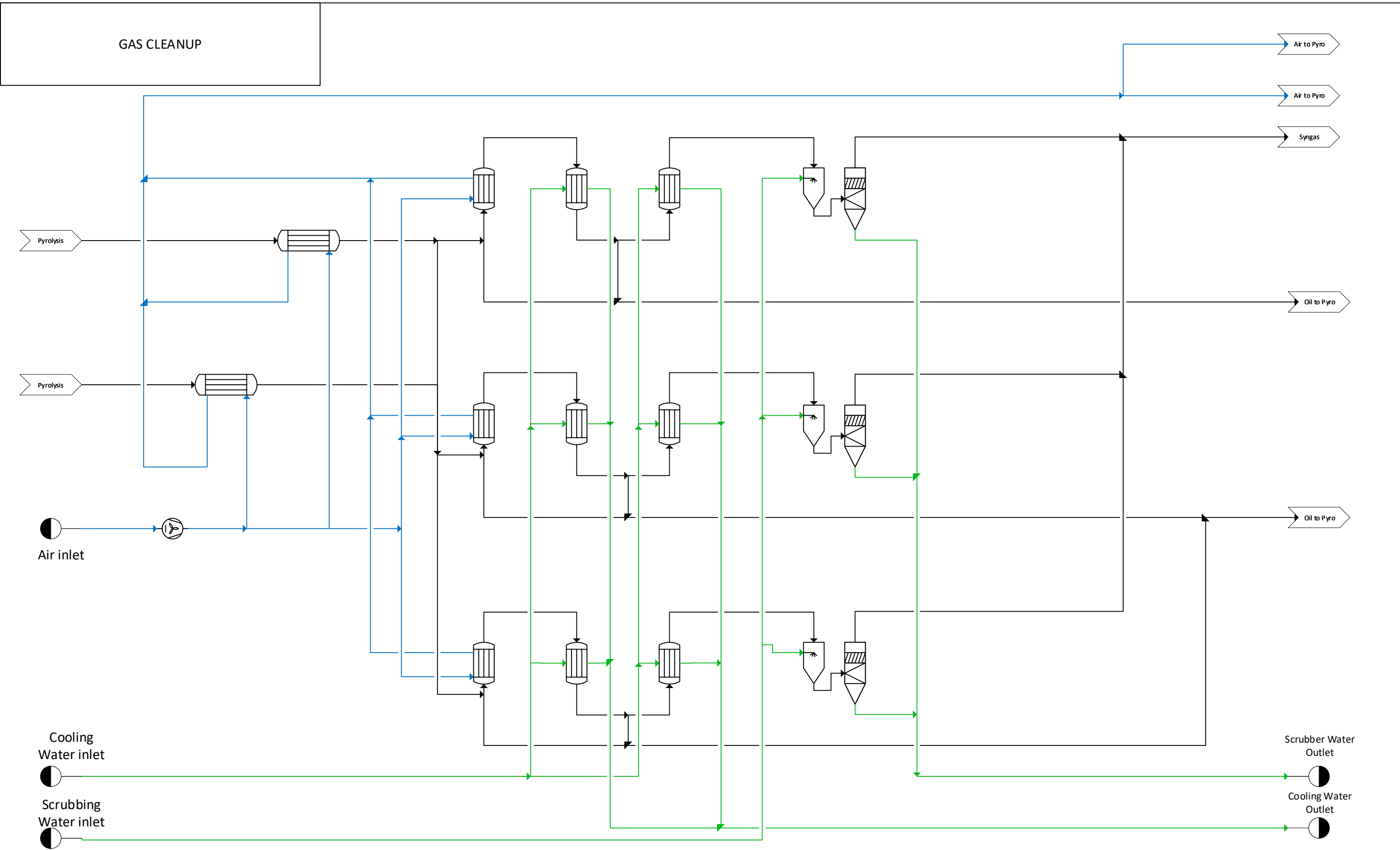


Designed by	N. Kennedy	
Date	March 2019	
Drawn by	N. Kennedy	
Date	March 2019	1131-Recycle, RI-BFD
Checked by	J. Irwin	
Date	March 2019	1131-000-002 REV-A SHT 2 of 6

PYROLYSIS

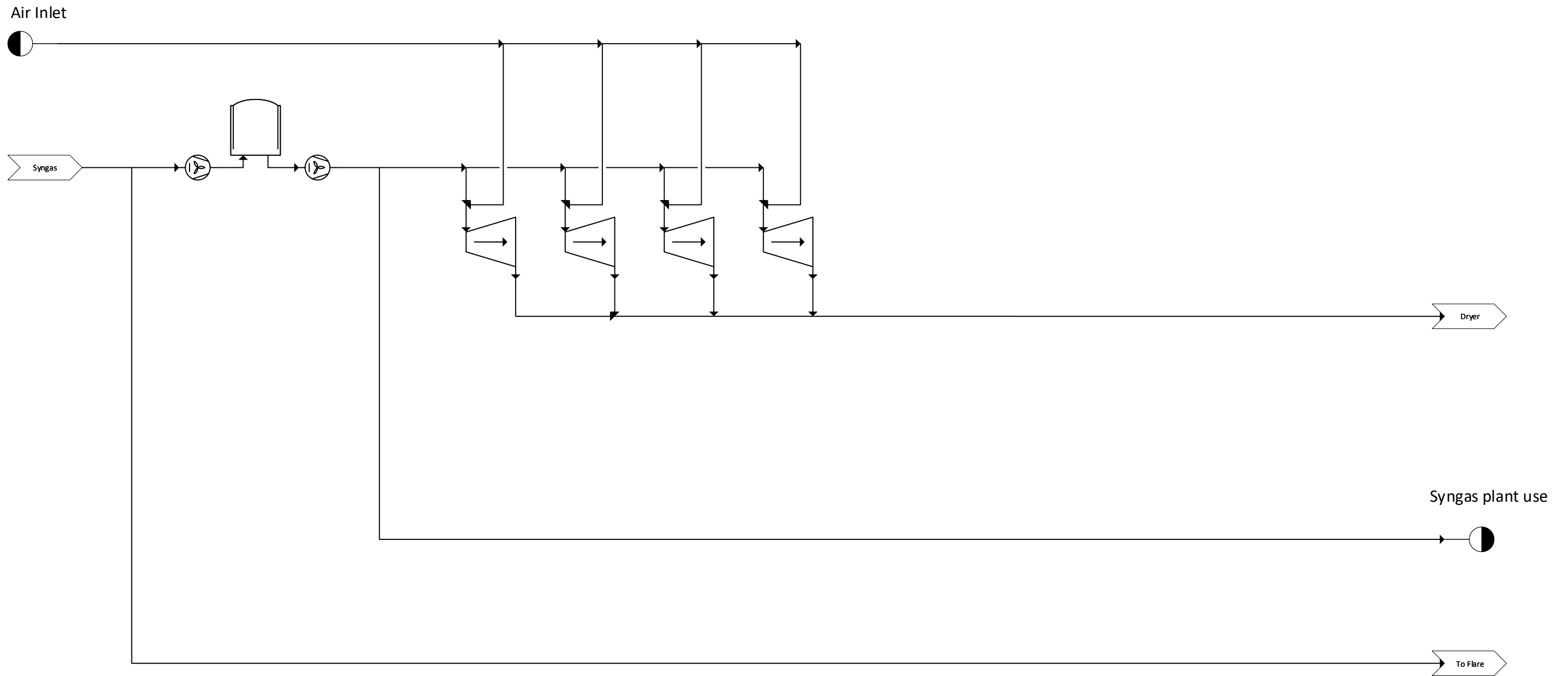


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Date	March 2019	
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Checked by	J. Irwin	1131-000-002 REV-A SHT 3 of 6
Date	March 2019	

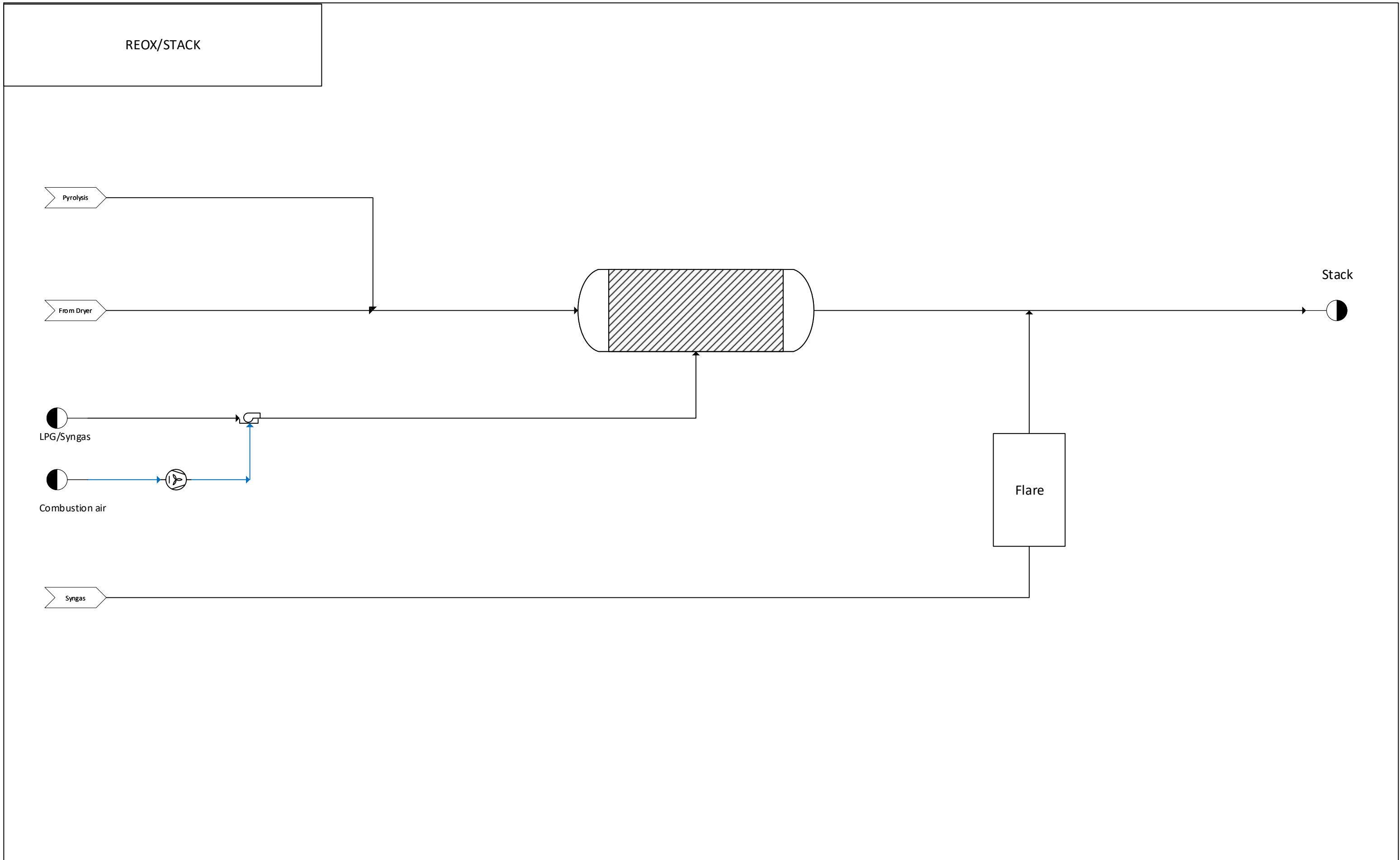


Designed by	N. Kennedy	TechnoTherm
Date	March 2019	
Drawn by	N. Kennedy	1131-Recycle, RI-BFD
Date	March 2019	
Checked by	J. Irwin	1131-000-002 REV-A SHT 4 of 6
Date	March 2019	

ENGINES



Designed by	N. Kennedy	Technotherm
Date	March 2019	
Drawn by	N. Kennedy	
Date	March 2019	
Checked by	J. Irwin	
Date	March 2019	
		1131-Recycle, RI-BFD
		1131-000-002 REV-A SHT 5 of 6



Designed by	N. Kennedy	Technotherm
Date	March 2019	
Drawn by	N. Kennedy	1131-Recycle, RI-BFD
Date	March 2019	
Checked by	J. Irwin	1131-000-002 REV-A SHT 6 of 6
Date	March 2019	

ATTACHMENT G

Process Description

REQUESTED REVISIONS

The following revisions from the original permit submittal are the following:

- All feedstock is now plastics, no medical waste will be processed through this system.
- Calorific value of the feed stock
- Plastics will be staged at a separate facility and brought on site as needed.
- Hydrochloric Acid (HCL) truck loading and associated scrubber system details added.

1. PRE-PROCESSING HANDLING

Feedstock will be sourced from recyclers, manufacturing, and plastic producers. Referring to Figure 1, Plastics will be received at an offsite location located in the state of Ohio. The plastics will be sorted by hand and sent to a shredder. the shredder is a diesel-powered generator which will be covered under an Ohio EPA General Air Permit 9.14. The plastics will be shredded to 1"to 4" these pieces will then be baled or placed into super sacks and loaded onto trucks for delivery to the facility as needed. The trucks into the site will be controlled by Empire Green Generation and the anticipated truck traffic is to be 4-6 trucks a day entering into the site via Route 2 from the north.

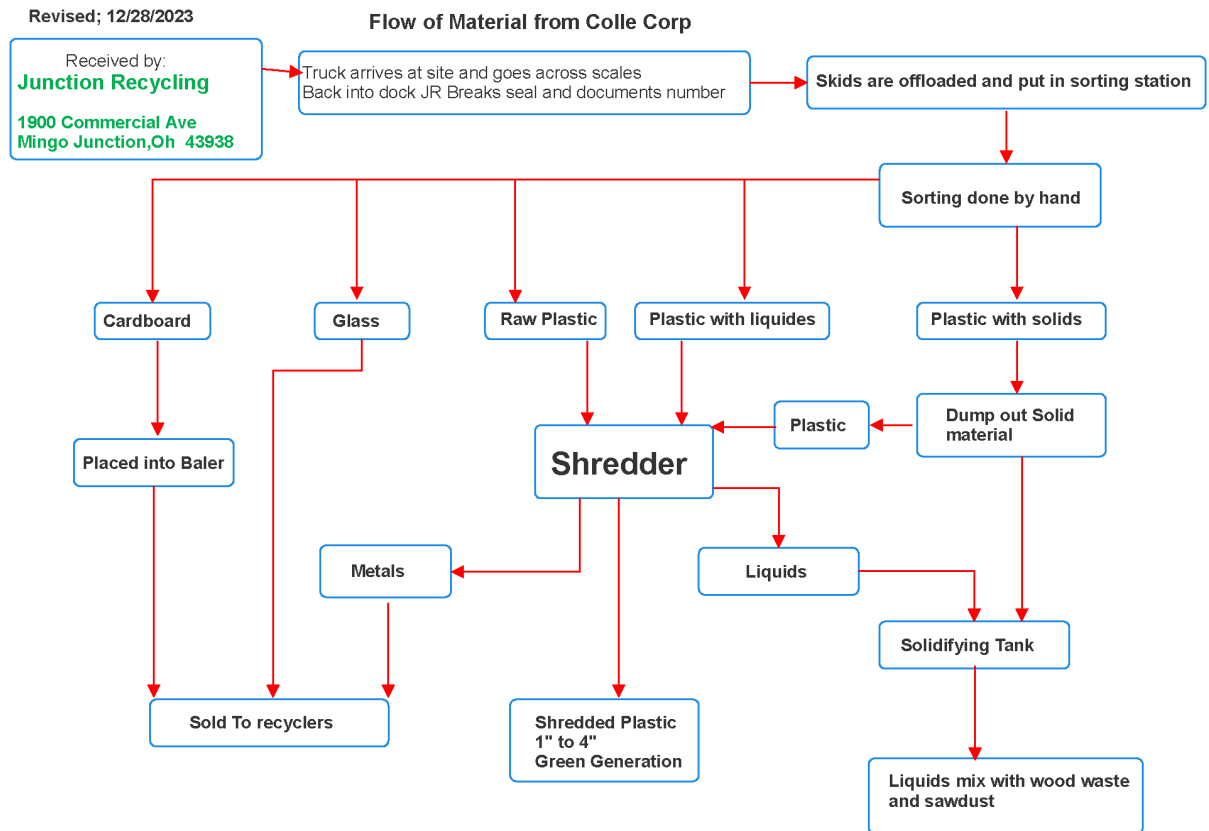


Figure 1. Flow Diagram for Pre-Processing Handling

2. GENERAL PROCESS DESCRIPTION

Overall process takes plastics, received by a transporting company, and thermally processes it in a pyrolysis system operating at 800°C - 900°C (1,472°F - 2,162°F). Waste composition will consist of plastics with resin numbers one through seven. Organic matter and hydrocarbons from the plastics are thermally decomposed without oxygen forming a syngas that can directly be used as a fuel source for electrical generating engines. Oil and tar are produced where the oil is recycled through the pyrolysis system to make more syngas and the tar is used to heat a vitrification system in which solids from the process are vitrified and made inert. The electrical generator's exhausts from the engines are sent to a drying unit where the plastic is dried prior to be introduced into the pyrolysis system. All exhaust gasses are sent to a Thermal Oxidizer where they are conditioned for release to atmosphere via a stack at a temperature of 850°C (1,562°F).

3. DETAILED PROCESS DESCRIPTION

Referring to Figure 2 below, a detailed description of the process follows where Plastics (#100) is received, sent to Staging (#120) and then to the Macerator (#200). Macerator (#200) operating at negative pressure of -0.024 kilopascals (kPa) reduces the Plastics to less than or equal to 20 mm (0.78-inch). Plastics (#100) moves from the Macerator (#200) to the Dryer (#220) and is dried from the exhaust of the four (4) Engines (#600). Once the Plastics (#100) is dried, it moves to the Feed Silo (#240) through load lock valves. When the Pyrolysis (#300) system is ready to accept feed, load locking valves are actuated such that the feed is put into the Pre-Pyrolysis (#300) system. Coordinated valve actuation is used to keep oxygen level from air below 2.0% in the Pre-Pyrolysis (#300) and Pyrolysis (#350) system. Chlorides are driven off in the Pre-Pyrolysis (#300) and processed into hydrochloric acid to be sold. As plastics (#100) is being processed in the Pyrolysis (#350) system, organic matter and hydrocarbons are thermally decomposed forming syngas and moves to the Gas Cleanup (#400). The Gas Cleanup (#400) removes particulate matter and performs the bulk of neutralizing acid forming gases. Next, the gas passes to the Scrubber (#420) where any acid gasses are further removed from the syngas. The syngas then proceeds to the Gasometer (#500) which helps regulate the pressure in the Engine (#600). Syngas is combusted in the Engine (#600) and the exhaust is sent to Dryer (#220). Exhaust from the dryer is diverted through the Cyclone (#620) and then to the Feed Silo (#240). The Vitrifier (#800) exhaust flows to the Pyrolysis (#300) system, then makes a single pass through the outer chamber of the Pyrolyser (#300) system where additional heat is provided. Next the gases flow through the Dryer (#220). Gases from the Dryer (#220) outlet is sent to the Thermal Oxidizer (TO) (#900) through Cyclone (#620). Tar (#720) is mixed with Air (#820) and heats the Vitrifier (#800) sufficiently to make an inert solid product (#840) which is ready for disposal. Oil (#700) is continuously recycled through the Pyrolysis (#300) system. Off-gas from the Thermal Oxidizer (#900) are sent through the Stack (#1000), which includes and emergency flare, prior to being released into the atmosphere.

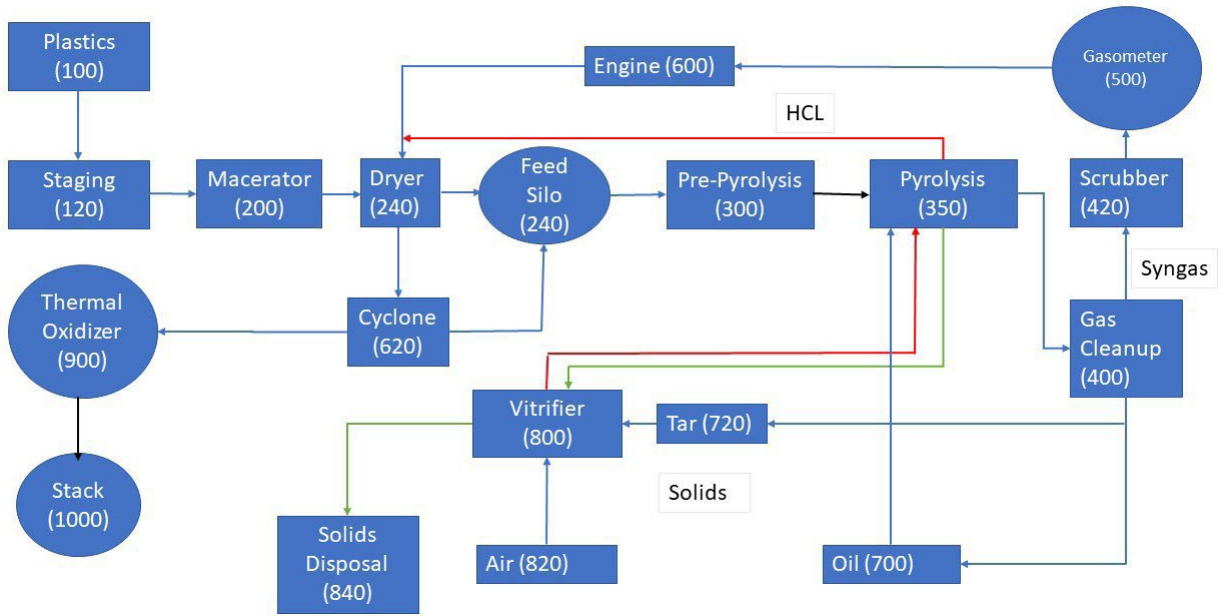


Figure 2. Block flow diagram for detailed process description.

SUB-SYSTEM OPERATION PRIME EQUIPMENT DETAIL

Prime Equipment & Systems

The following descriptions supplements the Process Flow Diagrams (PFDs) shown in Figure 1.

1. Delivery of Plastics

The material will be offloaded from five (5) tractor-trailers per day and tipped onto the receiving conveyor with the use of bin tipping stations as shown in Figure 2.



Figure 3: Illustration of typical bin tipping station

The waste operator will record the weight of each load prior to tipping. Additionally, a weighbridge operator records the weight of the trucks as they enter and exit the plant.

The material will automatically feed the Macerator required and dictated by the plant control philosophy.

An air extraction system is built into the Macerator with an extraction fan pulling from the topside of the Macerator at a rate of 1.2 m³/sec. Macerator will be under negative pressure of -0.024 kPa at all times during operations.

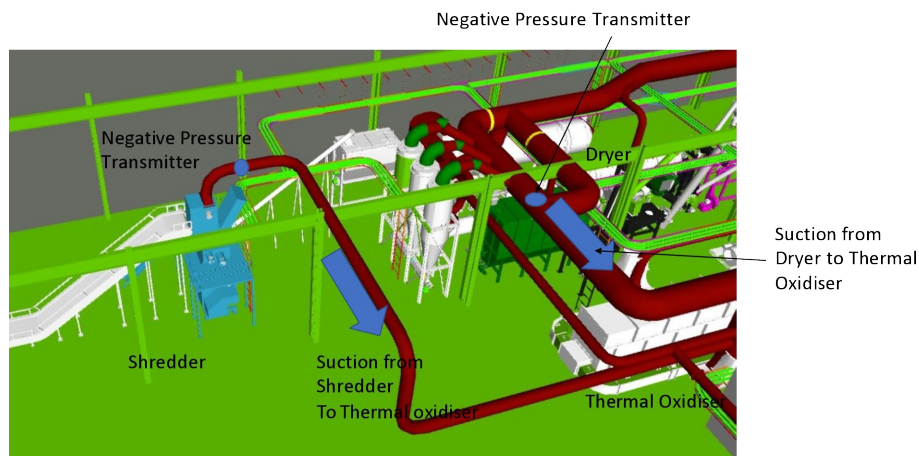


Figure 4. Negative Pressure from Macerator to Thermal Oxidizer.
Note all areas prior to thermal degradation are sealed and under negative pressure

Further detail, qualifying waste in prepared sealed containers are delivered to the plant and placed on an input conveyor. After placing on the conveyor operator has no further involvement with the waste.

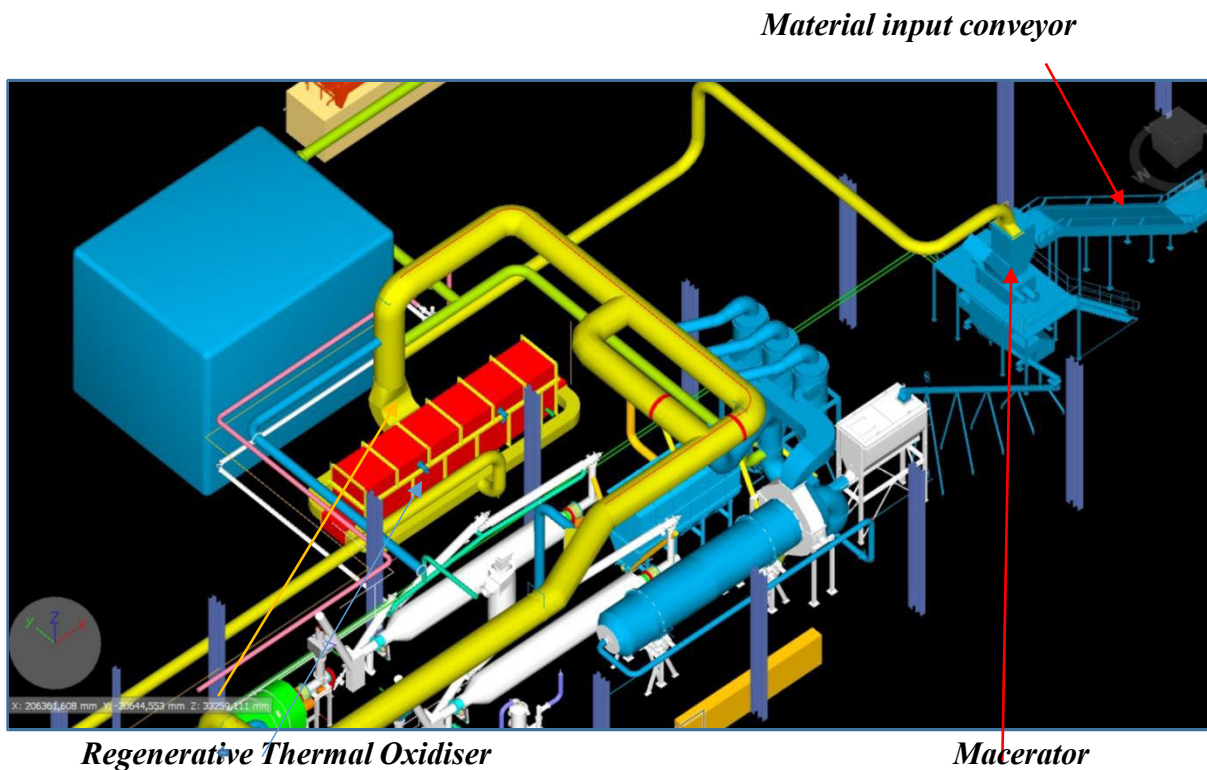


Figure 5.

2. Materials input conveyor to Macerator under negative pressure to Thermal Oxidizer.

The shredder / macerator has a single opening that is sealed, allowing the waste to enter as presented through a single entry point under suction that is closed when waste is not presented for an extended period or during shut down mode,

The entire facility is closed to the operating environment and operates under a negative pressure (-0.024 kPa), ensuring no escape of odors or pathogens.

Transfer from the Macerator to the dryer and from the dryer to the thermal pre-pyroliser is also sealed to the environment operating under a negative pressure.

Progression to the high temperature pyrolysis unit (Fig. 3) is again sealed.

The main item that is creating a negative pressure is an Induced Draft Fan. This fan is connected to the regenerative thermal oxidizer, from the thermal oxidizer to the Macerator, dryer and all material interfaces.

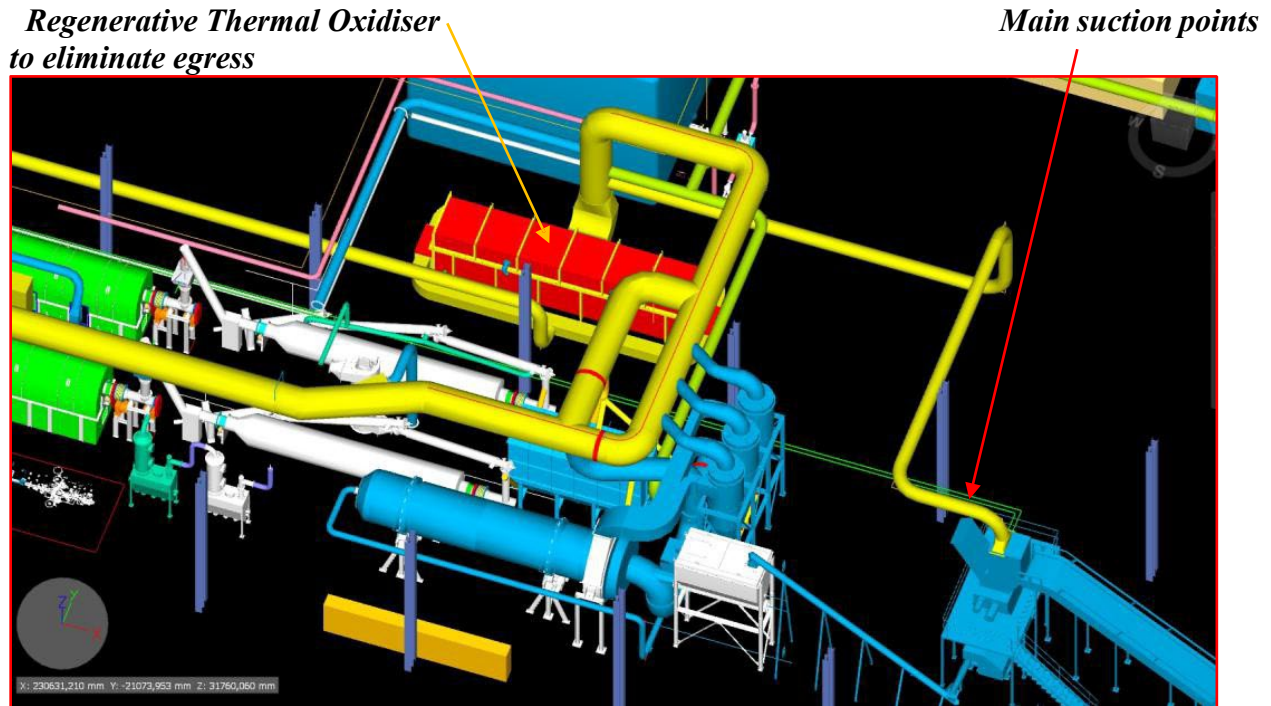


Figure 6. The Regenerative thermal oxidizer is maintained at 850°C.

2.1 Interlocks: The plant cannot be energized unless the ID fan is on and the Thermal oxidizer at temperature. There is no possibility of odors.

If the Thermal Oxidizer goes below a predetermined temperature, the plant goes into shut down mode. In the event of a power failure the main control functions are connected via UPS. At this time a normally closed solenoid valve will have closed the only orifice on the plant which is where the waste is admitted.

In the unlikely event of an ID fan failure (never had one in 25 years) the plant will again default to shut down mode.

2.2 Macerator Negative Pressure:

Macerator material (feed stock) is conveyed to the thermal dryer feed hopper. Figure 6 shows a typical Macerator system.



Figure 7. Picture of a typical Macerator/Shredder system.

3. Thermal Dryer

The drying of the feed stock is carried out in a direct heated, parallel flow, rotary twin drum type dryer using a combination of engine exhaust and, if necessary during start-up or unusual operating conditions, syngas and, as a last resort, propane.

Feed stock is transported from the dryer feed hopper into the dryer by means of a screw conveyor. Upon entering the dryer inner retort, the moist feed stock comes into direct contact with the parallel stream of hot

flue gases.

Lifters and progression plates ensure intimate contact between the feed stock and flue gas therefore facilitating efficient drying, sterilization and movement of feed stock along the retort. Once both feed stock and flue gases reach the closed end of the dryer they are discharged from the inner concentric retort into the outer retort and return to the entry end of the dryer, discharging 10% moisture level feed stock into an expansion chamber. Coarse dry feed stock falls to the bottom of the chamber forming a heap on the belt conveyor located beneath.

The flue gas exhaust, contaminated with light particulate feed stock material, is also discharged from the expansion chamber and ducted to a bank of cyclones where separation occurs. Fine particulate falls to the bottom of each cyclone and is discharged via rotary valves into a common screw conveyor. The screw conveyor discharges the fine product onto the belt conveyor joining the dryer exit material and fine product. This conveyor transfers the combined dry feed stock streams onto a conveyor feeding an intermediate storage hopper that feeds both Pyrolyzers.

The cooled flue gas stream from the cyclones is directed to the Thermal Oxidizer. 7 and 8 shows photos of a typical dryer in operation.



Figure 8. Photo of a typical dryer in operation from first floor level.



Figure 9. Photo of a typical dryer in operation from ground floor level.

4. Pyrolyser & Vitrification Furnace

Overview

The Pyrolyser train is fed dried feed stock from a thermal dryer as described in the previous section. The Pyrolysis train consists of two identical Pyrolyzers. Per unit, the source of indirect heat is primarily hot exhaust flue gas from a vitrification furnace located beneath the pyrolysis retort. These hot flue gasses exit the Pyrolysis Retorts and then progress to the medium grade heat applications (Thermal Dryer and during start up Syngas Cooler and Tar Condenser). Supplemental heating of the pyrolysis retort is being provided by firing a portion of the cleaned syngas. Natural gas / LPG is available for initial start-up or any start-up where insufficient syngas is available. After passing through the dryers the gas is progressed to the Thermal Oxidizer.

Detailed Description

Feed stock is transferred from the dryer to a live bottom screw hopper, which feed an inlet hopper complete with horizontal material feed screw. Material is fed from a gas-tight, storage hopper into the horizontal, conically shaped, rotary drum Pyrolyzer Retort by a rotary screw.

As the material passes through the pyrolysis retort, it undergoes thermal degradation releasing volatile organic syngas compounds that are discharged from the retort. The crude syngas off-takes are collected into a common manifold that transfers the syngas to the syngas cleaning system.

The heavier particles, mainly comprising of ash and fixed carbon, collect in a specially designed high temperature de-acceleration chamber where the particles are collected and returned to the vitrification furnace.

The Pyrolyzers must be designed and arranged such that no propensity for harmonic vibrations shall exist under any load condition and shall be complete with all ancillary equipment for safe, reliable and efficient operation, and be of proven design capable of the required continuous, intermittent and transient operation and be suitable for its intended location. The design and materials of construction shall take fully into account the location.

Ash and carbonaceous residue produced by the Pyrolyzers drops off the dust from the aforementioned de-acceleration chamber screw conveyors, together with the main residue collected from the base of the Pyrolyzer into a Vitrifier, a refractory lined furnace fired by recovered tars (described below in the syngas cleaning equipment). The heat liberated by burning the tars and oils is sufficient to heat the ash from the Pyrolysis units above their eutectic temperature with excess, preheated air to burn off the tars. The char is completely combusted into CO₂ and H₂O.

Figure 10, 11 and 2 show photos of Pyrolyzers in operation.

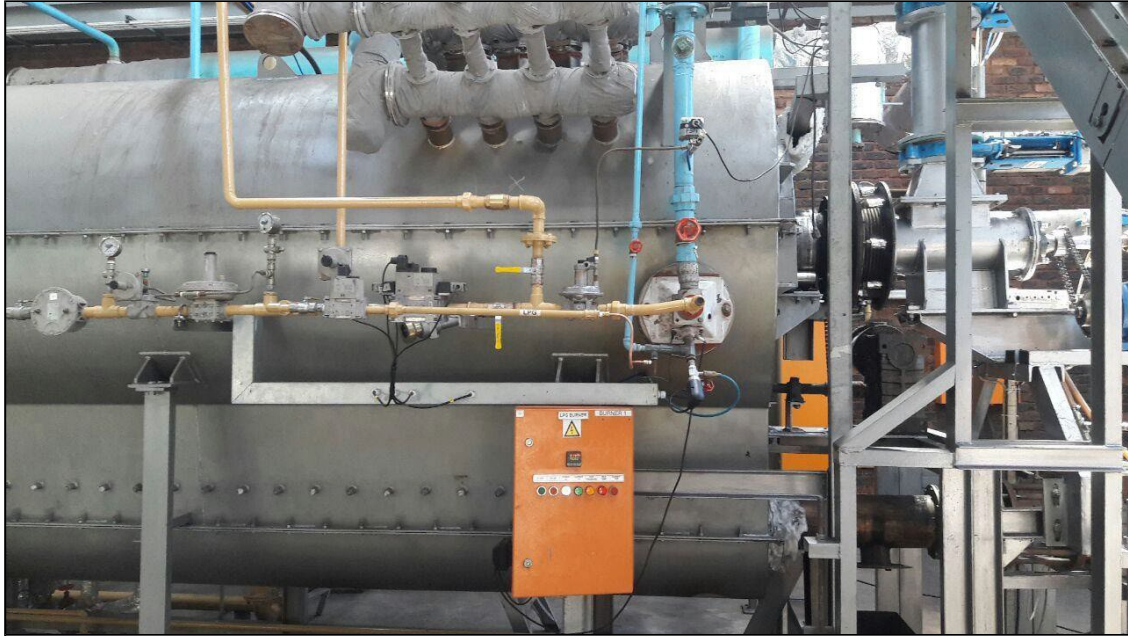


Figure 10. Photo A of typical high temperature pyrolysis unit.



Figure 11. Photo B of typical high temperature pyrolysis unit.



Figure 12. Photo of typical low temperature pyrolysis unit.

5. Syngas Cleanup

Particulate Matter (PM) Cleanup

Raw syngas is removed from the Pyrolysis Retorts, as described above, and passes through a de-acceleration chamber and then hot cyclones. The cyclones are arranged for parallel flow to ensure maximum PM removal efficiency during start-up and shutdown as the flow varies. PM drops to specially designed hot screw conveyors and from there is directed to the vitrification furnaces described above.

Syngas Coolers

The partially cleaned, still hot, flue gas flows next through stainless steel tubular syngas coolers. The cooler is in essence a Heat Exchanger which indirectly transfers heat from syngas to the combustion air heaters.

Tar Condensers

The syngas from the coolers described above flows to a stainless-steel shell & tube Heat Exchanger/cooler that is cooled by an air blower system. Tars are condensed out and drop into heated troughs, the heat source of which is engine exhaust. Hot condensed tar is pumped to the vitrification furnaces described above. The common installed spare set of coolers uses engine exhaust fluegas to heat the heat exchangers and thereby cause the tars to drop into the heated trough below.

Oil Condensers

The syngas from the tar condensers described above flows to a shell & tube Heat Exchangers/cooler that are cooled by water cooling system. Condensed oils, which also contain condensed water, are collected and is pumped to the vitrification furnace described previously. The common installed spare set of coolers uses engine exhaust flue gas to heat the heat exchangers and thereby cause the oils to drop into the heated trough below.

Venturi Scrubbers

From the oil condensers the syngas flows through a high pressure drop Venturi Scrubber to remove any remaining PM.

Figure 13 and 14 show photos of a typical gas cleanup system in operation.



Figure 13. Photo A of a typical gas cleanup system in operation



Figure 14. Photo B of a typical gas clean up system in operation

Gas Bladder (Syngas Storage Tank)

The syngas storage tank provides surge capacity of cleaned syngas to level out flow and composition variations. It shall be a bladder contained within a demarcated area. The bladder will operate with an internal pressure of 30 to 40 millibar gauge.

Figure 15 shows a typical gas bladder in operation.



Figure 15. Picture of typical gas bladder

Stack

The hot gasses progress through the stack in to the atmosphere after passing through the Thermal Oxidizer (discussed in next section).

6. Thermal Oxidizer

After passing through a scrubber the flue gasses enter a Thermal Oxidizer comprising of a rectangular box shaped furnace. The internal dimensions are determined by the total volume that needs to be raised to 850 °C and maintained for 2 seconds.

Figure 16 shows a typical Thermal Oxidizer in operation. Please refer to the technical specification file for more details if required.



Figure 16 Photo of a typical Thermal Oxidizer in operation

7. Syngas Engines

Each syngas engine shall be a fully packaged unit complete with all associated components and auxiliaries. These engines are of robust design and have been proven on low and medium calorific value gas fuels.

The engine package will be complete to allow the engine to start, synchronize, operate continuously at base or part load and shut down.

The syngas engines shall be assembled in containers as indicated on the plant layout. The containerized engines shall conform to a sound pressure level of 80 dBA (2005 Noise Regulations 1st Action Level) as measured one meter from the enclosure at two meter above floor level.

Notwithstanding the syngas clean up equipment and systems described in the Syngas Clean up Section above, the syngas engine exhaust systems shall be designed and installed such that they meet emissions standards as of the Commencement Date.

The Engine cooling will be by means of external radiators, they shall be designed and constructed with sufficient margin and spare surface area for the maximum heat rejection duty under all operational conditions.

The radiators shall incorporate features to minimize corrosion and erosion on the air and watersides and suitable provisions for cleaning and core replacement.

The radiators and all of their component parts shall be of proven design and arranged so as to minimize maintenance work.

Figure 17 and Figure 18 illustrates the containerized engines in production.

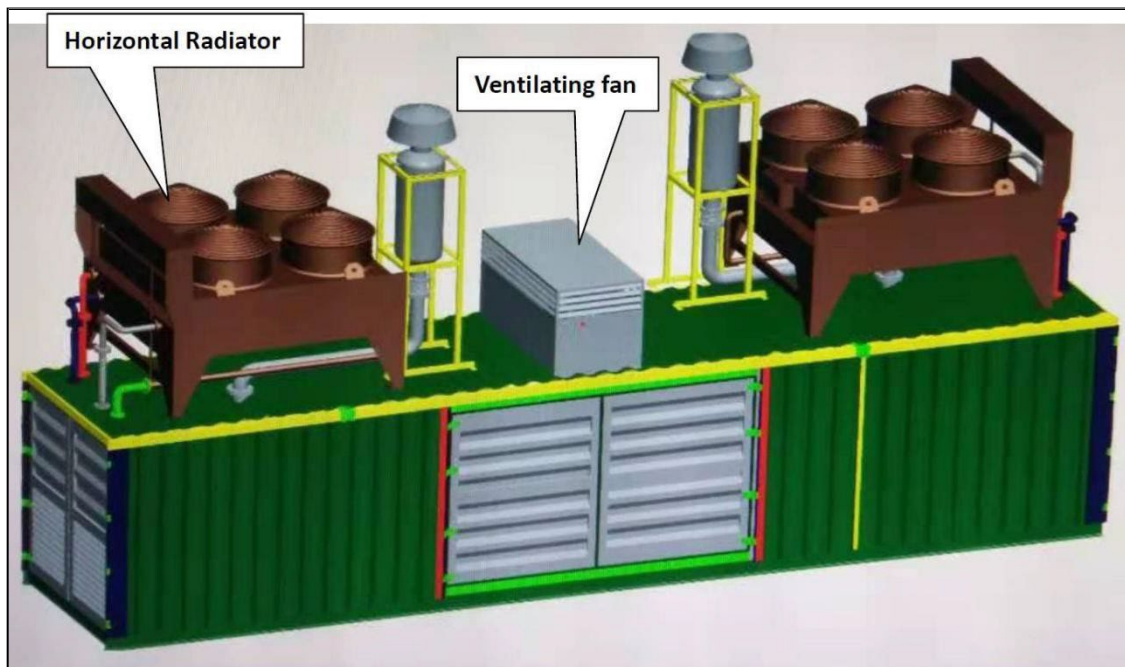


Figure 17. Illustration A of containerized engines in production

ATTACHMENT H

Material Data Safety Sheets (MSDSs)

Safety Data Sheets (SDSs)

Section 1: Identification

Product identifier

Product Name • Synthetic Natural Gas

Relevant identified uses of the substance or mixture and uses advised against

Recommended use • Fuel for combustion applications, raw material for chemical reactions

Details of the supplier of the safety data sheet

Manufacturer • Dakota Gasification
420 County Road 26
Beulah, ND 58523-9400
United States
www.dakotagas.com

Telephone (General) • 701-873-2100

Emergency Contact Information

Email • DGCEmergency@bepec.com

Manufacturer • (701) 873-6600

CHEMTREK • 800-424-9300

Section 2: Hazard Identification

United States (US)

According to OSHA 29 CFR 1910.1200 HCS

Classification of the substance or mixture

OSHA HCS 2012 • Flammable Gases 1 - H220
Compressed Gas - H280
Simple Asphyxiant

Label elements

OSHA HCS 2012

DANGER



Hazard statements • Extremely flammable gas - H220
Contains gas under pressure; may explode if heated - H280
May displace oxygen and cause rapid suffocation.

Precautionary statements

Prevention • Keep away from heat, sparks, open flames and/or hot surfaces. - P210

Response • Leaking gas fire: Do not extinguish, unless leak can be stopped safely. - P377
Eliminate all ignition sources if safe to do so. - P381

Storage/Disposal • Protect from sunlight. Store in a well-ventilated place. - P410+P403

Other hazards

OSHA HCS 2012 • Under United States Regulations (29 CFR 1910.1200 - Hazard Communication Standard), this product is considered hazardous.

Canada

According to WHMIS

Classification of the substance or mixture

WHMIS • Compressed Gas - A
Flammable Gases - B1

Label elements

WHMIS



• Compressed Gas - A
Flammable Gases - B1

Other hazards

WHMIS • This material is a simple asphyxiant. May displace or reduce oxygen available for breathing especially in confined spaces.

In Canada, the product mentioned above is considered hazardous under the Workplace Hazardous Materials Information System (WHMIS).

Section 3 - Composition/Information on Ingredients

Substances

• Material does not meet the criteria of a substance.

Mixtures

Composition					
Chemical Name	Identifiers	%	LD50/LC50	Classifications According to Regulation/Directive	Comments
Methane	CAS:74-82-8	95%	NDA	OSHA HCS 2012: Flam. Gas 1; Press. Gas - Comp.; Simp. Asphyx.	NDA

Hydrogen	CAS:1333-74-0	3.1%	NDA	OSHA HCS 2012: Flam. Gas 1; Press. Gas - Comp.; Simp. Asphyx.	NDA
Carbon dioxide	CAS:124-38-9	1.1%	Inhalation-Rat LC50 • 470000 ppm 30 Minute(s)	OSHA HCS 2012: Press. Gas - Comp.; Simp. Asphyx.	NDA

Section 4: First-Aid Measures

Description of first aid measures

- Inhalation** • IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Administer oxygen if breathing is difficult. Give artificial respiration if victim is not breathing. If signs/symptoms continue, get medical attention.
- Skin** • IF ON SKIN: Wash with plenty of soap and water. If skin irritation occurs: Get medical advice/attention. Wash contaminated clothing before reuse.
- Eye** • IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention.
- Ingestion** • Ingestion is not anticipated to be a likely route of exposure to this product.

Most important symptoms and effects, both acute and delayed

- Refer to Section 11 - Toxicological Information.

Indication of any immediate medical attention and special treatment needed

- Notes to Physician** • All treatments should be based on observed signs and symptoms of distress in the patient. Consideration should be given to the possibility that overexposure to materials other than this product may have occurred.

Other information

- Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves. RESCUERS SHOULD NOT ATTEMPT TO RETRIEVE VICTIMS OF EXPOSURE TO GASES WITHOUT ADEQUATE PERSONAL PROTECTIVE EQUIPMENT. At a minimum, Self-Contained Breathing Apparatus must be worn. Victim(s) who experience any adverse effect after over-exposure to this gas mixture must be taken for medical attention. Rescuers should be taken for medical attention if necessary. Take a copy of the label and the MSDS to physician or other health professional with victim(s).

Section 5: Fire-Fighting Measures

Extinguishing media

- Suitable Extinguishing Media** • SMALL FIRES: Dry chemical or CO2.
LARGE FIRES: Water spray or fog.

- Unsuitable Extinguishing Media** • No data available

Special hazards arising from the substance or mixture

- Unusual Fire and Explosion Hazards** • EXTREMELY FLAMMABLE
Will form explosive mixtures with air.
Vapors may travel to source of ignition and flash back.
Cylinders exposed to fire may vent and release flammable gas through pressure relief devices.
Containers may explode when heated.
Ruptured cylinders may rocket.

Burns with a pale, faintly luminous flame; air containing more than 14% methane burns without noise.

Hazardous Combustion Products • No data available

Advice for firefighters

- Structural firefighters' protective clothing provides limited protection in fire situations ONLY; it is not effective in spill situations where direct contact with the substance is possible.
Wear positive pressure self-contained breathing apparatus (SCBA).
DO NOT EXTINGUISH A LEAKING GAS FIRE UNLESS LEAK CAN BE STOPPED
Move containers from fire area if you can do it without risk.
FIRE: If tank, rail car or tank truck is involved in a fire, ISOLATE for 1600 meters (1 mile) in all directions; also, consider initial evacuation for 1600 meters (1 mile) in all directions.
FIRE INVOLVING TANKS: ALWAYS stay away from tanks engulfed in fire.
FIRE INVOLVING TANKS: Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
FIRE INVOLVING TANKS: Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
FIRE INVOLVING TANKS: Cool containers with flooding quantities of water until well after fire is out.
FIRE INVOLVING TANKS: Do not direct water at source of leak or safety devices; icing may occur.
FIRE INVOLVING TANKS: For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.

Section 6 - Accidental Release Measures

Personal precautions, protective equipment and emergency procedures

- Personal Precautions** • Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Do not walk through spilled material. Ventilate the area before entry.
- Emergency Procedures** • ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). As an immediate precautionary measure, isolate spill or leak area for at least 100 meters (330 feet) in all directions. Stop leak if you can do it without risk. Keep unauthorized personnel away. Keep out of low areas. Stay upwind. **LARGE SPILL:** Consider initial downwind evacuation for at least 800 meters (1/2 mile) If uncontrolled leakage is encountered which cannot be stopped by shutting off the closest appropriate valve or main supply valve (without risk), implement a plan for evacuation and quickly contact the local fire department.

Environmental precautions

- Prevent spreading of vapors through sewers, ventilation systems and confined areas.

Methods and material for containment and cleaning up

- Containment/Clean-up Measures** • All equipment used when handling the product must be grounded.
Stop leak if you can do it without risk.
If possible, turn leaking containers so that gas escapes rather than liquid.
Use water spray to reduce vapors; do not put water directly on leak, spill area or inside container.
Do not direct water at spill or source of leak.
Isolate area until gas has dispersed.

Section 7 - Handling and Storage

Precautions for safe handling

Handling • Keep away from heat and ignition sources – No Smoking. Take precautionary measures against static charges. All equipment used when handling the product must be grounded. Use only non-sparking tools. Use only with adequate ventilation. Ventilate closed spaces before entering. Be aware of any signs of dizziness or fatigue, especially if work is done in a poorly ventilated area; exposures to fatal concentrations of this gas mixture could occur without any significant warning symptoms, due to olfactory fatigue or oxygen deficiency. Cylinders should be firmly secured to prevent falling or being knocked-over. Use explosion-proof - electrical, ventilating and/or lighting equipment. Do not attempt to repair, adjust, or in any other way modify cylinders. If there is a malfunction or another type of operational problem, contact nearest distributor immediately. Empty containers retain product residue and can be hazardous. Do not cut, weld, puncture or incinerate container.

Conditions for safe storage, including any incompatibilities

Storage • Cylinders should be stored in dry, well-ventilated areas away from sources of heat, ignition and direct sunlight. Do not allow area where cylinders are stored to exceed 52C (125F). Cylinders must be protected from the environment, and preferably kept at room temperature approximately 21C (70F). Protect cylinders against physical damage. Cylinders should be firmly secured to prevent falling or being knocked-over. Store locked up.

Section 8 - Exposure Controls/Personal Protection

Control parameters

Exposure Limits/Guidelines				
	Result	ACGIH	NIOSH	OSHA
Carbon dioxide (124-38-9)	TWAs	5000 ppm TWA	5000 ppm TWA; 9000 mg/m3 TWA	5000 ppm TWA; 9000 mg/m3 TWA
	STELs	30000 ppm STEL	30000 ppm STEL; 54000 mg/m3 STEL	Not established
Methane (74-82-8)	TWAs	1000 ppm TWA (listed under Aliphatic hydrocarbon gases: Alkane C1-4)	Not established	Not established

Exposure controls

Engineering Measures/Controls • Good general ventilation should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. Use explosion-proof - electrical, ventilating and/or lighting equipment.

Personal Protective Equipment

Respiratory • Follow the OSHA respirator regulations found in 29 CFR 1910.134 Use a NIOSH/MSHA approved respirator if exposure limits are exceeded or symptoms are experienced.

Eye/Face • Wear safety glasses.

Skin/Body • Wear leather gloves when handling cylinders.

Environmental Exposure Controls • Follow best practice for site management and disposal of waste. Controls should be engineered to prevent release to the environment, including procedures to prevent spills, atmospheric release and release to waterways.

Key to abbreviations

ACGIH = American Conference of Governmental Industrial Hygiene

NIOSH = National Institute of Occupational Safety and Health

OSHA = Occupational Safety and Health Administration

STEL = Short Term Exposure Limits are based on 15-minute exposures

TWA = Time-Weighted Averages are based on 8h/day, 40h/week exposures

Section 9 - Physical and Chemical Properties

Information on Physical and Chemical Properties

Material Description			
Physical Form	Gas	Appearance/Description	Colorless gas with a mild sweet odor.
Color	Colorless	Odor	Mild, sweet.
Odor Threshold	200 ppm		
General Properties			
Boiling Point	-258.52 F(-161.4 C)	Melting Point	-296.5 F(-182.5 C)
Decomposition Temperature	No data available	pH	Not relevant
Specific Gravity/Relative Density	0.422 Water=1 @ -160 C(-256 F) (liquid)	Bulk Density	No data available
Water Solubility	Slightly Soluble	Viscosity	No data available
Explosive Properties	No data available	Oxidizing Properties:	No data available
Volatility			
Vapor Pressure	Very high	Vapor Density	0.416 to 0.55 Air=1
Evaporation Rate	No data available	Volatiles (Vol.)	100 %
Flammability			
Flash Point	-306 F(-187.7778 C)	UEL	15 %
LEL	5 %	Autoignition	999 F(537.2222 C)
Flammability (solid, gas)	Flammable Gas.		
Environmental			
Octanol/Water Partition coefficient	No data available		

Section 10: Stability and Reactivity

Reactivity

- No dangerous reaction known under conditions of normal use.

Chemical stability

- Stable

Possibility of hazardous reactions

- Hazardous polymerization will not occur.

Conditions to avoid

- Incompatible materials. Avoid contact with heat and ignition sources. Excess heat.

Incompatible materials

- Reacts violently with powerful oxidizers (e.g. bromine pentafluoride, chlorine trifluoride, chlorine, fluorine, iodine heptafluoride, dioxygenyl tetrafluoroborate, dioxygen difluoride, trioxigen difluoride, liquid oxygen).

Hazardous decomposition products

- No data available

Section 11 - Toxicological Information

Information on toxicological effects

Components		
Methane (95%)	74-82-8	Acute Toxicity: Inhalation-Mouse LC50 • 326 g/m ³ 2 Hour(s)
Carbon dioxide (1.1%)	124-38-9	Acute Toxicity: Inhalation-Rat LC50 • 470000 ppm 30 Minute(s); Inhalation-Human TClO • 7 pph; <i>Behavioral: Irritability; Brain and Coverings: Other degenerative changes; Nutritional and Gross Metabolic: Changes in Chemistry or Temperature: Body temperature decrease;</i> Reproductive: Inhalation-Rat TClO • 6 pph 24 Hour(s)(10D preg); <i>Reproductive Effects: Specific Developmental Abnormalities: Musculoskeletal system; Reproductive Effects: Specific Developmental Abnormalities: Cardiovascular (circulatory) system; Reproductive Effects: Specific Developmental Abnormalities: Respiratory system</i>

GHS Properties	Classification
Acute toxicity	OSHA HCS 2012•Data lacking
Aspiration Hazard	OSHA HCS 2012•Data lacking
Carcinogenicity	OSHA HCS 2012•Data lacking
Germ Cell Mutagenicity	OSHA HCS 2012•Data lacking
Skin corrosion/Irritation	OSHA HCS 2012•Data lacking
Skin sensitization	OSHA HCS 2012•Data lacking
STOT-RE	OSHA HCS 2012•Data lacking
STOT-SE	OSHA HCS 2012•Data lacking
Toxicity for Reproduction	OSHA HCS 2012•Data lacking
Respiratory sensitization	OSHA HCS 2012•Data lacking
Serious eye damage/Irritation	OSHA HCS 2012•Data lacking

Potential Health Effects

Inhalation

Acute (Immediate)

- This material is a simple asphyxiant. May displace or reduce oxygen available for breathing especially in confined spaces. If this material is released in a small, poorly ventilated area (i.e. an enclosed or confined space), an oxygen-deficient environment may occur. Individuals breathing such an atmosphere may experience symptoms which include headaches, ringing in ears, dizziness, drowsiness, unconsciousness, nausea, vomiting, and depression of all the senses. Under some circumstances of over-exposure, death may occur. The following effects associated with decreased levels of oxygen: increase in breathing and pulse rate, emotional upset, abnormal fatigue, nausea, vomiting, collapse, loss of consciousness, convulsive movements, respiratory collapse and death.

Chronic (Delayed)

- No data available

Skin

Acute (Immediate)

- Under normal conditions of use, no health effects are expected.

Chronic (Delayed)

- No data available

Eye

Acute (Immediate)

- Under normal conditions of use, no health effects are expected.

Chronic (Delayed)

- No data available

Ingestion

Acute (Immediate) • Under normal conditions of use, no health effects are expected.

Chronic (Delayed) • No data available

Key to abbreviations

LC = Lethal Concentration

TC = Toxic Concentration

Section 12 - Ecological Information

Toxicity

- Material data lacking.

Persistence and degradability

- Material data lacking.

Bioaccumulative potential

- Material data lacking.

Mobility in Soil

- Material data lacking.

Results of PBT and vPvB assessment

- PBT and vPvB assessment has not been conducted for this material.

Other adverse effects

- No studies have been found.

Section 13 - Disposal Considerations

Waste treatment methods

Product waste • Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

Packaging waste • Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

Section 14 - Transport Information

	UN number	UN proper shipping name	Transport hazard class(es)	Packing group	Environmental hazards
DOT	UN1954	Compressed gas, flammable, n.o.s. (Methane and Hydrogen)	2.1	NDA	NDA
TDG	UN1954	COMPRESSED GAS, FLAMMABLE, N.O.S.(Methane and Hydrogen)	2.1	NDA	Potential Marine Pollutant
IATA/ICAO	UN1954	Compressed gas, flammable, n.o.s. (Methane and Hydrogen)	2.1	NDA	NDA

Special precautions for user • Cylinders should be transported in a secure position, in a well-ventilated vehicle. The transportation of compressed gas cylinders in automobiles or in closed-body vehicles

can present serious safety hazards. If transporting these cylinders in vehicles, ensure these cylinders are not exposed to extremely high temperatures (as may occur in an enclosed vehicle on a hot day). Additionally, the vehicle should be well-ventilated during transportation.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

- No data available

Section 15 - Regulatory Information

Safety, health and environmental regulations/legislation specific for the substance or mixture

SARA Hazard Classifications

- Acute, Fire, Pressure(Sudden Release of)

Inventory						
Component	CAS	Canada DSL	Canada NDSL	EU EINECS	EU ELNICS	Korea KECL
Carbon dioxide	124-38-9	Yes	No	Yes	No	Yes
Hydrogen	1333-74-0	Yes	No	Yes	No	Yes
Methane	74-82-8	Yes	No	Yes	No	Yes

Canada

Labor

Canada - WHMIS - Classifications of Substances

•Hydrogen	1333-74-0	A, B1
•Carbon dioxide	124-38-9	A; Uncontrolled product according to WHMIS classification criteria (solid)
•Methane	74-82-8	A, B1

Canada - WHMIS - Ingredient Disclosure List

•Hydrogen	1333-74-0	Not Listed
•Carbon dioxide	124-38-9	1 %
•Methane	74-82-8	Not Listed

Environment

Canada - CEPA - Priority Substances List

•Hydrogen	1333-74-0	Not Listed
•Carbon dioxide	124-38-9	Not Listed
•Methane	74-82-8	Not Listed

United States

Labor

U.S. - OSHA - Process Safety Management - Highly Hazardous Chemicals

•Hydrogen	1333-74-0	Not Listed
•Carbon dioxide	124-38-9	Not Listed
•Methane	74-82-8	Not Listed

U.S. - OSHA - Specifically Regulated Chemicals

•Hydrogen	1333-74-0	Not Listed
•Carbon dioxide	124-38-9	Not Listed
•Methane	74-82-8	Not Listed

Environment

U.S. - CAA (Clean Air Act) - 1990 Hazardous Air Pollutants

•Hydrogen	1333-74-0	Not Listed
•Carbon dioxide	124-38-9	Not Listed

•Methane	74-82-8	Not Listed
U.S. - CERCLA/SARA - Hazardous Substances and their Reportable Quantities		
•Hydrogen	1333-74-0	Not Listed
•Carbon dioxide	124-38-9	Not Listed
•Methane	74-82-8	Not Listed
U.S. - CERCLA/SARA - Radionuclides and Their Reportable Quantities		
•Hydrogen	1333-74-0	Not Listed
•Carbon dioxide	124-38-9	Not Listed
•Methane	74-82-8	Not Listed
U.S. - CERCLA/SARA - Section 302 Extremely Hazardous Substances EPCRA RQs		
•Hydrogen	1333-74-0	Not Listed
•Carbon dioxide	124-38-9	Not Listed
•Methane	74-82-8	Not Listed
U.S. - CERCLA/SARA - Section 302 Extremely Hazardous Substances TPQs		
•Hydrogen	1333-74-0	Not Listed
•Carbon dioxide	124-38-9	Not Listed
•Methane	74-82-8	Not Listed
U.S. - CERCLA/SARA - Section 313 - Emission Reporting		
•Hydrogen	1333-74-0	Not Listed
•Carbon dioxide	124-38-9	Not Listed
•Methane	74-82-8	Not Listed
U.S. - CERCLA/SARA - Section 313 - PBT Chemical Listing		
•Hydrogen	1333-74-0	Not Listed
•Carbon dioxide	124-38-9	Not Listed
•Methane	74-82-8	Not Listed
Inventory - United States - Section 8(b) Inventory (TSCA) - PMN Number to EPA Accession Number Link		
•Hydrogen	1333-74-0	Not Listed
•Carbon dioxide	124-38-9	Not Listed
•Methane	74-82-8	Not Listed

United States - California

Environment

U.S. - California - Proposition 65 - Carcinogens List		
•Hydrogen	1333-74-0	Not Listed
•Carbon dioxide	124-38-9	Not Listed
•Methane	74-82-8	Not Listed
U.S. - California - Proposition 65 - Developmental Toxicity		
•Hydrogen	1333-74-0	Not Listed
•Carbon dioxide	124-38-9	Not Listed
•Methane	74-82-8	Not Listed
U.S. - California - Proposition 65 - Maximum Allowable Dose Levels (MADL)		
•Hydrogen	1333-74-0	Not Listed
•Carbon dioxide	124-38-9	Not Listed
•Methane	74-82-8	Not Listed
U.S. - California - Proposition 65 - No Significant Risk Levels (NSRL)		
•Hydrogen	1333-74-0	Not Listed
•Carbon dioxide	124-38-9	Not Listed
•Methane	74-82-8	Not Listed
U.S. - California - Proposition 65 - Reproductive Toxicity - Female		
•Hydrogen	1333-74-0	Not Listed
•Carbon dioxide	124-38-9	Not Listed
•Methane	74-82-8	Not Listed
U.S. - California - Proposition 65 - Reproductive Toxicity - Male		
•Hydrogen	1333-74-0	Not Listed
•Carbon dioxide	124-38-9	Not Listed
•Methane	74-82-8	Not Listed

Section 16 - Other Information

Last Revision Date • 02/October/2019
Preparation Date • 01/October/2014

Key to abbreviations

NDA = No data available

Disclaimer/Statement of Liability

- The information contained in this Safety Data Sheet (SDS) is believed to be correct since it was obtained from sources we believe are reliable. However no representation, guarantees or warranties of any kind are made as to its accuracy, suitability for particular applications, hazards connected with the use of the material, or the results to be obtained from the use thereof. User assumes all risks and liability of any use, processing or handling of any material, variations in methods, conditions and equipment used to store, handle, or process the material and hazards connected with the use of the material are solely the responsibility of the user and remain at his sole discretion. Compliance with all applicable federal, state, and local laws and regulations remains the responsibility of the user, and the user has the responsibility to provide a safe work place to examine all aspects of its operation and to determine if or where precautions, in addition to those described herein, are required.
-

Safety Data Sheet

Material Name: Propane – UN1075 Specific

SDS ID: 00245010

Section 1 - PRODUCT AND COMPANY IDENTIFICATION

Material Name

Propane – UN1075 Specific

Synonyms

INDUSTRIAL PROPANE; MTG MSDS 76; N-PROPANE; DIMETHYLMETHANE; PROPYL HYDRIDE; R-290; PROPYLHYDRIDE; LIQUEFIED PETROLEUM GAS; LPG; >96% NATURAL GRADE; >99.9% PURE GRADE; UN 1978; C3H8

Chemical Family

Hydrocarbons, aliphatic

Product Description

Classification determined in accordance with Compressed Gas Association standards.

Product Use

Industrial and Specialty Gas Applications.

Restrictions on Use

None known.

Details of the supplier of the safety data sheet

MATHESON TRI-GAS, INC.

909 Lake Carolyn Parkway

Suite 1300

Irving, TX 75039

General Information: 1-800-416-2505

Emergency #: 1-800-424-9300 (CHEMTREC)

Outside the US: 703-527-3887 (Call collect)

Section 2 - HAZARDS IDENTIFICATION

Classification in accordance with paragraph (d) of 29 CFR 1910.1200.

Flammable Gases - Category 1

Gases Under Pressure - Liquefied gas

Simple Asphyxiant

GHS Label Elements

Symbol(s)



Signal Word

Danger

Hazard Statement(s)

Extremely flammable gas.

Contains gas under pressure; may explode if heated.

May displace oxygen and cause rapid suffocation.

Precautionary Statement(s)

Prevention

Keep away from heat/sparks/open flame/hot surfaces - No smoking.

Response

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Leaking gas fire: Do not extinguish, unless leak can be stopped safely.
Eliminate all ignition sources if safe to do so.

Storage

Protect from sunlight. Store in a well-ventilated place.

Disposal

Dispose of contents/container in accordance with local/regional/national/international regulations.

Other Hazards

May cause frostbite upon sudden release of liquefied gas.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS		
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CAS	Component Name	Percent
74-98-6	Propane	>96

Section 4 - FIRST AID MEASURES		
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Inhalation

If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention.

Skin

If frostbite or freezing occur, immediately flush with plenty of lukewarm water (105-115°F; 41-46°C). DO NOT USE HOT WATER. If warm water is not available, gently wrap affected parts in blankets. Get immediate medical attention.

Eyes

Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Then get immediate medical attention.

Ingestion

If swallowed, get medical attention.

Most Important Symptoms/Effects

Acute

frostbite, suffocation

Delayed

No information on significant adverse effects.

Indication of any immediate medical attention and special treatment needed

For inhalation, consider oxygen. Treat symptomatically and supportively.

Section 5 - FIRE FIGHTING MEASURES		
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Extinguishing Media

Suitable Extinguishing Media

regular dry chemical, carbon dioxide, Large fires: water spray or fog

Unsuitable Extinguishing Media

Do not direct water at source of leak or safety devices; icing may occur.

Special Hazards Arising from the Chemical

Severe fire hazard. Severe explosion hazard. Gas/air mixtures are explosive. The vapor is heavier than air. Vapors or gases may ignite at distant ignition sources and flash back. Electrostatic discharges may be generated by flow or agitation resulting in ignition or explosion.

Hazardous Combustion Products

Oxides of carbon

Fire Fighting Measures

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Move container from fire area if it can be done without risk. Cool containers with water spray until well after the fire is out. Apply water from a protected location or from a safe distance. Stay away from the ends of tanks. For fires in cargo or storage area: Cool containers with water from unmanned hose holder or monitor nozzles until well after fire is out. If this is impossible then take the following precautions: Keep unnecessary people away, isolate hazard area and deny entry. Let the fire burn. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tanks due to fire. For tank, rail car or tank truck: Evacuation radius: 1600 meters (1 mile). Stop leak if possible without personal risk. Let burn unless leak can be stopped immediately. For smaller tanks or cylinders, extinguish and isolate from other flammables.

Special Protective Equipment and Precautions for Firefighters

Wear full protective fire fighting gear including self contained breathing apparatus (SCBA) for protection against possible exposure.

Section 6 - ACCIDENTAL RELEASE MEASURES

Personal Precautions, Protective Equipment and Emergency Procedures

Wear personal protective clothing and equipment, see Section 8.

Methods and Materials for Containment and Cleaning Up

Avoid heat, flames, sparks and other sources of ignition. All equipment used when handling the product must be grounded. Remove sources of ignition. Do not touch or walk through spilled material. Stop leak if possible without personal risk. If possible, turn leaking containers so that gas escapes rather than liquid. Use water spray to reduce vapors or divert vapor cloud drift. Avoid allowing water runoff to contact spilled material. Do not direct water at spill or source of leak. Keep unnecessary people away, isolate hazard area and deny entry. Ventilate closed spaces before entering.

Environmental Precautions

Avoid release to the environment.

Section 7 - HANDLING AND STORAGE

Precautions for Safe Handling

Keep away from heat, sparks, open flame, and hot surfaces - No smoking. Avoid breathing dust/fume/gas/mist/vapors/spray. Use only outdoors or in a well-ventilated area. Wash hands thoroughly after handling. Close valve after each use and when empty. Never put cylinders into unventilated areas of passenger vehicles. Do not open valve until connected to equipment prepared for use.

Conditions for Safe Storage, Including any Incompatibilities

Protect from sunlight. Store in a well-ventilated place.

Store and handle in accordance with all current regulations and standards. Keep container tightly closed. Grounding and bonding required. Keep separated from incompatible substances.

Incompatible Materials

combustible materials, oxidizing materials

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

Component Exposure Limits

Propane	74-98-6
ACGIH:	(See Appendix F: Minimal Oxygen Content, explosion hazard)
NIOSH:	1000 ppm TWA ; 1800 mg/m3 TWA
	2100 ppm IDLH (10% LEL)
OSHA (US):	1000 ppm TWA ; 1800 mg/m3 TWA

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Mexico:	1000 ppm TWA [VLE-PPT]
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ACGIH - Threshold Limit Values - Biological Exposure Indices (BEI)

There are no biological limit values for any of this product's components.

Engineering Controls

Ventilation equipment should be explosion-resistant if explosive concentrations of material are present. Provide local exhaust ventilation system. Ensure compliance with applicable exposure limits. Use a back flow preventive device in the piping.

Individual Protection Measures, such as Personal Protective Equipment

Eye/face protection

For the gas: Eye protection not required, but recommended. For the liquid: Wear splash resistant safety goggles. Contact lenses should not be worn. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

Skin Protection

For the gas: Protective clothing is not required. For the liquid: Wear appropriate protective, cold insulating clothing.

Respiratory Protection

The following respirators and maximum use concentrations are drawn from NIOSH and/or OSHA. 2100 ppm. Any supplied-air respirator. Any self-contained breathing apparatus with a full facepiece. Emergency or planned entry into unknown concentrations or IDLH conditions -. Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode. Any supplied-air respirator with a full facepiece that is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive-pressure mode. Escape -. Any appropriate escape-type, self-contained breathing apparatus.

Glove Recommendations

Wear insulated gloves.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

Appearance	colorless gas	Physical State	gas
Odor	gasoline odor	Color	colorless
Odor Threshold	5000 - 20000 ppm	pH	Not available
Melting Point	-190 °C (-310 °F)	Boiling Point	-40 °C (-40 °F)
Boiling Point Range	Not available	Freezing point	Not available
Evaporation Rate	Not available	Flammability (solid, gas)	Flammable gas
Autoignition Temperature	450 °C (842 °F)	Flash Point	-105 °C (-157 °F)
Lower Explosive Limit	2.1 %	Decomposition temperature	Not available
Upper Explosive Limit	9.5 %	Vapor Pressure	6398 mmHg @ 21.1 °C
Vapor Density (air=1)	1.55	Specific Gravity (water=1)	0.5853 at -45 °C

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Water Solubility	(Very slightly soluble)	Partition coefficient: n-octanol/water	Not available
Viscosity	Not available	Kinematic viscosity	Not available
Solubility (Other)	Not available	Density	Not available
Log KOW	2.36	Physical Form	Liquefied gas
Molecular Formula	C-H3-C-H2-C-H3	Molecular Weight	44.11
Critical Temperature	96.74 °C		

Solvent Solubility

Soluble

absolute alcohol, ether, chloroform, benzene, turpentine

Section 10 - STABILITY AND REACTIVITY

Reactivity

No reactivity hazard is expected.

Chemical Stability

Stable at normal temperatures and pressure.

Possibility of Hazardous Reactions

Will not polymerize.

Conditions to Avoid

Avoid heat, flames, sparks and other sources of ignition. Minimize contact with material. Containers may rupture or explode if exposed to heat.

Incompatible Materials

combustible materials, oxidizing materials

Hazardous decomposition products

Oxides of carbon

Section 11 - TOXICOLOGICAL INFORMATION

Information on Likely Routes of Exposure

Inhalation

nausea, suffocation, vomiting, irregular heartbeat, headache, drowsiness, dizziness, disorientation, mood swings, loss of coordination, convulsions, unconsciousness, coma

Skin Contact

blisters, frostbite

Eye Contact

frostbite, blurred vision

Ingestion

ingestion of a gas is unlikely

Acute and Chronic Toxicity

Component Analysis - LD50/LC50

The components of this material have been reviewed in various sources and the following selected endpoints are published:

Propane (74-98-6)

Inhalation LC50 Rat >800000 ppm 15 min

Safety Data Sheet

Material Name: Propane – UN1075 Specific

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Product Toxicity Data

Acute Toxicity Estimate

Inhalation - Gas	> 20000 ppm
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Immediate Effects

frostbite, suffocation

Delayed Effects

No information on significant adverse effects.

Irritation/Corrosivity Data

No data available.

Respiratory Sensitization

No data available.

Dermal Sensitization

No data available.

Component Carcinogenicity

None of this product's components are listed by ACGIH, IARC, NTP, DFG or OSHA.

Germ Cell Mutagenicity

No data available.

Tumorigenic Data

No data available

Reproductive Toxicity

No data available.

Specific Target Organ Toxicity - Single Exposure

No target organs identified.

Specific Target Organ Toxicity - Repeated Exposure

No target organs identified.

Aspiration hazard

Not applicable.

Medical Conditions Aggravated by Exposure

None known.

Additional Data

Stimulants such as epinephrine may induce ventricular fibrillation.

Section 12 - ECOLOGICAL INFORMATION

Component Analysis - Aquatic Toxicity

No LOLI ecotoxicity data are available for this product's components.

Persistence and Degradability

This material is expected to biodegrade.

Bioaccumulative Potential

Bioconcentration potential in aquatic organisms is low based on a BCF value of 13.

Mobility

Expected to have moderate mobility in soil.

Other Toxicity

No additional information is available.

Section 13 - DISPOSAL CONSIDERATIONS

Disposal Methods

Dispose in accordance with all applicable regulations.

Component Waste Numbers

Safety Data Sheet

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The U.S. EPA has not published waste numbers for this product's components.

Section 14 - TRANSPORT INFORMATION

US DOT Information:

Shipping Name: PETROLEUM GASES, LIQUEFIED

Hazard Class: 2.1

UN/NA #: UN1075

Required Label(s): 2.1

IMDG Information:

Shipping Name: PETROLEUM GASES, LIQUEFIED

Hazard Class: 2.1

UN#: UN1075

Required Label(s): 2.1

International Bulk Chemical Code

This material does not contain any chemicals required by the IBC Code to be identified as dangerous chemicals in bulk.

Section 15 - REGULATORY INFORMATION

U.S. Federal Regulations

None of this product's components are listed under SARA Sections 302/304 (40 CFR 355 Appendix A), SARA Section 313 (40 CFR 372.65), CERCLA (40 CFR 302.4), TSCA 12(b), or require an OSHA process safety plan.

SARA Section 311/312 (40 CFR 370 Subparts B and C) reporting categories

Flammable; Gas Under Pressure; Simple Asphyxiant

U.S. State Regulations

The following components appear on one or more of the following state hazardous substances lists:

Component	CAS	CA	MA	MN	NJ	PA
Propane	74-98-6	No	Yes	Yes	Yes	Yes

California Safe Drinking Water and Toxic Enforcement Act (Proposition 65)

Not listed under California Proposition 65.

Component Analysis - Inventory

Propane (74-98-6)

US	CA	AU	CN	EU	JP - ENCS	JP - ISHL	KR KECI - Annex 1	KR KECI - Annex 2
Yes	DSL	Yes	Yes	EIN	Yes	Yes	Yes	No

KR - REACH CCA	MX	NZ	PH	TH-TECI	TW, CN	VN (Draft)
No	Yes	Yes	Yes	Yes	Yes	Yes

Section 16 - OTHER INFORMATION

NFPA Ratings

Health: 2 Fire: 4 Instability: 0

Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe

Preparation Date

New SDS: 10/09/2018

Safety Data Sheet

Material Name: Propane – UN1075 Specific

SDS ID: 00245010

Key / Legend

ACGIH - American Conference of Governmental Industrial Hygienists; ADR - European Road Transport; AU - Australia; BOD - Biochemical Oxygen Demand; C - Celsius; CA - Canada; CA/MA/MN/NJ/PA - California/Massachusetts/Minnesota/New Jersey/Pennsylvania*; CAS - Chemical Abstracts Service; CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act; CFR - Code of Federal Regulations (US); CLP - Classification, Labelling, and Packaging; CN - China; CPR - Controlled Products Regulations; DFG - Deutsche Forschungsgemeinschaft; DOT - Department of Transportation; DSD - Dangerous Substance Directive; DSL - Domestic Substances List; EC - European Commission; EEC - European Economic Community; EIN - European Inventory of (Existing Commercial Chemical Substances); EINECS - European Inventory of Existing Commercial Chemical Substances; ENCS - Japan Existing and New Chemical Substance Inventory; EPA - Environmental Protection Agency; EU - European Union; F - Fahrenheit; F - Background (for Venezuela Biological Exposure Indices); IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; ICAO - International Civil Aviation Organization; IDL - Ingredient Disclosure List; IDLH - Immediately Dangerous to Life and Health; IMDG - International Maritime Dangerous Goods; ISHL - Japan Industrial Safety and Health Law; IUCLID - International Uniform Chemical Information Database; JP - Japan; Kow - Octanol/water partition coefficient; KR KECI Annex 1 - Korea Existing Chemicals Inventory (KECI) / Korea Existing Chemicals List (KECL); KR KECI Annex 2 - Korea Existing Chemicals Inventory (KECI) / Korea Existing Chemicals List (KECL), KR - Korea; LD50/LC50 - Lethal Dose/ Lethal Concentration; KR REACH CCA - Korea Registration and Evaluation of Chemical Substances Chemical Control Act; LEL - Lower Explosive Limit; LLV - Level Limit Value; LOLI - List Of Lists™ - ChemADVISOR's Regulatory Database; MAK - Maximum Concentration Value in the Workplace; MEL - Maximum Exposure Limits; MX - Mexico; Ne- Non-specific; NFPA - National Fire Protection Agency; NIOSH - National Institute for Occupational Safety and Health; NJTSR - New Jersey Trade Secret Registry; Nq - Non-quantitative; NSL - Non-Domestic Substance List (Canada); NTP - National Toxicology Program; NZ - New Zealand; OSHA - Occupational Safety and Health Administration; PEL - Permissible Exposure Limit; PH - Philippines; RCRA - Resource Conservation and Recovery Act; REACH - Registration, Evaluation, Authorisation, and restriction of Chemicals; RID - European Rail Transport; SARA - Superfund Amendments and Reauthorization Act; Sc - Semi-quantitative; STEL - Short-term Exposure Limit; TCCA - Korea Toxic Chemicals Control Act; TDG - Transportation of Dangerous Goods; TH-TECI - Thailand - FDA Existing Chemicals Inventory (TECI); TLV - Threshold Limit Value; TSCA - Toxic Substances Control Act; TW - Taiwan; TWA - Time Weighted Average; UEL - Upper Explosive Limit; UN/NA - United Nations /North American; US - United States; VLE - Exposure Limit Value (Mexico); VN (Draft) - Vietnam (Draft); WHMIS - Workplace Hazardous Materials Information System (Canada).

Other Information

Disclaimer:

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Hydrochloric Acid,ACS

SECTION 1 : Identification of the substance/mixture and of the supplier

Product name : Hydrochloric Acid,ACS

Manufacturer/Supplier Trade name:

Manufacturer/Supplier Article number: S25358

Recommended uses of the product and uses restrictions on use:

Manufacturer Details:

AquaPhoenix Scientific
9 Barnhart Drive, Hanover, PA 17331

Supplier Details:

Fisher Science Education
15 Jet View Drive, Rochester, NY 14624

Emergency telephone number:

Fisher Science Education Emergency Telephone No.: 800-535-5053

SECTION 2 : Hazards identification

Classification of the substance or mixture:



Corrosive

Serious eye damage, category 1
Corrosive to metals, category 1
Skin corrosion, category 1B



Irritant

Specific target organ toxicity following single exposure, category 3

Corr. Metals 1
Corr. Skin 1B
Eye Damage 1
STOT. SE 3

Signal word :Danger

Hazard statements:

May be corrosive to metals
Causes severe skin burns and eye damage
May cause respiratory irritation

Precautionary statements:

If medical advice is needed, have product container or label at hand
Keep out of reach of children
Read label before use
Use only outdoors or in a well-ventilated area
Wear protective gloves/protective clothing/eye protection/face protection
Keep only in original container
Do not get in eyes, on skin, or on clothing
Wash skin thoroughly after handling
IF SWALLOWED: Rinse mouth. Do NOT induce vomiting

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IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower
 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do.
 Continue rinsing
 Immediately call a POISON CENTER or doctor/physician
 Specific treatment (see supplemental first aid instructions on this label)
 Wash contaminated clothing before reuse
 Absorb spillage to prevent material damage
 Store in a well ventilated place. Keep container tightly closed
 Store locked up
 Store in corrosive resistant stainless steel container with a resistant inner liner
 Dispose of contents and container to an approved waste disposal plant

Other Non-GHS Classification:

WHMIS



NFPA/HMIS



NFPA SCALE (0-4)

Health	3
Flammability	0
Physical Hazard	1
Personal Protection	X

HMIS RATINGS (0-4)

SECTION 3 : Composition/information on ingredients

Ingredients:		
CAS 7647-01-0	Hydrochloric Acid, ACS	30-50 %
CAS 7732-18-5	Water	50-70 %
Percentages are by weight		

SECTION 4 : First aid measures

Description of first aid measures

After inhalation: Move exposed individual to fresh air. Loosen clothing as necessary and position individual in a comfortable position. Seek medical attention if irritation or coughing persists.

After skin contact: Wash affected area with soap and water. Immediately remove contaminated clothing and shoes. Rinse thoroughly with plenty of water for at least 15 minutes. Immediately seek medical attention.

After eye contact: Protect unexposed eye. Flush thoroughly with plenty of water for at least 15

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minutes.Remove contact lenses while rinsing.Continue rinsing eyes during transport to hospital.

After swallowing: Rinse mouth thoroughly. Do not induce vomiting. Have exposed individual drink sips of water. Immediately seek medical attention.

Most important symptoms and effects, both acute and delayed:

Inhalation may cause irritation to nose and upper respiratory tract, ulceration, coughing, chest tightness and shortness of breath. Higher concentrations cause tachypnoea, pulmonary oedema and suffocation . Ingestion may cause corrosion of lips, mouth, oesophagus and stomach, dysphagia and vomiting.Pain, eye ulceration, conjunctival irritation, cataracts and glaucoma may occur following eye exposure.Erythema and skin irritation, as well as chemical burns to skin and mucous membranes may arise following skin exposure.;Potential sequelae following ingestion of hydrochloric acid include perforation, scarring of the oesophagus or stomach and stricture formation causing dysphagia or gastric outlet obstruction. In some cases, RADS may develop. Respiratory symptoms may take up to 36 hours to develop.Symptoms of burning sensation, cough, wheezing, laryngitis, shortness of breath, spasm, inflammation, edema of the larynx, spasm, inflammation and edema of the bronchi, pneumonitis, pulmonary edema. Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin.

Indication of any immediate medical attention and special treatment needed:

Provide SDS to Physician.Physician should treat symptomatically.

SECTION 5 : Firefighting measures

Extinguishing media

Suitable extinguishing agents: Use water, dry chemical, chemical foam, carbon dioxide, or alcohol-resistant foam.

For safety reasons unsuitable extinguishing agents:

Special hazards arising from the substance or mixture:

Combustion products may include carbon oxides or other toxic vapors.If in contact with metals toxic fumes may be released.

Advice for firefighters:

Protective equipment: Wear protective eyeware, gloves, and clothing. Refer to Section 8. Wear respiratory protection.

Additional information (precautions): Thermal decomposition can produce poisoning chlorine. Hydrochloric acid reacts also with many organic materials with liberation of heat.Avoid inhaling gases, fumes, dust, mist, vapor, and aerosols. Avoid contact with skin, eyes, and clothing.

SECTION 6 : Accidental release measures

Personal precautions, protective equipment and emergency procedures:

Ensure adequate ventilation. Ensure that air-handling systems are operational.

Environmental precautions:

Should not be released into environment. Prevent from reaching drains, sewer, or waterway.

Methods and material for containment and cleaning up:

Always obey local regulations. If necessary use trained response staff or contractor. Evacuate personnel to safe areas. Containerize for disposal. Refer to Section 13. Keep in suitable closed containers for disposal. Soak up with inert absorbent material and dispose of as hazardous waste. Cover spill with soda ash or calcium carbonate. Mix and add water to form slurry.Wear protective eyeware, gloves, and clothing. Refer to Section 8.

Reference to other sections:

SECTION 7 : Handling and storage

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Hydrochloric Acid,ACS

Precautions for safe handling:

Prevent formation of aerosols. Never use hot water and never add water to the acid. Do not allow contact between hydrochloric acid, metal, and organics. Follow good hygiene procedures when handling chemical materials. Refer to Section 8. Prevent contact with skin, eyes, and clothing. Follow proper disposal methods. Refer to Section 13. Do not eat, drink, smoke, or use personal products when handling chemical substances. Use only in well ventilated areas. Avoid splashes or spray in enclosed areas.

Conditions for safe storage, including any incompatibilities:

Store in a cool location. Keep away from food and beverages. Protect from freezing and physical damage. Store away from incompatible materials. Provide ventilation for containers. Keep container tightly sealed. Containers for hydrochloric acid must be made from corrosion resistant materials: glass, polyethylene, polypropylene, polyvinyl chloride, carbon steel lined with rubber or ebonite.

SECTION 8 : Exposure controls/personal protection



Control Parameters:

7647-01-0, Hydrochloric Acid, ACGIH: 2 ppm Ceiling
7647-01-0, Hydrochloric Acid, NIOSH: 5 ppm Ceiling; 7 mg/m³ Ceiling

Appropriate Engineering controls:

Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapor and mists below the applicable workplace exposure limits (Occupational Exposure Limits-OELs) indicated above. Emergency eye wash fountains and safety showers should be available in the immediate vicinity of handling.

Respiratory protection:

Not required under normal conditions of use. Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. When necessary use NIOSH approved breathing equipment.

Protection of skin:

Select glove material impermeable and resistant to the substance. Select glove material based on rates of diffusion and degradation. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Use proper glove removal technique without touching outer surface. Avoid skin contact with used gloves. Wear protective clothing.

Eye protection:

Faceshield (8-inch minimum). Tightly fitting safety goggles.

General hygienic measures:

Perform routine housekeeping. Wash hands before breaks and immediately after handling the product. Avoid contact with skin, eyes, and clothing. Before re-wearing wash contaminated clothing.

SECTION 9 : Physical and chemical properties

Appearance (physical state,color):	Clear, colorless liquid.	Explosion limit lower: Explosion limit upper:	Non Explosive Non Explosive
Odor:	Pungent odor	Vapor pressure:	5.7mmHg @ 0C
Odor threshold:	0.3 - 14.9 mg/m ³	Vapor density:	1.27 (Air=1)
pH-value:	< 1	Relative density:	1.0 - 1.2

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Melting/Freezing point:	- 74 C	Solubilities:	Miscible
Boiling point/Boiling range:	81.5 - 110 C	Partition coefficient (n-octanol/water):	Not Determined
Flash point (closed cup):	Not Applicable	Auto/Self-ignition temperature:	Not Determined
Evaporation rate:	>1.00	Decomposition temperature:	Not Determined
Flammability (solid,gaseous):	non combustible	Viscosity:	a. Kinematic:Not Determined b. Dynamic: Not Determined
Density: Not Determined Hydrochloric Acid: MW is36.46			

SECTION 10 : Stability and reactivity

Reactivity:Reacts violently with bases and is corrosive.

Chemical stability:No decomposition if used and stored according to specifications.

Possible hazardous reactions:Attacks many metals in the presence of water forming flammable explosive gas (hydrogen).Reacts violently with oxidants forming toxic gas (chlorine).

Conditions to avoid:Incompatible materials.

Incompatible materials:Bases, Amines, Alkali metals, Metals, permanganates (potassium permanganate), Fluorine, Metal acetylides, Hexalithium disilicide.

Hazardous decomposition products:Hydrogen chloride gas.Carbon oxides.

SECTION 11 : Toxicological information

Acute Toxicity:		
Inhalation:	7647-01-0	LD50 Rat 3124 ppm/hour
Oral:	7647-01-0	LD50 Rat 238 - 277 mg/kg
Dermal:	7647-01-0	LD50 Rabbit >5010 mg/kg
Chronic Toxicity: No additional information.		
Corrosion Irritation:		
Dermal:	7647-01-0	Skin - rabbit Result: Causes burns.
Ocular:	7647-01-0	Eyes - rabbit Result: Corrosive to eyes
Sensitization: No additional information.		
Single Target Organ (STOT):		7647-01-0: The substance or mixture is classified as specific target organ toxicant, single exposure, category 3 with respiratory tract irritation.
Numerical Measures: No additional information.		
Carcinogenicity: No additional information.		
Mutagenicity: No additional information.		

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Reproductive Toxicity:

No additional information.

SECTION 12 : Ecological information

Ecotoxicity

7647-01-0: Toxicity to fish LC50 - Gambusia affinis (Mosquito fish) - 282 mg/l - 96 h (Hydrochloric acid)

Persistence and degradability:

Bioaccumulative potential:

Mobility in soil:

Other adverse effects:

SECTION 13 : Disposal considerations

Waste disposal recommendations:

Do not allow product to reach sewage system or open water. It is the responsibility of the waste generator to properly characterize all waste materials according to applicable regulatory entities (US 40CFR262.11). Contact a licensed professional waste disposal service to dispose of this material. Dispose of empty containers as unused product. Product or containers must not be disposed together with household garbage. Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations. Ensure complete and accurate classification.

SECTION 14 : Transport information

UN-Number

1789

UN proper shipping name

HYDROCHLORIC ACID

Transport hazard class(es)



Class:

8 Corrosive substances

Packing group:II

Environmental hazard:

Transport in bulk:

Special precautions for user:

SECTION 15 : Regulatory information

United States (USA)

SARA Section 311/312 (Specific toxic chemical listings):

Acute

SARA Section 313 (Specific toxic chemical listings):

7647-01-0 Hydrochloric Acid

RCRA (hazardous waste code):

None of the ingredients is listed

TSCA (Toxic Substances Control Act):

All ingredients are listed.

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CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act):

7647-01-0 Hydrochloric Acid 5000 lbs

Proposition 65 (California):

Chemicals known to cause cancer:

None of the ingredients is listed

Chemicals known to cause reproductive toxicity for females:

None of the ingredients is listed

Chemicals known to cause reproductive toxicity for males:

None of the ingredients is listed

Chemicals known to cause developmental toxicity:

None of the ingredients is listed

Canada

Canadian Domestic Substances List (DSL):

All ingredients are listed.

Canadian NPRI Ingredient Disclosure list (limit 0.1%):

None of the ingredients is listed

Canadian NPRI Ingredient Disclosure list (limit 1%):

7647-01-0 Hydrochloric Acid

SECTION 16 : Other information

This product has been classified in accordance with hazard criteria of the Controlled Products Regulations and the SDS contains all the information required by the Controlled Products Regulations. Note: The responsibility to provide a safe workplace remains with the user. The user should consider the health hazards and safety information contained herein as a guide and should take those precautions required in an individual operation to instruct employees and develop work practice procedures for a safe work environment. The information contained herein is, to the best of our knowledge and belief, accurate. However, since the conditions of handling and use are beyond our control, we make no guarantee of results, and assume no liability for damages incurred by the use of this material. It is the responsibility of the user to comply with all applicable laws and regulations applicable to this material.

GHS Full Text Phrases:

Abbreviations and acronyms:

IMDG: International Maritime Code for Dangerous Goods

PNEC: Predicted No-Effect Concentration (REACH)

CFR: Code of Federal Regulations (USA)

SARA: Superfund Amendments and Reauthorization Act (USA)

RCRA: Resource Conservation and Recovery Act (USA)

TSCA: Toxic Substances Control Act (USA)

NPRI: National Pollutant Release Inventory (Canada)

DOT: US Department of Transportation

IATA: International Air Transport Association

GHS: Globally Harmonized System of Classification and Labelling of Chemicals

ACGIH: American Conference of Governmental Industrial Hygienists

CAS: Chemical Abstracts Service (division of the American Chemical Society)

NFPA: National Fire Protection Association (USA)

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HMIS: Hazardous Materials Identification System (USA)

WHMIS: Workplace Hazardous Materials Information System (Canada)

DNEL: Derived No-Effect Level (REACH)

Effective date : 01.08.2015

Last updated : 03.20.2015

ATTACHMENT I

Emission Units Table

Attachment I

Emission Units Table

(includes all emission units and air pollution control devices
that will be part of this permit application review, regardless of permitting status)

Emission Unit ID ¹	Emission Point ID ²	Emission Unit Description	Year Installed/ Modified	Design Capacity	Type ³ and Date of Change	Control Device ⁴
900	1000	Thermal Oxidizer (Re-Ox)	2024	3.7 MMBTU/hr	New	1C
1000	1000	Emergency Flare (Stack)	2024	12,247 btu/hr	New	2C
200	1000	Macerator/Shredder	2024	3,542.7ft ³ /hr	New	N/A
220	1000	Dryer	2024	7,700 lb/hr	New	1C/2C
300	300	Pyrolysers	2024	70 tpd	New	1C/2C
400	1000	Gas Cleanup System	2024		New	1C/2C
600	1000	Engines	2024	320 kW	New	1C/2C

¹ For Emission Units (or Sources) use the following numbering system: 1S, 2S, 3S,... or other appropriate designation.
² For Emission Points use the following numbering system: 1E, 2E, 3E, ... or other appropriate designation.
³ New, modification, removal
⁴ For Control Devices use the following numbering system: 1C, 2C, 3C,... or other appropriate designation.

ATTACHMENT J

Emission Points Data Summary Sheet

**Attachment J
EMISSION POINTS DATA SUMMARY SHEET**

Table 1: Emissions Data																
Emission Point ID No. (Must match Emission Units Table & Plot Plan)	Emission Point Type ¹	Emission Unit Vented Through This Point (Must match Emission Units Table & Plot Plan)		Air Pollution Control Device (Must match Emission Units Table & Plot Plan)		Vent Time for Emission Unit (chemical processes only)		All Regulated Pollutants - Chemical Name/CAS ³ (Speciate VOCs & HAPS)	Maximum Potential Uncontrolled Emissions ⁴		Maximum Potential Controlled Emissions ⁵		Emission Form or Phase (At exit conditions, Solid, Liquid or Gas/Vapor)	Est. Method Used ⁶	Emission Concentration ⁷ (ppmv or mg/m ³)	
		ID No.	Source	ID No.	Device Type	Short Term ²	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr				
1000	Thermal Oxidizer (RTO) /Flare Stack		RTO (900)	1000	Stack (RTO /Flare)		8,760	NOx	5.70	24.0	5.70	24.0	gas	EE	796 ppmw	
			Flare (1000)						CO	22.60	99.0	22.60			99.0	3,284 ppmw
			Shredder (200)						SO2	8.90	39.0	8.90			39.0	1,294 ppmw
			Dryer (22)						PM-10	3.20	14.0	3.20			14.0	464 ppmw
			Pyrolyzers (300)						PM-2.5	2.05	9.0	2.05			9.0	299 ppmw
			Gas Cleanup System (400)						VOC Methane (CH4)	5.48	24.0	5.48			24.0	796 ppmw
			Engines (600)						HAP	0.46	2.0	0.46			2.0	6.6 ppmw

The EMISSION POINTS DATA SUMMARY SHEET provides a summation of emissions by emission unit. Note that uncaptured process emission unit emissions are not typically considered to be fugitive and must be accounted for on the appropriate EMISSIONS UNIT DATA SHEET and on the EMISSION POINTS DATA SUMMARY SHEET. Please note that total emissions from the source are equal to all vented emissions, all fugitive emissions, plus all other emissions (e.g. uncaptured emissions). Please complete the FUGITIVE EMISSIONS DATA SUMMARY SHEET for fugitive emission activities.

¹ Please add descriptors such as upward vertical stack, downward vertical stack, horizontal stack, relief vent, rain cap, etc.

² Indicate by "C" if venting is continuous. Otherwise, specify the average short-term venting rate with units, for intermittent venting (ie., 15 min/hr). Indicate as many rates as needed to clarify frequency of venting (e.g., 5 min/day, 2 days/wk).

³ List all regulated air pollutants. Speciate VOCs, including all HAPs. Follow chemical name with Chemical Abstracts Service (CAS) number. **LIST** Acids, CO, CS₂, VOCs, H₂S, Inorganics, Lead, Organics, O₃, NO, NO₂, SO₂, SO₃, all applicable Greenhouse Gases (including CO₂ and methane), etc. **DO NOT LIST** H₂, H₂O, N₂, O₂, and Noble Gases.

⁴ Give maximum potential emission rate with no control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).

⁵ Give maximum potential emission rate with proposed control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).

⁶ Indicate method used to determine emission rate as follows: MB = material balance; ST = stack test (give date of test); EE = engineering estimate; O = other (specify).

⁷ Provide for all pollutant emissions. Typically, the units of parts per million by volume (ppmv) are used. If the emission is a mineral acid (sulfuric, nitric, hydrochloric or phosphoric) use units of milligram per dry cubic meter (mg/m³) at standard conditions (68 °F and 29.92 inches Hg) (see 45CSR7). If the pollutant is SO₂, use units of ppmv (See 45CSR10).

**Attachment J
EMISSION POINTS DATA SUMMARY SHEET**

Table 2: Release Parameter Data								
Emission Point ID No. <i>(Must match Emission Units Table)</i>	Inner Diameter (ft.)	Exit Gas			Emission Point Elevation (ft)		UTM Coordinates (km)	
		Temp. (°F)	Volumetric Flow ¹ (acfm) <i>at operating conditions</i>	Velocity (fps)	Ground Level <i>(Height above mean sea level)</i>	Stack Height ² <i>(Release height of emissions above ground level)</i>	Northing	Easting
1000	2.29	1,562	11,000	TBD	TBD	TBD	TBD	TBD

¹ Give at operating conditions. Include inerts.
² Release height of emissions above ground level.

ATTACHMENT K

Fugitive Emissions Data Summary Sheet

Attachment K

FUGITIVE EMISSIONS DATA SUMMARY SHEET

The FUGITIVE EMISSIONS SUMMARY SHEET provides a summation of fugitive emissions. Fugitive emissions are those emissions which could not reasonably pass through a stack, chimney, vent or other functionally equivalent opening. Note that uncaptured process emissions are not typically considered to be fugitive, and must be accounted for on the appropriate EMISSIONS UNIT DATA SHEET and on the EMISSION POINTS DATA SUMMARY SHEET.

Please note that total emissions from the source are equal to all vented emissions, all fugitive emissions, plus all other emissions (e.g. uncaptured emissions).

APPLICATION FORMS CHECKLIST - FUGITIVE EMISSIONS
<p>1.) Will there be haul road activities?</p> <p><input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p> <p><input type="checkbox"/> If YES, then complete the HAUL ROAD EMISSIONS UNIT DATA SHEET.</p>
<p>2.) Will there be Storage Piles?</p> <p><input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</p> <p><input type="checkbox"/> If YES, complete Table 1 of the NONMETALLIC MINERALS PROCESSING EMISSIONS UNIT DATA SHEET.</p>
<p>3.) Will there be Liquid Loading/Unloading Operations?</p> <p><input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p> <p><input type="checkbox"/> If YES, complete the BULK LIQUID TRANSFER OPERATIONS EMISSIONS UNIT DATA SHEET.</p>
<p>4.) Will there be emissions of air pollutants from Wastewater Treatment Evaporation?</p> <p><input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</p> <p><input type="checkbox"/> If YES, complete the GENERAL EMISSIONS UNIT DATA SHEET.</p>
<p>5.) Will there be Equipment Leaks (e.g. leaks from pumps, compressors, in-line process valves, pressure relief devices, open-ended valves, sampling connections, flanges, agitators, cooling towers, etc.)?</p> <p><input checked="" type="checkbox"/> Yes No</p> <p><input type="checkbox"/> If YES, complete the LEAK SOURCE DATA SHEET section of the CHEMICAL PROCESSES EMISSIONS UNIT DATA SHEET.</p>
<p>6.) Will there be General Clean-up VOC Operations?</p> <p><input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</p> <p><input type="checkbox"/> If YES, complete the GENERAL EMISSIONS UNIT DATA SHEET.</p>
<p>7.) Will there be any other activities that generate fugitive emissions?</p> <p><input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p> <p><input type="checkbox"/> If YES, complete the GENERAL EMISSIONS UNIT DATA SHEET or the most appropriate form.</p>
<p>If you answered "NO" to all of the items above, it is not necessary to complete the following table, "Fugitive Emissions Summary."lo</p>

FUGITIVE EMISSIONS SUMMARY	All Regulated Pollutants - Chemical Name/CAS ¹	Maximum Potential Uncontrolled Emissions ²		Maximum Potential Controlled Emissions ³		Est. Method Used ⁴
		lb/hr	ton/yr	lb/hr	ton/yr	
Haul Road/Road Dust Emissions Paved Haul Roads						
Unpaved Haul Roads						
Storage Pile Emissions						
Loading/Unloading Operations						
Wastewater Treatment Evaporation & Operations						
Equipment Leaks	Synthetic Natural Gas/74-82-8 Propane/74-98-6		50.41			
General Clean-up VOC Emissions						
Other						

¹ List all regulated air pollutants. Speciate VOCs, including all HAPs. Follow chemical name with Chemical Abstracts Service (CAS) number. LIST Acids, CO, CS₂, VOCs, H₂S, Inorganics, Lead, Organics, O₃, NO, NO₂, SO₂, SO₃, all applicable Greenhouse Gases (including CO₂ and methane), etc. DO NOT LIST H₂, H₂O, N₂, O₂, and Noble Gases.

² Give rate with no control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).

³ Give rate with proposed control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).

⁴ Indicate method used to determine emission rate as follows: MB = material balance; ST = stack test (give date of test); EE = engineering estimate; O = other (specify).

ATTACHMENT L

Emission Units Data Sheet

Attachment L
EMISSIONS UNIT DATA SHEET
CHEMICAL PROCESS

For chemical processes please fill out this sheet and all supplementary forms (see below) that apply. Please check all supplementary forms that have been completed.

- Emergency Vent Summary Sheet*
- Leak Sources Data Sheet*
- Toxicology Data Sheet*
- Reactor Data Sheet*
- Distillation Column Data Sheet*

1. Chemical process area name and equipment ID number (as shown in *Equipment List Form*)

2. Standard Industrial Classification Codes (SICs) for process(es)

3. List raw materials and attach MSDSs

4. List Products and Maximum Production and attach MSDSs

Description and CAS Number	Maximum Hourly (lb/hr)	Maximum Annual (ton/year)

5. Complete the *Emergency Vent Summary Sheet* for all emergency relief devices.

6. Complete the *Leak Source Data Sheet* and describe below or attach to application the leak detection or maintenance program to minimize fugitive emissions. Include detection instruments, calibration gases or methods, planned inspection frequency, and record-keeping, and similar pertinent information. If subject to a rule requirement (e.g. 40CFR60, Subpart VV), please list those here.

7. Clearly describe below or attach to application Accident Procedures to be followed in the event of an accidental spill or release.

8A. Complete the *Toxicology Data Sheet* or attach to application a toxicology report (an up-to-date material safety data sheets (MSDS) may be used) outlining the currently known acute and chronic health effects of each compound or chemical entity emitted to the air. If these compounds have already been listed in Item 3, then a duplicate MSDS sheet is not required. Include data such as the OSHA time weighted average (TWA) or mutagenicity, teratogenicity, irritation, and other known or suspected effects should be addressed. Indicate where these are unknown, and provide references.

8B. Describe any health effects testing or epidemiological studies on these compounds that are being or may be conducted by the company or required under TSCA, RCRA or other federal regulations. Discuss the persistence in the environment of any emission (e.g. pesticides, etc.).

9. **Waste Products** - Waste products status: (If source is subject to RCRA or 45CSR25, please contact the Hazardous Waste Section of WVDEP, OAQ at (304) 926-3647.)

9A. Types and amounts of wastes to be disposed:

9B. Method of disposal and location of waste disposal facilities:
 Carrier: _____ Phone: _____

9C. Check here if approved USEPA/State Hazardous Waste Landfill will be used

10. Maximum and Projected Typical Operating Schedule for process or project as a whole (circle appropriate units).

circle units:	(hrs/day) (hr/batch)	(days), (batches/day), (batches/week)	(days/yr), (weeks/year)
10A. Maximum			
10B. Typical			

11. Complete a *Reactor Data Sheet* for each reactor in this chemical process.

12. Complete a *Distillation Column Data Sheet* for each distillation column in this chemical process.

13. Proposed Monitoring, Recordkeeping, Reporting, and Testing

Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING	RECORDKEEPING
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REPORTING	TESTING
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MONITORING. Please list and describe the process parameters and ranges that are proposed to be monitored in order to demonstrate compliance with the operation of this process equipment operation or air pollution control device.

RECORDKEEPING. Please describe the proposed recordkeeping that will accompany the monitoring.

REPORTING. Please describe the proposed frequency of reporting of the recordkeeping.

TESTING. Please describe any proposed emissions testing for this process equipment or air pollution control device.

14. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty

INFORMATION REQUIRED FOR CHEMICAL PROCESSES

The notes listed below for chemical processes are intended to help the applicant submit a complete application to the OAQ; these notes are not intended to be all inclusive. The requirements for a complete application for a permit issued under 45CSR13 are designed to provide enough information for a permit reviewer to begin a technical review. Additional information beyond that identified may be required to complete the technical review of any individual application.

Process Description

Please keep these points in mind when completing your process description as part of this permit application.

1. Provide a general process overview. This brief, but complete, process description should include chemical or registered trademark names of chemical products, intermediates, and/or raw materials to be produced or consumed, and the ultimate use(s) of the product(s). A list of the various chemical compounds is helpful.
2. Describe each process step. Include the process chemistry and stoichiometrically balanced reaction equation or material mass balance on all components.
3. Describe the methods and equipment used to receive, store, handle, and charge raw materials.
4. Describe the methods and equipment used to handle, store, or package final products and intermediates.
5. Provide process flow diagrams or equipment layout drawings which clearly show the process flow relationships among all pieces of process and control equipment. Identify all air emission discharge points. Discuss instrumentation and controls for the process.
6. Discuss the possibilities of process upsets, the duration and frequency of upsets, and consequences (including air emissions) of these upsets. Include a description of rupture discs, pressure relief valves, and secondary containment systems.
7. Discuss any fugitive emissions and the methods used to minimize them.
8. Include the following plans for the process if available:
 - a. preventative maintenance and malfunction abatement plan (recommended for all control equipment).
 - b. continuous emissions (in-stack) monitoring plan
 - c. ambient monitoring plan
 - d. emergency response plan

Regulatory Discussion

The following state and federal air pollution control regulations may be applicable to your chemical process. You should review these regulations carefully to determine if they apply to your process. Please summarize the results of your review in your permit application along with any other regulations you believe are applicable.

- Title 45 Legislative Rule Division of Environmental Protection, Office of Air Quality contains West Virginia's air pollution control regulations, including the following promulgated rules which may require emissions reductions or control technologies for your chemical process:
 - a. 45CSR27 - Best Available Technology (BAT) for Toxic Air Pollutants (TAPs)
 - b. 45CSR21 - VOC emissions controls for ozone maintenance in Kanawha, Cabell, Putnam, Wayne, and Wood counties.
 - c. 45CSR13 (Table 45-13A) - plantwide emission thresholds for permitting for certain pollutants.
- Federal Guidelines for case-by-case MACT determinations under section 112(g) of the 1990 CAAA for individual and total HAPs greater than 10 and 25 tons per year, respectively.
- There are also subparts of the federal Standards of Performance for New Stationary Sources (NSPS), 40CFR60.60, and the National Emission Standards for Hazardous Air Pollutants (NESHAP) at 40CFR61 and 40CFR63, which apply to various chemical and nonchemical processes. These subparts are too numerous to list here, but these areas of the federal regulations should be consulted carefully to determine applicability to your process.

Emissions Summary and Calculations

Please keep these points in mind when submitting your emissions calculations as part of this permit application.

1. For each pollutant, provide the basis for the emissions estimate and for all emission reduction(s) or control efficiency(ies) claimed.
2. For all batch processes provide the following
 - a. Emissions of each pollutant in pound(s) per batch, from each process step
 - b. Annual emissions based on number of batches requested per year
 - c. The total time for each process step and the duration of the emissions during the process step
 - d. Total batch time, total emissions per batch (or per day), and annual emissions based on the number of batches requested per year.

EMERGENCY VENT SUMMARY SHEET

List below all emergency relief devices, rupture disks, safety relief valves, and similar openings that will vent only under abnormal conditions.

Emission Point ID ¹	Equipment to Relief Vent (type, ID if available) ²	Relief Vents (type) & Set Pressure (psig)	Name of Chemical(s) or Pollutants Controlled	Worst Case Emission per Release Event (lbs)

All routine vents (non-emergency) should be listed on the *Emission Points Data Summary Sheet*.

¹ Indicate the emission point, if any, to which source equipment normally vents. Do not assign emission point ID numbers to each emergency relief vent or device.

² List all emergency relief devices next to the piece of equipment from which they control releases.

LEAK SOURCE DATA SHEET

Source Category	Pollutant	Number of Source Components ¹	Number of Components Monitored by Frequency ²	Average Time to Repair (days) ³	Estimated Annual Emission Rate (lb/yr) ⁴
Pumps ⁵	light liquid VOC ^{6,7}				
	heavy liquid VOC ⁸				
	Non-VOC ⁹				
Valves ¹⁰	Gas VOC				
	Light Liquid VOC				
	Heavy Liquid VOC				
	Non-VOC				
Safety Relief Valves ¹¹	Gas VOC				
	Non VOC				
Open-ended Lines ¹²	VOC				
	Non-VOC				
Sampling Connections ¹³	VOC				
	Non-VOC				
Compressors	VOC				
	Non-VOC				
Flanges	VOC				
	Non-VOC				
Other	VOC				
	Non-VOC				

^{1 - 13} See notes on the following page.

Notes for Leak Source Data Sheet

1. For VOC sources include components on streams and equipment that contain greater than 10% w/w VOC, including feed streams, reaction/separation facilities, and product/by-product delivery lines. Do not include certain leakless equipment as defined below by category.
2. By monitoring frequency, give the number of sources routinely monitored for leaks, using a portable detection device that measures concentration in ppm. Do not include monitoring by visual or soap-bubble leak detection methods. "M/Q(M)/Q/SA/A/O" means the time period between inspections as follows:

Monthly/Quarterly, with Monthly follow-up of repaired leakers/Quarterly/Semi-annual/Annually/Other (specify time period)

If source category is not monitored, a single zero in the space will suffice. For example, if 50 gas-service valves are monitored quarterly, with monthly follow-up of those repaired, 75 are monitored semi-annually, and 50 are checked bimonthly (alternate months), with non checked at any other frequency, you would put in the category "valves, gas service:" 0/50/0/75/0/50 (bimonthly).
3. Give the average number of days, after a leak is discovered, that an attempt will be made to repair the leak.
4. Note the method used: MB - material balance; EE - engineering estimate; EPA - emission factors established by EPA (cite document used); O - other method, such as in-house emission factor (specify).
5. Do not include in the equipment count sealless pumps (canned motor or diaphragm) or those with enclosed venting to a control device. (Emissions from vented equipment should be included in the estimates given in the Emission Points Data Sheet.)
6. Volatile organic compounds (VOC) means the term as defined in 40 CFR §51.100 (s).
7. A light liquid is defined as a fluid with vapor pressure equal to or greater than 0.04 psi (0.3 Kpa) at 20°C. For mixtures, if 20% w/w or more of the stream is composed of fluids with vapor pressures greater than 0.04 psi (0.3 Kpa) at 20 °C, then the fluid is defined as a light liquid.
8. A heavy liquid is defined as a fluid with a vapor pressure less than 0.04 psi (0.3 Kpa) at 20°C. For mixtures, if less than 20% w/w of the stream is composed of fluids with vapor pressures greater than 0.04 psi (0.3 Kpa) at 20 °C, then the fluid is defined as a heavy liquid.
9. LIST CO, H₂S, mineral acids, NO, NO₂, SO₃, etc. DO NOT LIST CO₂, H₂, H₂O, N₂, O₂, and Noble Gases.
10. Include all process valves whether in-line or on an open-ended line such as sample, drain and purge valves. Do not include safety-relief valves, or leakless valves such as check, diaphragm, and bellows seal valves.
11. Do not include a safety-relief valve if there is a rupture disk in place upstream of the valve, or if the valve vents to a control device.
12. Open-ended lines include purge, drain and vent lines. Do not include sampling connections, or lines sealed by plugs, caps, blinds or second valves.
13. Do not include closed-purge sampling connections.

TOXICOLOGY DATA SHEET¹

Descriptor Name/CAS Number	OSHA Limits ²		Acute ³ TC _{LO} - Animal LC _{LO} - Animal LC ₅₀ - Animal	Chronic ⁴	Irritation ⁵	References
	TWA	CL				

¹ Indicate by "ND" where no data exists, in company's knowledge.

² Time Weighted Average, Ceiling Limit, or other, with units.

³ If inhalation data is not available, provide other data as available.

⁴ Relying on animal or human studies, indicate if any data suggests: C = carcinogenicity, M = mutagenicity, T = teratogenicity, O = oncogenicity.

⁵ Indicate if there are dermal or eye irritation effects and whether they are considered to be low, moderate, or severe.

REACTOR DATA SHEET

Provide the following information for each piece of equipment that is a potential or actual source of emissions as shown on the *Equipment List Form* and other parts of application.

Identification Number (as shown on <i>Equipment List Form</i>): 300							
1. Name and type of equipment (e.g. CSTR, plug flow, batch, etc.) Pyrolyzers							
2. Type of operation <input checked="" type="checkbox"/> Batch <input checked="" type="checkbox"/> Continuous <input type="checkbox"/> Semi-batch							
3. Projected Actual Equipment Operating Schedule (complete appropriate lines): <div style="display: flex; justify-content: space-around; text-align: center;"> <div>24 hrs/day hrs/batch</div> <div>7 days/week batches/day, weeks (Circle one)</div> <div>52 weeks/year day, weeks/yr (Circle one)</div> </div>							
4. Feed Data Flow In = Varies on Batch gal/hr, or gal/batch							
Material Name & CAS No.	Phase ^a	Specific Gravity	Vapor Pressure ^b	Charge Rate			Fill Time (min/batch, run) ^c
Varies	S	TBD	N/A	Normal	Max	Units	Varies
				Varies	70	tpd	
<p>a. S = Solid, L = Liquid, G = gas or vapor</p> <p>b. At feed conditions</p> <p>c. Total time that equipment is filling per batch or run (start-up), for tank or vessel-type equipment.</p>							
5. Provide all chemical reactions that will be involved (if applicable), including the residence time and any side reactions that may occur as well as gases that may be generated during these reactions. Indicate if the reaction(s) are exothermic or endothermic.							

6. Maximum Temperature		7A. Maximum Pressure			
900	°C	7B. Max. Set Pressure for venting		-0.18	mmHg
2,165	°F	N/A	psig	-0.18	mmHg
		N/A	psig	N/A	psig

8. Output Data		Flow Out = gal/hr or gal/batch				
Material Name and CAS No.	Phase	Specific Gravity	Vapor Pressure	Hourly or Batch Output Rate		Units
				Normal	Maximum	
Varies per feed	SGL	TBD	TBD	TBD	TBD	

9. Complete the following emission data for equipment connected to a header exhaust system, giving emissions levels before entering header system (i.e. before control equipment).

Check here if not applicable

Emission Point ID (exhaust point of header system): 1000

Material Name and CAS No.	Maximum Potential Emission Rate (lb/hr)	Method **
TBD		

** MB - material balance: EE - Engineering Estimate: TM - Test Measurement (submit test data): O - other (Explain)

10. Provide the following information pertaining to each condenser that may be attached to this reactor. Attach additional pages as necessary if more than one condenser is used for this reactor. Complete the Condenser Air Pollution Control Device Sheet if necessary.

Check here if not applicable

- 10A. Cooling material
- 10B. Minimum and Maximum flowrate of cooling material (gal/hr)
- 10C. Inlet temperature of cooling material (°F)
- 10D. Outlet temperature of cooling material (°F)
- 10E. Pressure drop of gas to be condensed from inlet to outlet (psig)
- 10F. Inlet temperature of gas stream (°F)
- 10G. Outlet temperature of gas stream (°F)
- 10H. Number of passes
- 10I. Cooling surface area

11. Provide the following pertaining to auxiliary equipment that burns fuel (heaters, dryers, etc.):

Check here if not applicable

11A. Type of fuel and maximum fuel burn rate, per hour:

Natural Gas for startup at 122cfm for 4hrs, syngas to continue process once start-up has been completed.

11B. Provide maximum percent sulfur (S), ash content of fuel, and the energy content using appropriate units:

%S	% Ash	BTU/lb, std. ft ³ /day, gal
		(circle one)

11C. Theoretical combustion air requirement in SCFD per unit of fuel (circle appropriate unit) @ 70°F and 14.7 PSIA:

SCFD/lb, SCFD, gal (circle one)

11D. Percent excess air: %

11E. Type, amount, and BTU rating of burners and all other firing equipment that are planned to be used:

11F. Total maximum design heat input: x10⁶ BTU/hr.

12. Proposed Monitoring, Recordkeeping, Reporting, and Testing

Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING

Weekly and monthly inspections according to manufacturer specifications.

RECORDKEEPING

All Weekly and Monthly inspections along with any malfunctions.

REPORTING

Any malfunctions.

TESTING

Per request

MONITORING. PLEASE LIST AND DESCRIBE THE PROCESS PARAMETERS AND RANGES THAT ARE PROPOSED TO BE MONITORED IN ORDER TO DEMONSTRATE COMPLIANCE WITH THE OPERATION OF THIS PROCESS EQUIPMENT OPERATION OR AIR POLLUTION CONTROL DEVICE.

RECORDKEEPING. PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.

REPORTING. PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.

TESTING. PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT OR AIR POLLUTION CONTROL DEVICE.

13. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty
N/A

NOTE: An *AIR POLLUTION CONTROL DEVICE SHEET* must be completed for any air pollution device(s) (except emergency relief devices) used to control emissions from this reactor.

DISTILLATION COLUMN DATA SHEET

Identification Number (as assigned on <i>Equipment List Form</i>):		
1. Name and type of equipment		
#. Projected actual equipment operating schedule (complete appropriate lines):		
hrs/day	days/week	weeks/year
hrs/batch	batches/day, batches/week (circle one)	days/yr, weeks/yr (circle one)
2. Number of stages (plates), excluding condenser		
3. Number of feed plates and stage location		
4. Specify details of any reheating, recycling, or stage conditioning along with the stage locations		
5. Specify reflux ratio, R (where R is defined as the ratio of the reflux to the overhead product, given symbolically as $R=L/D$, where L = liquid down column, D = distillation product)		
6. Specify the fraction of feed which is vaporized, f (where f is the molal fraction of the feed that leaves the feed plate continuously as vapor).		
7A. Type of condenser used: <input type="checkbox"/> total <input type="checkbox"/> partial <input type="checkbox"/> multiple <input type="checkbox"/> other		
7B. For each condenser provide process operating details including all inlet and outlet temperatures, pressures, and compositions.		
8. Feed Characteristics		
A. Molar composition		
B. Individual vapor pressure of each component		
C. Total feed stage pressure		
D. Total feed stage temperature		
E. Total mass flow rate of each stream into the system		
9. Overhead Product		
A. Molar composition of components		
B. Vapor pressure of components		
C. Total mass flow rate of all streams leaving the system as overhead products		
10. Bottom Product		
A. Molar composition of all components		
B. Total mass flow rate of all streams leaving the system as bottom products		

11. General Information

- A. Distillation column diameter
- B. Distillation column height
- C. Type of plates
- D. Plate spacing
- E. Murphree plate efficiency
- F. Any other information necessary of describe the operation of this distillation column.

12. **Proposed Monitoring, Recordkeeping, Reporting, and Testing**

Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING

RECORDKEEPING

REPORTING

TESTING

MONITORING. PLEASE LIST AND DESCRIBE THE PROCESS PARAMETERS AND RANGES THAT ARE PROPOSED TO BE MONITORED IN ORDER TO DEMONSTRATE COMPLIANCE WITH THE OPERATION OF THIS PROCESS EQUIPMENT OPERATION OR AIR POLLUTION CONTROL DEVICE.

RECORDKEEPING. PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.

REPORTING. PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.

TESTING. PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT OR AIR POLLUTION CONTROL DEVICE.

13. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty

NOTE: An *AIR POLLUTION CONTROL DEVICE SHEET* must be completed for any air pollution device(s) (except emergency relief devices) used to control emissions from this distillation column.



Supertherm (Pty) Ltd t/a TECHNOTHERM

Woodhill Office Park - 53 Philip Engelbrecht Street,
Ground Floor, Block 6, Meyersdal, 1448
Email: info@technotherm.co.za | Tel: 010 045 3603
VAT: 4680256643 | Reg No: 2010/009041/07
All hours number: 0027 78 311 6236

Superior thermal technologies

www.technotherm.co.za

1131

TECHNICAL FILE
(Area-010)

Phase Pyroliser for Power Plant

PYROLISER PLANT
(Area 010)

Equipment – MEDRECYCLER – 010

Redacted Copy – Claim of Confidentiality

Pyrolyser Plant
Equipment No. General-010-001

1131

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[REDACTED]

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Pyrolyser Plant
Equipment No. General-010-001

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Equipment No. General-010-001

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Pyrolyser Plant
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SUBSECTION 1



DATE	
DRAWN BY	J.A.
DATE	Mar 2019
CHECKED BY	M.K.
DATE	Mar 2019
APPROVED (ENG)	R.B.
DATE	Mar 2019
APPROVED (CLIENT)	
DATE	

Technotherm
Superior thermal technologies

EMAIL: INFO@TECHNOTHERM.CO.ZA WWW.TECHNOTHERM.CO.ZA

**PYROLYSIS PLANT
 PYROLYSER
 GENERAL ARRANGEMENT**

DRG No :- 1131-003 SHT 1 OF 1

Attachment L
Emission Unit Data Sheet
(INCINERATOR)

Control Device ID No. (must match List Form): 900

Equipment Information

1. Manufacturer: Technotherm	2. Model No. Regenerative Thermal Oxidizer
3. On a separate sheet sketch or draw the proposed incinerator showing the location and dimensions (inside and out) of (1) the primary combustion chamber, (2) the secondary combustion chamber, (3) the flame port, (4) auxiliary burners, and (5) dampers with special emphasis on dimensions of the flame port and secondary combustion chambers (inside) . Also, sketch in the minimum distance the gas travels through the secondary combustion chamber.	
4. Rated capacity of the incinerator for the type of waste to be burned: Maximum: 110,000 lb/hr Typical: ~72,970 lb/hr Annual: ~297,716 tons/yr	
5. By what means is waste charged? <input type="checkbox"/> Batch <input checked="" type="checkbox"/> Continuous <input type="checkbox"/> Periodically	
6. Type: <input type="checkbox"/> Multiple Chamber <input checked="" type="checkbox"/> Single Chamber <input type="checkbox"/> Other, specify:	
7. Projected operating schedule: 24 hr/day 365 day/yr	

Primary Combustion Chamber

8. Volume: ft ³	9. Effective grate area: ft ²
10. Maximum temperature: 1562 °F	11. Burning rate: lb/ft ² /hr
12. Heat release in primary chamber: BTU/hr/ft ³	13. Total heat release in incinerator: BTU/hr/ft ³

Secondary Combustion Chamber

14. Volume: N/A ft ³	15. Cross sectional area: ft ²
16. Volume of gas through secondary combustion chamber: ACFM @ °F	17. Gas velocity through secondary combustion chamber: ft/sec
18. Minimum gas temperature: °F	19. Minimum retention time of gas: sec
20. Minimum distance of gas travel through secondary combustion chamber: ft	21. Location of air admission:

Flame Port

22. Flame port area: ft ²	23. Velocity through flame port: ft/sec
--------------------------------------	-----------------------------------------

Dampers

24. Type: Pneumatically operated, prallel blade louver	25. Number 4
26. Diameter: inches	27. Capacity: ACFM @ °F

Combustion Air

28. Type of draft: <table style="display: inline-table; vertical-align: middle; margin-left: 20px;"> <tr> <td><input type="checkbox"/> Natural</td> <td><input checked="" type="checkbox"/> Forced</td> </tr> <tr> <td><input type="checkbox"/> Sliding damper</td> <td><input type="checkbox"/> Induced</td> </tr> <tr> <td><input type="checkbox"/> Barometric damper</td> <td></td> </tr> </table> Windshielding? <input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Natural	<input checked="" type="checkbox"/> Forced	<input type="checkbox"/> Sliding damper	<input type="checkbox"/> Induced	<input type="checkbox"/> Barometric damper		29. If draft is forced or induced, describe ID fans or blowers: <table style="width: 100%; margin-top: 10px;"> <tr> <td style="width: 30%;">Number</td> <td style="width: 40%;">1 fan</td> <td style="width: 30%;"></td> </tr> <tr> <td>HP rating</td> <td>~19</td> <td>HP</td> </tr> <tr> <td>Rated flow</td> <td>1,236</td> <td>ft³/min</td> </tr> <tr> <td>Rated speed</td> <td></td> <td>RPM</td> </tr> <tr> <td>Fan rated draft</td> <td></td> <td>in. H₂O</td> </tr> <tr> <td>Volume</td> <td>@</td> <td>°F</td> </tr> </table>	Number	1 fan		HP rating	~19	HP	Rated flow	1,236	ft ³ /min	Rated speed		RPM	Fan rated draft		in. H ₂ O	Volume	@	°F
<input type="checkbox"/> Natural	<input checked="" type="checkbox"/> Forced																								
<input type="checkbox"/> Sliding damper	<input type="checkbox"/> Induced																								
<input type="checkbox"/> Barometric damper																									
Number	1 fan																								
HP rating	~19	HP																							
Rated flow	1,236	ft ³ /min																							
Rated speed		RPM																							
Fan rated draft		in. H ₂ O																							
Volume	@	°F																							
30. Theoretical air/refuse ratio: lb air/lb refuse																									
31. Percent of total air applied as:																									
overfire air																									
underfire air																									

Auxiliary Burners

32. Proposed type and fuel: NG	
33. Primary Burner Capacity: 3.79 MMBTU/hr Number: 2 Manufacture: Technotherm Model: TBD Estimated capacity: BTU/hr Fuel: NG How controlled? Air Is there a temperature indicator? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No How temperature recorded? thermocouples/transmit	34. Secondary Burner Capacity: N/A MMBTU/hr Number: Manufacture: Model: Estimated capacity: BTU/hr Fuel: How controlled? Is there a temperature indicator? <input type="checkbox"/> Yes <input type="checkbox"/> No

Miscellaneous Devices and Controls

35. Automatic loading device. <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If yes, describe. Gas flow	36. Self closing doors. <input type="checkbox"/> Yes <input type="checkbox"/> No
37. Sparks arrestor <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	38. Flame failure protection equipment <input type="checkbox"/> Yes <input type="checkbox"/> No
39. Method of creating turbulence for combustion gases. Describe. Air	40. Method of cleaning secondary or settling chamber. Describe. N/A
41. Other interlocking devices or controls. If yes, describe. <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Maintenance and fire protection	

Installation

42. Indoor Installation: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If yes, describe method of supplying combustion air.	43. Outdoor Installation: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
------------------------------------------------------------------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------

Stack or Vent Data

44. Inside diameter or dimensions: 2.36 ft	45. Gas exit temperature: 300 °F
46. Height: 49.21 ft	47. Stack serves: <input type="checkbox"/> This equipment only <input checked="" type="checkbox"/> Other equipment also (submit type and rating of all other equipment exhausted through this stack or vent)
48. Gas flow rate: 15,239 ft/min	
49. Estimated percent of moisture: %	

Waste

50. Source of waste: <input type="checkbox"/> Hospital <input type="checkbox"/> Restaurant <input type="checkbox"/> Store <input checked="" type="checkbox"/> Industry <input type="checkbox"/> Apartment <input type="checkbox"/> Crematory <input type="checkbox"/> Warehouse <input type="checkbox"/> Public Institution <input checked="" type="checkbox"/> Other, specify:	
51. Describe fully, in detail, the composition of waste feed to the incinerator: The waste feed will vary and is a combination of all of the emissions from the process equipment and engines.	
52. Expected BTU/lb as fired: BTU/lb	53. Daily amount: lb
54. Does incinerator have a charge hopper <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	55. What is the volume of the charge hopper? ft ³
56. Does the charge hopper have automatic control? <input type="checkbox"/> Yes <input type="checkbox"/> No	57. Is the waste charged to the incinerator weighed? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
58. Is the secondary chamber preheated prior to charging waste? <input type="checkbox"/> Yes <input type="checkbox"/> No	59. At what secondary temperature does waste charging begin? °F
60. Is the ash waste quenched? <input type="checkbox"/> Yes <input type="checkbox"/> No	61. Is all the waste burned generated on site? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
62. For hospital waste, is the ash inspected for recognizable combustible components? <input type="checkbox"/> Yes <input type="checkbox"/> No	
63. For hospital waste, are recognizable combustible components of the ash returned? <input type="checkbox"/> Yes <input type="checkbox"/> No	
64. Is any waste received from outside the local government boundary? <input type="checkbox"/> Yes <input type="checkbox"/> No	
65. Are hazardous or special waste burned? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If yes, please describe:	66. Are potential infectious waste burned? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
67. How will the waste material from process and control equipment be disposed of? Through the stack. Gas.	
68. Method of charging waste solids: <input type="checkbox"/> Manual <input type="checkbox"/> Manual charge hopper <input type="checkbox"/> Automatic charge hopper <input type="checkbox"/> Other, specify: N/A	69. Method of feeding liquids: <input type="checkbox"/> Lab pack <input type="checkbox"/> Injection as a primary burner fuel <input type="checkbox"/> Injection as a secondary burner fuel <input type="checkbox"/> Other, specify: N/A
70. Rated steam flow – heat recovery boiler: lbs/hr	71. Rated pressure – recovery boiler: PSIG

Emissions Stream

72. Emission rates: Emission Rates Vary by Feed

Pollutant	Pounds per Hour lb/hr	grain/ACF	@ °F	PSIA	Tons per Year Tons/yr	Parts per Million ppm
CO						
Hydrocarbons						
NO _x						
Pb						
PM ₁₀						
SO ₂						
VOCs						
Other (specify)						

73. If an *Air Pollution Control Device* is not submitted, the emission rates should be the same as those reported home "Maximum Potential and Maximum Actual Emissions" on the *Emission Points Data Summary Sheet*.

74. Emissions rates should be substantiated by submitting *stack test data* and/or *calculations*.

Fuel Usage Data

75. Estimated annual fuel cost: \$	
76. Firing rate: Maximum: mmBTU/hr	77. Fuel type: <input checked="" type="checkbox"/> Natural Gas <input type="checkbox"/> Coal
Typical: mmBTU/hr	<input type="checkbox"/> Fuel Oil, No.
Design: mmBTU/hr	<input type="checkbox"/> Other, specify:
78. Typical heating content of fuel:	79. Typical fuel sulfur content: wt. %
80. Typical fuel ash content: wt. %	81. Annual fuel usage:
82. Please complete an <i>Air Pollution Control Device Sheet(s)</i> for the control(s) used on this Emission Unit, if applicable.	
83. Have you included the <i>air pollution rates</i> on the Emissions Points Data Summary Sheet?	

84. Proposed Monitoring, Recordkeeping, Reporting, and Testing

Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING PLAN: Please list (1) describe the process parameters and how they were chosen (2) the ranges and how they were established for monitoring to demonstrate compliance with the operation of this process equipment operation or air pollution control device.

Monitoring will be accomplished using the TO control panel. The facility personnel will conduct monthly inspections for visible stack emissions and malodors. The TO stack emission observations will not be required to be performed by a person certified as a qualified observer under EPA Method 9 for Visual Determination of Opacity of Emission from Stationary Sources.

TESTING PLAN: Please describe any proposed emissions testing for this process equipment or air pollution control device.

TBD

RECORDKEEPING: Please describe the proposed recordkeeping that will accompany the monitoring. Record all upsets to the system. Visual inspection reports will be maintained on site in the control room.

REPORTING: Please describe the proposed frequency of reporting of the recordkeeping. Report to WVDEP all upsets sent to the flare.

85. Please describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty.

Annual shutdown of two weeks. Maintenance manual provided to the plant.



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All hours number: 0027 78 311 6236

Superior thermal technologies

www.technotherm.co.za

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TECHNICAL FILE
(Area-950)

Regenerative Thermal Oxidiser for
Power Plant

**REGENERATIVE
THERMAL OXIDISER (Re-Ox)**
(Area 950)

Equipment – MEDRECYCLER – 950

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Regenerative Thermal Oxidiser
Equipment No. General-950

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Haul Road Fugitives

Attachment L
Emission Unit Data Sheet
(INDIRECT HEAT EXCHANGER)

Control Device ID No. (must match List Form): 400

Equipment Information

1. Manufacturer: Technotherm	2. Model No. Serial No.
3. Number of units: Gas deacceleration chamber with Cyclones, Desuperheater Heat Exchanger, Tar Condensers, Oil Condensing Scrubbers, Wet Alkali dosed Gas Scrubbers, API CPI Settling tanks (per scrubber), Centrifuge	4. Use: Gas Clean-Up System
5. Rated Boiler Horsepower: N/A hp	6. Boiler Serial No.:
7. Date constructed:	8. Date of last modification and explain:
9. Maximum design heat input per unit: N/A ×10 ⁶ BTU/hr	10. Peak heat input per unit: ×10 ⁶ BTU/hr
11. Steam produced at maximum design output: N/A LB/hr psig	12. Projected Operating Schedule: Hours/Day 24 Days/Week 7 Weeks/Year 52
13. Type of firing equipment to be used: <input type="checkbox"/> Pulverized coal <input type="checkbox"/> Spreader stoker <input type="checkbox"/> Oil burners <input type="checkbox"/> Natural Gas Burner <input type="checkbox"/> Others, specify	14. Proposed type of burners and orientation: <input type="checkbox"/> Vertical <input type="checkbox"/> Front Wall <input type="checkbox"/> Opposed <input type="checkbox"/> Tangential <input type="checkbox"/> Others, specify
15. Type of draft: <input type="checkbox"/> Forced <input type="checkbox"/> Induced	16. Percent of ash retained in furnace: %
17. Will flyash be reinjected? <input type="checkbox"/> Yes <input type="checkbox"/> No	18. Percent of carbon in flyash: %

Stack or Vent Data

19. Inside diameter or dimensions: ft.	20. Gas exit temperature: 302 °F
21. Height: ft.	22. Stack serves: <input type="checkbox"/> This equipment only <input type="checkbox"/> Other equipment also (submit type and rating of all other equipment exhausted through this stack or vent)
23. Gas flow rate: ft ³ /min	
24. Estimated percent of moisture: %	

Fuel Requirements

25.	Type	Fuel Oil No.	Natural Gas	Gas (other, specify)	Coal, Type:	Other:
	Quantity (at Design Output)	gph @ 60°F	ft ³ /hr	ft ³ /hr	TPH	
	Annually	×10 ³ gal	×10 ⁶ ft ³ /hr	×10 ⁶ ft ³ /hr	tons	
	Sulfur	Maximum: wt. % Average: wt. %	gr/100 ft ³	gr/100 ft ³	Maximum: wt. %	
	Ash (%)				Maximum	
	BTU Content	BTU/Gal. Lbs/Gal. @ 60°F	BTU/ft ³	BTU/ft ³	BTU/lb	
	Source					
	Supplier					
	Halogens (Yes/No)					
	List and Identify Metals					

26. Gas burner mode of control: <input type="checkbox"/> Manual <input type="checkbox"/> Automatic hi-low <input type="checkbox"/> Automatic full modulation <input type="checkbox"/> Automatic on-off	27. Gas burner manufacture: <hr/> 28. Oil burner manufacture:
29. If fuel oil is used, how is it atomized? <input type="checkbox"/> Oil Pressure <input type="checkbox"/> Steam Pressure <input type="checkbox"/> Compressed Air <input type="checkbox"/> Rotary Cup <input type="checkbox"/> Other, specify	
30. Fuel oil preheated: <input type="checkbox"/> Yes <input type="checkbox"/> No	31. If yes, indicate temperature: _____ °F
32. Specify the calculated theoretical air requirements for combustion of the fuel or mixture of fuels described above actual cubic feet (ACF) per unit of fuel: @ _____ °F, _____ PSIA, _____ % moisture	
33. Emission rate at rated capacity: _____ lb/hr	
34. Percent excess air actually required for combustion of the fuel described: _____ %	
Coal Characteristics	
35. Seams:	
36. Proximate analysis (dry basis): % of Fixed Carbon: _____ % of Sulfur: _____ % of Moisture: _____ % of Volatile Matter: _____ % of Ash: _____	

Emissions Stream

37. What quantities of pollutants will be emitted from the boiler before controls?

Pollutant	Pounds per Hour lb/hr	grain/ACF	@ °F	PSIA
CO				
Hydrocarbons				
NO _x				
Pb				
PM ₁₀				
SO ₂				
VOCs				
Other (specify)				

38. What quantities of pollutants will be emitted from the boiler after controls?

Pollutant	Pounds per Hour lb/hr	grain/ACF	@ °F	PSIA
CO				
Hydrocarbons				
NO _x				
Pb				
PM ₁₀				
SO ₂				
VOCs				
Other (specify)				

39. How will waste material from the process and control equipment be disposed of?

Stack 1000, Landfill

40. Have you completed an *Air Pollution Control Device Sheet(s)* for the control(s) used on this Emission Unit. Y

41. Have you included the **air pollution rates** on the Emissions Points Data Summary Sheet?

42. Proposed Monitoring, Recordkeeping, Reporting, and Testing

Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING PLAN: Please list (1) describe the process parameters and how they were chosen (2) the ranges and how they were established for monitoring to demonstrate compliance with the operation of this process equipment operation or air pollution control device.

Weekly and monthly inspections according to manufacturer specifications. Instrumentation to assist in presenting issues.

TESTING PLAN: Please describe any proposed emissions testing for this process equipment or air pollution control device.

Per request.

RECORDKEEPING: Please describe the proposed recordkeeping that will accompany the monitoring.

Any Malfunctions

REPORTING: Please describe the proposed frequency of reporting of the recordkeeping.

All Weekly and Monthly inspections along with any malfunctions.

43. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty.

The gas clean-up system will be monitored via instrumentation for any errors or blockages requiring maintenance. Remaining regular maintenance procedures to be provided by manufacturer.

Technotherm

S U P E R I O R T H E R M A L T E C H N O L O G Y

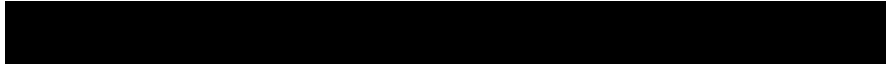
Superthem (Pty) Ltd t/a TECHNOTHERM

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FUNCTIONAL SPECIFICATION

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Synthesis Gas Cleaning System

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Synthesis Gas Cleaning System

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Synthesis Gas Cleaning System

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Synthesis Gas Cleaning System

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Attachment L
EMISSIONS UNIT DATA SHEET
GENERAL

To be used for affected sources other than asphalt plants, foundries, incinerators, indirect heat exchangers, and quarries.

Identification Number (as assigned on *Equipment List Form*): 220

<p>1. Name or type and model of proposed affected source:</p> <p>Dryer Technotherm</p>
<p>2. On a separate sheet(s), furnish a sketch(es) of this affected source. If a modification is to be made to this source, clearly indicated the change(s). Provide a narrative description of all features of the affected source which may affect the production of air pollutants.</p>
<p>3. Name(s) and maximum amount of proposed process material(s) charged per hour:</p> <p>7,332.6 lb/hr</p>
<p>4. Name(s) and maximum amount of proposed material(s) produced per hour:</p> <p>7,700 lb/hr dryer maximum</p>
<p>5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants:</p> <p>N/A</p>

* The identification number which appears here must correspond to the air pollution control device identification number appearing on the *List Form*.

6. Combustion Data (if applicable):			
(a) Type and amount in appropriate units of fuel(s) to be burned:			
76 cfm of natural gas for 6 hrs during start-up then will use syngas			
(b) Chemical analysis of proposed fuel(s), excluding coal, including maximum percent sulfur and ash:			
Natural gas Syngas will vary in composition			
(c) Theoretical combustion air requirement (ACF/unit of fuel):			
296643	@	60	°F and 14.7 psia.
(d) Percent excess air:			
(e) Type and BTU/hr of burners and all other firing equipment planned to be used:			
1 burner			
(f) If coal is proposed as a source of fuel, identify supplier and seams and give sizing of the coal as it will be fired:			
N/A			
(g) Proposed maximum design heat input:			
		4.30	× 10 ⁶ BTU/hr.
7. Projected operating schedule:			
Hours/Day	24	Days/Week	7
		Weeks/Year	52

8. Projected amount of pollutants that would be emitted from this affected source if no control devices were used:				
@	N/A	°F and		psia
a.	NO _x	N/A	lb/hr	N/A grains/ACF
b.	SO ₂	N/A	lb/hr	N/A grains/ACF
c.	CO	N/A	lb/hr	N/A grains/ACF
d.	PM ₁₀	N/A	lb/hr	N/A grains/ACF
e.	Hydrocarbons	N/A	lb/hr	N/A grains/ACF
f.	VOCs	N/A	lb/hr	N/A grains/ACF
g.	Pb	N/A	lb/hr	N/A grains/ACF
h.	Specify other(s)		lb/hr	grains/ACF
			lb/hr	grains/ACF
			lb/hr	grains/ACF
			lb/hr	grains/ACF

NOTE: (1) An Air Pollution Control Device Sheet must be completed for any air pollution device(s) used to control emissions from this affected source.

(2) Complete the Emission Points Data Sheet.

9. Proposed Monitoring, Recordkeeping, Reporting, and Testing
 Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

<p>MONITORING Weekly and monthly inspections according to manufacturer specifications.</p>	<p>RECORDKEEPING All Weekly and Monthly inspections along with any malfunctions.</p>
----------------------------------------------------------------------------------------------------------------	----------------------------------------------------------------------------------------------------------

<p>REPORTING Any malfunctions.</p>	<p>TESTING Upon request.</p>
--------------------------------------------------------	--------------------------------------------------

MONITORING. PLEASE LIST AND DESCRIBE THE PROCESS PARAMETERS AND RANGES THAT ARE PROPOSED TO BE MONITORED IN ORDER TO DEMONSTRATE COMPLIANCE WITH THE OPERATION OF THIS PROCESS EQUIPMENT OPERATION/AIR POLLUTION CONTROL DEVICE.

RECORDKEEPING. PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.

REPORTING. PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.

TESTING. PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT/AIR POLLUTION CONTROL DEVICE.

10. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty
 Routine maintenance (lubrication) do not require shut down. Major maintenance issues to involve a shut-down.



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TECHNICAL FILE

(Area-030)

Dryer for Power Plant

DRYER PLANT

(Area 030)

Equipment – MEDRECYCLER – 030

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Dryer
Equipment No. General-030

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Dryer
Equipment No. General-030

1131

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Dryer
Equipment No. General-030

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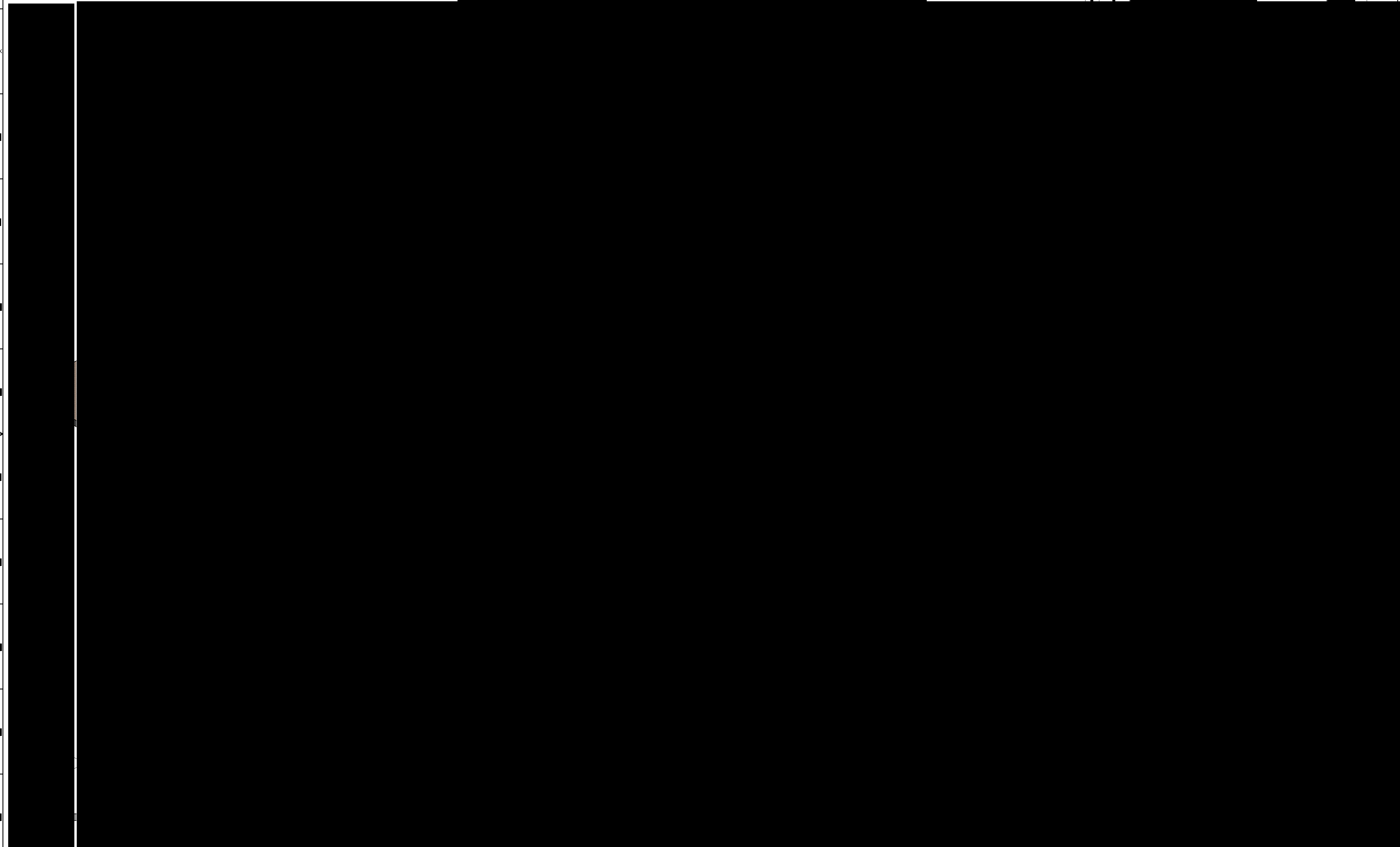
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	REVISED BY	DATE	REVISION	REVISION

MATERIAL LIST		MASS KG
SUPERIOR THERMAL TECHNOLOGIES		
EMAIL: INFO@TECHOTHERM.CO.ZA		WWW.TECHOTHERM.CO.ZA
TITLE: GENERAL ARRANGMENT		
DRG NO : T1127-030-001 SHEET 1 OF 1		

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Attachment L
EMISSIONS UNIT DATA SHEET
GENERAL

To be used for affected sources other than asphalt plants, foundries, incinerators, indirect heat exchangers, and quarries.

Identification Number (as assigned on *Equipment List Form*): 200

<p>1. Name or type and model of proposed affected source:</p> <p>Macerator/Shredder Medical Waste Shredder by Technotherm</p>
<p>2. On a separate sheet(s), furnish a sketch(es) of this affected source. If a modification is to be made to this source, clearly indicated the change(s). Provide a narrative description of all features of the affected source which may affect the production of air pollutants.</p>
<p>3. Name(s) and maximum amount of proposed process material(s) charged per hour:</p> <p>2,542.7 ft³/hr</p>
<p>4. Name(s) and maximum amount of proposed material(s) produced per hour:</p> <p>2,542.7 ft³/hr</p>
<p>5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants:</p> <p>N/A</p>

* The identification number which appears here must correspond to the air pollution control device identification number appearing on the *List Form*.

6. Combustion Data (if applicable):			
(a) Type and amount in appropriate units of fuel(s) to be burned:			
N/A			
(b) Chemical analysis of proposed fuel(s), excluding coal, including maximum percent sulfur and ash:			
N/A			
(c) Theoretical combustion air requirement (ACF/unit of fuel):			
N/A	@	°F and	psia.
(d) Percent excess air: N/A			
(e) Type and BTU/hr of burners and all other firing equipment planned to be used:			
N/A			
(f) If coal is proposed as a source of fuel, identify supplier and seams and give sizing of the coal as it will be fired:			
N/A			
(g) Proposed maximum design heat input: N/A × 10 ⁶ BTU/hr.			
7. Projected operating schedule:			
Hours/Day	24	Days/Week	7
		Weeks/Year	52

8. Projected amount of pollutants that would be emitted from this affected source if no control devices were used:

@	N/A	°F and	psia
a. NO _x	N/A	lb/hr	N/A grains/ACF
b. SO ₂	N/A	lb/hr	N/A grains/ACF
c. CO	N/A	lb/hr	N/A grains/ACF
d. PM ₁₀	N/A	lb/hr	N/A grains/ACF
e. Hydrocarbons	N/A	lb/hr	N/A grains/ACF
f. VOCs	N/A	lb/hr	N/A grains/ACF
g. Pb	N/A	lb/hr	N/A grains/ACF
h. Specify other(s)		lb/hr	grains/ACF
		lb/hr	grains/ACF
		lb/hr	grains/ACF
		lb/hr	grains/ACF

NOTE: (1) An Air Pollution Control Device Sheet must be completed for any air pollution device(s) used to control emissions from this affected source.

(2) Complete the Emission Points Data Sheet.

9. Proposed Monitoring, Recordkeeping, Reporting, and Testing
 Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

<p>MONITORING Weekly and monthly inspections according to manufacturer specifications.</p>	<p>RECORDKEEPING All Weekly and Monthly inspections along with any malfunctions.</p>
----------------------------------------------------------------------------------------------------------------	----------------------------------------------------------------------------------------------------------

<p>REPORTING Any malfunctions.</p>	<p>TESTING No air emissions associated with equipment.</p>
--------------------------------------------------------	--------------------------------------------------------------------------------

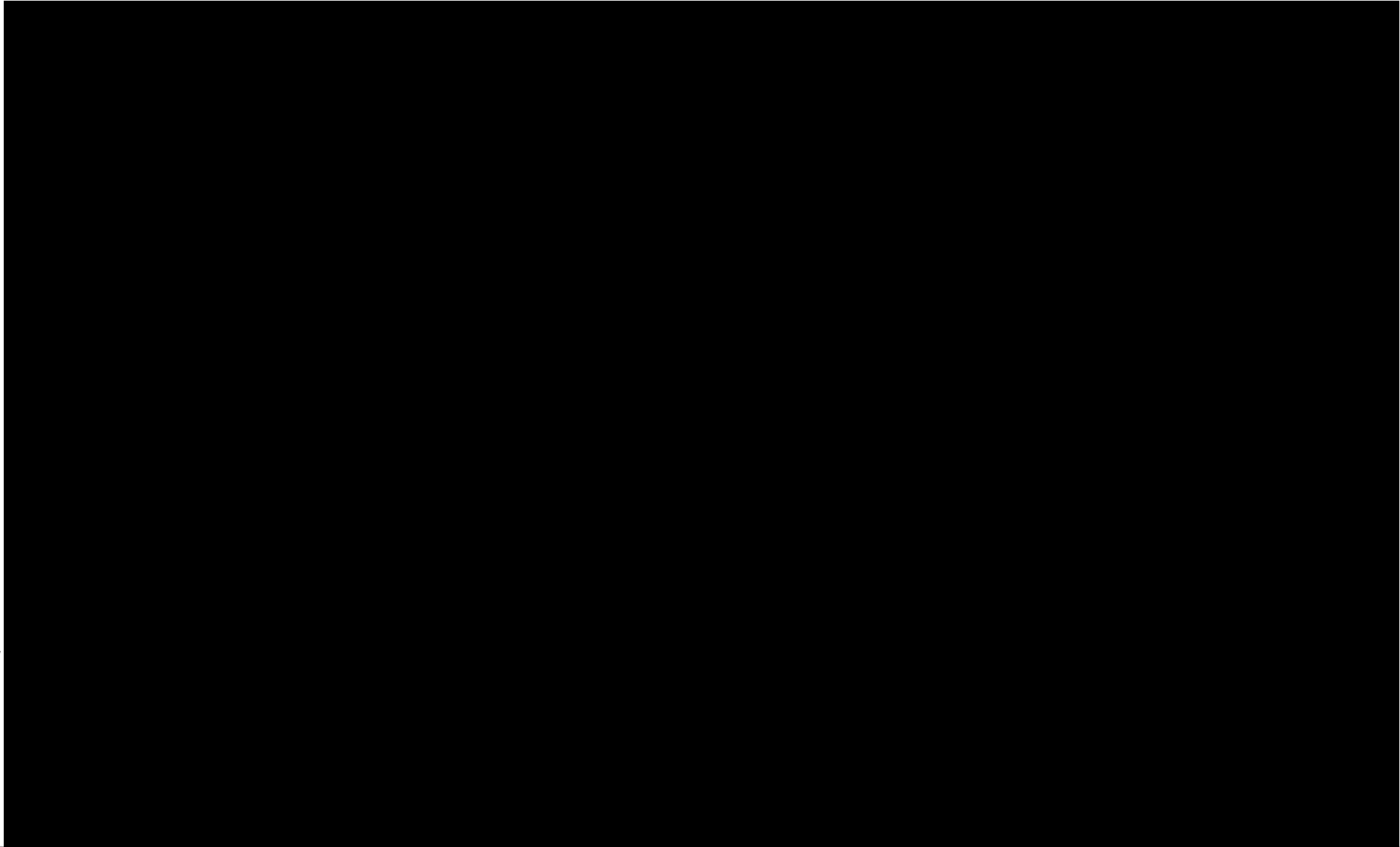
MONITORING. PLEASE LIST AND DESCRIBE THE PROCESS PARAMETERS AND RANGES THAT ARE PROPOSED TO BE MONITORED IN ORDER TO DEMONSTRATE COMPLIANCE WITH THE OPERATION OF THIS PROCESS EQUIPMENT OPERATION/AIR POLLUTION CONTROL DEVICE.

RECORDKEEPING. PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.

REPORTING. PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.

TESTING. PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT/AIR POLLUTION CONTROL DEVICE.

10. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty
 Operations to take place at -0.0035psia.



4kW

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		J.P. SPANGENBERG APPROVED CHIEF ENGINEER		DATE
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		THIS DWG PRINTED:		



EMAIL: INFO@TECHNOTHERM.CO.ZA / WWW.TECHNOTHERM.CO.ZA

TITLE		MEDI RECYCLER - RI SHREDDING AREA MEDICAL WASTE SHREDDER GENERAL ARRANGEMENT									
ORIG/SIZE	SCALE	DWG NO	PROJECT	PHASE/STEAM	AREA	TYPE	SEQ No	SHEET	REV	CAD FILE NUMBER	
A1	1:50				1131-020-001			1/1	A		

REV No.	DATE	DESCRIPTION	DRAWN	CHKD
A	21.11.2019	FIRST ISSUE	TGB	
REVISIONS				

Attachment L
EMISSIONS UNIT DATA SHEET
BULK LIQUID TRANSFER OPERATIONS

Furnish the following information for each new or modified bulk liquid transfer area or loading rack, as shown on the *Equipment List Form* and other parts of this application. This form is to be used for bulk liquid transfer operations such as to and from drums, marine vessels, rail tank cars, and tank trucks.

Identification Number (as assigned on <i>Equipment List Form</i>):				
1. Loading Area Name:				
2. Type of cargo vessels accommodated at this rack or transfer point (check as many as apply):				
<input type="checkbox"/> Drums <input type="checkbox"/> Marine Vessels <input type="checkbox"/> Rail Tank Cars <input type="checkbox"/> Tank Trucks				
3. Loading Rack or Transfer Point Data:				
Number of pumps				
Number of liquids loaded				
Maximum number of marine vessels, tank trucks, tank cars, and/or drums loading at one time				
4. Does ballasting of marine vessels occur at this loading area?				
<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply				
5. Describe cleaning location, compounds and procedure for cargo vessels using this transfer point:				
6. Are cargo vessels pressure tested for leaks at this or any other location?				
<input type="checkbox"/> Yes <input type="checkbox"/> No				
If YES, describe:				
7. Projected Maximum Operating Schedule (for rack or transfer point as a whole):				
Maximum	Jan. - Mar.	Apr. - June	July - Sept.	Oct. - Dec.
hours/day				
days/week				

weeks/quarter				
---------------	--	--	--	--

8. Bulk Liquid Data (add pages as necessary):						
Pump ID No.						
Liquid Name						
Max. daily throughput (1000 gal/day)						
Max. annual throughput (1000 gal/yr)						
Loading Method ¹						
Max. Fill Rate (gal/min)						
Average Fill Time (min/loading)						
Max. Bulk Liquid Temperature (°F)						
True Vapor Pressure ²						
Cargo Vessel Condition ³						
Control Equipment or Method ⁴						
Minimum control efficiency (%)						
Maximum Emission Rate	Loading (lb/hr)					
	Annual (lb/yr)					
Estimation Method ⁵						
¹ BF = Bottom Fill SP = Splash Fill SUB = Submerged Fill						
² At maximum bulk liquid temperature						
³ B = Ballasted Vessel, C = Cleaned, U = Uncleaned (dedicated service), O = other (describe)						
⁴ List as many as apply (complete and submit appropriate <i>Air Pollution Control Device Sheets</i>): CA = Carbon Adsorption LOA = Lean Oil Adsorption CO = Condensation SC = Scrubber (Absorption) CRA = Compressor-Refrigeration-Absorption TO = Thermal Oxidation or Incineration CRC = Compression-Refrigeration-Condensation VB = Dedicated Vapor Balance (closed system) O = other (describe)						
⁵ EPA = EPA Emission Factor as stated in AP-42 MB = Material Balance						

TM = Test Measurement based upon test data submittal
 O = other (describe)

9. Proposed Monitoring, Recordkeeping, Reporting, and Testing

Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING

RECORDKEEPING

REPORTING

TESTING

MONITORING. PLEASE LIST AND DESCRIBE THE PROCESS PARAMETERS AND RANGES THAT ARE PROPOSED TO BE MONITORED IN ORDER TO DEMONSTRATE COMPLIANCE WITH THE OPERATION OF THIS PROCESS EQUIPMENT OPERATION/AIR POLLUTION CONTROL DEVICE.

RECORDKEEPING. PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.

REPORTING. PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.

TESTING. PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT/AIR POLLUTION CONTROL DEVICE.

10. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty

ATTACHMENT M

Air Pollution Control Device Sheet

Attachment L FUGITIVE EMISSIONS FROM UNPAVED HAULROADS

UNPAVED HAULROADS (including all equipment traffic involved in process, haul trucks, endloaders, etc.)

		PM	PM-10
k =	Particle size multiplier	0.80	0.36
s =	Silt content of road surface material (%)		
p =	Number of days per year with precipitation >0.01 in.		

Item Number	Description	Number of Wheels	Mean Vehicle Weight (tons)	Mean Vehicle Speed (mph)	Miles per Trip	Maximum Trips per Hour	Maximum Trips per Year	Control Device ID Number	Control Efficiency (%)
1									
2									
3									
4									
5									
6									
7									
8									

Source: AP-42 Fifth Edition – 13.2.2 Unpaved Roads

$$E = k \times 5.9 \times (s \div 12) \times (S \div 30) \times (W \div 3)^{0.7} \times (w \div 4)^{0.5} \times ((365 - p) \div 365) = \text{lb/Vehicle Mile Traveled (VMT)}$$

Where:

		PM	PM-10
k =	Particle size multiplier	0.80	0.36
s =	Silt content of road surface material (%)		
S =	Mean vehicle speed (mph)		
W =	Mean vehicle weight (tons)		
w =	Mean number of wheels per vehicle		
p =	Number of days per year with precipitation >0.01 in.		

For lb/hr: $[\text{lb} \div \text{VMT}] \times [\text{VMT} \div \text{trip}] \times [\text{Trips} \div \text{Hour}] = \text{lb/hr}$

For TPY: $[\text{lb} \div \text{VMT}] \times [\text{VMT} \div \text{trip}] \times [\text{Trips} \div \text{Hour}] \times [\text{Ton} \div 2000 \text{ lb}] = \text{Tons/year}$

SUMMARY OF UNPAVED HAULROAD EMISSIONS

Item No.	PM				PM-10			
	Uncontrolled		Controlled		Uncontrolled		Controlled	
	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
1								
2								
3								
4								
5								
6								
7								
8								
TOTALS								

FUGITIVE EMISSIONS FROM PAVED HAULROADS

INDUSTRIAL PAVED HAULROADS (including all equipment traffic involved in process, haul trucks, endloaders, etc.)

I =	Industrial augmentation factor (dimensionless)	
n =	Number of traffic lanes	
s =	Surface material silt content (%)	
L =	Surface dust loading (lb/mile)	

Item Number	Description	Mean Vehicle Weight (tons)	Miles per Trip	Maximum Trips per Hour	Maximum Trips per Year	Control Device ID Number	Control Efficiency (%)
1							
2							
3							
4							
5							
6							
7							
8							

Source: AP-42 Fifth Edition – 11.2.6 Industrial Paved Roads

$$E = 0.077 \times I \times (4 \div n) \times (s \div 10) \times (L \div 1000) \times (W \div 3)^{0.7} = \text{lb/Vehicle Mile Traveled (VMT)}$$

Where:

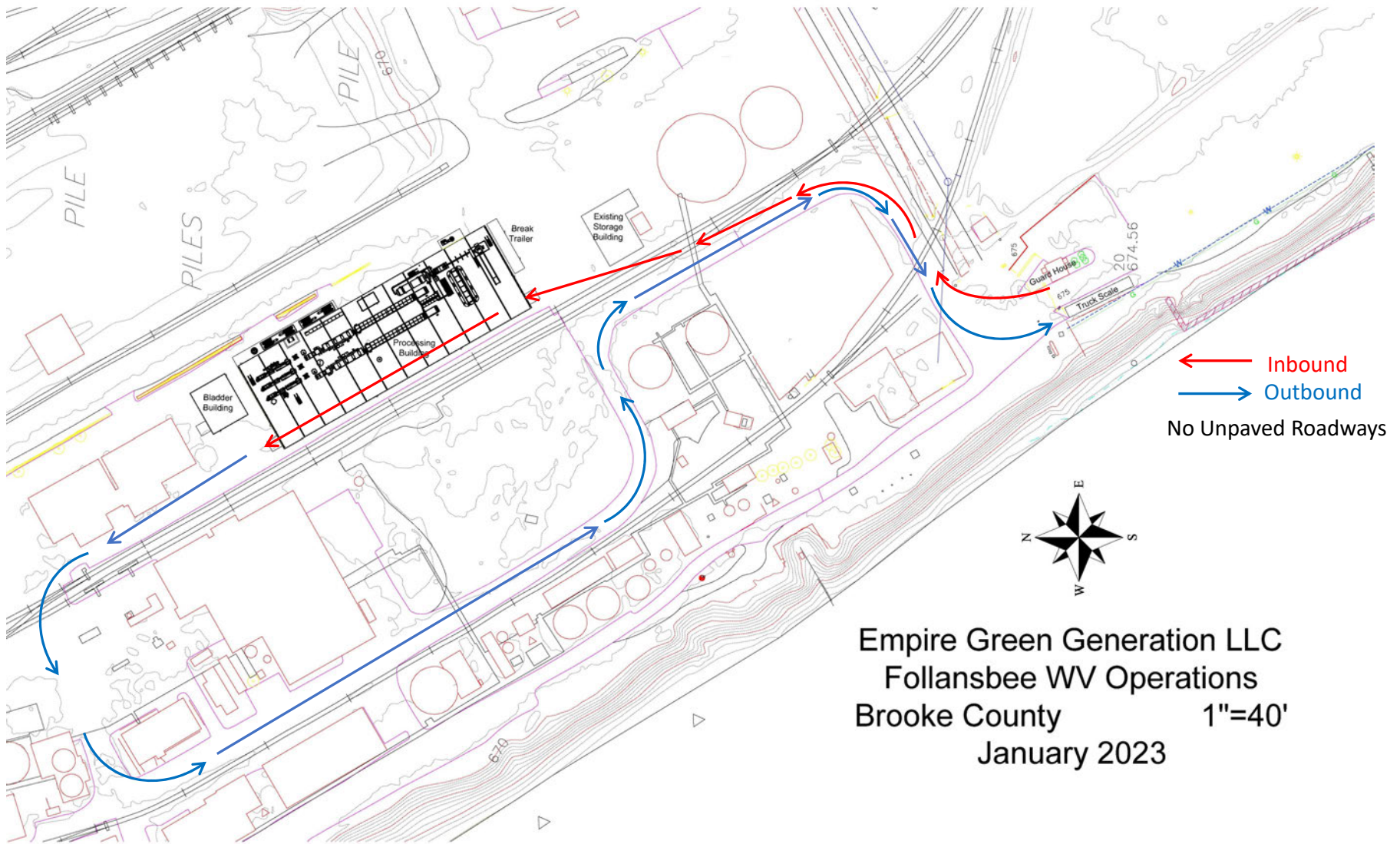
I =	Industrial augmentation factor (dimensionless)	
n =	Number of traffic lanes	
s =	Surface material silt content (%)	
L =	Surface dust loading (lb/mile)	
W =	Average vehicle weight (tons)	

For lb/hr: $[\text{lb} \div \text{VMT}] \times [\text{VMT} \div \text{trip}] \times [\text{Trips} \div \text{Hour}] = \text{lb/hr}$

For TPY: $[\text{lb} \div \text{VMT}] \times [\text{VMT} \div \text{trip}] \times [\text{Trips} \div \text{Hour}] \times [\text{Ton} \div 2000 \text{ lb}] = \text{Tons/year}$

SUMMARY OF PAVED HAULROAD EMISSIONS

Item No.	Uncontrolled		Controlled	
	lb/hr	TPY	lb/hr	TPY
1				
2				
3				
4				
5				
6				
7				
8				
TOTALS				



Attachment M
Air Pollution Control Device Sheet
 (FLARE SYSTEM)

Control Device ID No. (must match Emission Units Table): 1000

Equipment Information

1. Manufacturer: Technotherm Model No. To Be Determined	2. Method: <input type="checkbox"/> Elevated flare <input checked="" type="checkbox"/> Ground flare <input type="checkbox"/> Other Describe Stack/Emergency Flare
3. Provide diagram(s) of unit describing capture system with duct arrangement and size of duct, air volume, capacity, horsepower of movers. If applicable, state hood face velocity and hood collection efficiency.	
4. Method of system used: <input type="checkbox"/> Steam-assisted <input checked="" type="checkbox"/> Air-assisted <input type="checkbox"/> Pressure-assisted <input type="checkbox"/> Non-assisted	
5. Maximum capacity of flare: <div style="text-align: right; margin-right: 50px;"> 15,239 scf/min scf/hr </div>	6. Dimensions of stack: <div style="text-align: right;"> Diameter 2.36 ft. Height 49.21 ft. </div>
7. Estimated combustion efficiency: (Waste gas destruction efficiency) Estimated: >98 % Minimum guaranteed: >98 %	8. Fuel used in burners: <input checked="" type="checkbox"/> Natural Gas <input type="checkbox"/> Fuel Oil, Number <input type="checkbox"/> Other, Specify: Syn Gas
9. Number of burners: 1 Rating: 12,247 BTU/hr	11. Describe method of controlling flame:
10. Will preheat be used? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
12. Flare height: 49.21 ft	14. Natural gas flow rate to flare pilot flame per pilot light: <div style="text-align: right; margin-right: 50px;"> 0.20 scf/min 12.0 scf/hr </div>
13. Flare tip inside diameter: 2.36 ft	
15. Number of pilot lights: 1 Total 12,247 BTU/hr	16. Will automatic re-ignition be used? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
17. If automatic re-ignition will be used, describe the method: An electrical ignition assembly will be used to ignite the gases and including ignitor rods and an electrical control assembly to provide a spark. The assembly will be employed to light the pilot. A pilot flame thermocouple and a stack flame thermocouple will monitor the system and provide the spark for re-ignition when necessary.	
18. Is pilot flame equipped with a monitor? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If yes, what type? <input checked="" type="checkbox"/> Thermocouple <input type="checkbox"/> Infra-Red <input type="checkbox"/> Ultra Violet <input type="checkbox"/> Camera with monitoring control room <input type="checkbox"/> Other, Describe:	
19. Hours of unit operation per year: 24 hours per day; 7 days per week	

Steam Injection

20. Will steam injection be used? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	21. Steam pressure PSIG Minimum Expected: Design Maximum:
22. Total Steam flow rate: LB/hr	23. Temperature: °F
24. Velocity ft/sec	25. Number of jet streams
26. Diameter of steam jets: in	27. Design basis for steam injected: LB steam/LB hydrocarbon
28. How will steam flow be controlled if steam injection is used?	

Characteristics of the Waste Gas Stream to be Burned

29.	Name	Quantity Grains of H ₂ S/100 ft ³	Quantity (LB/hr, ft ³ /hr, etc)	Source of Material
	Hydrocarbons	TBD		
	Cyanide Compounds	TBD		
	Ammonia	TBD		
	CO	TBD		
	Hydrogen	TBD		
	NO _x / SO _x	TBD		
30. Estimate total combustible to flare: 66,000 max (Maximum mass flow rate of waste gas) LB/hr or ACF/hr scfm				
31. Estimated total flow rate to flare including materials to be burned, carrier gases, auxiliary fuel, etc.: 5,100 LB/hr or ACF/hr				
32. Give composition of carrier gases: TBD Syngas				
33. Temperature of emission stream: 1,562 °F max Heating value of emission stream: TBD BTU/ft³ Mean molecular weight of emission stream: MW = TBD lb/lb-mole			34. Identify and describe all auxiliary fuels to be burned. Not Applicable BTU/scf BTU/scf BTU/scf BTU/scf BTU/scf	
35. Temperature of flare gas: 932 °F			36. Flare gas flow rate: 11,000 mscf/min	
37. Flare gas heat content: TBD BTU/ft³			38. Flare gas exit velocity: TBD scf/min	
39. Maximum rate during emergency for one major piece of equipment or process unit: N/A scf/min				
40. Maximum rate during emergency for one major piece of equipment or process unit: N/A BTU/min				
41. Describe any air pollution control device inlet and outlet gas conditioning processes (e.g., gas cooling, gas reheating, gas humidification): Not Applicable				
42. Describe the collection material disposal system: Not Applicable				
43. Have you included Flare Control Device in the Emissions Points Data Summary Sheet? Yes				

44. Proposed Monitoring, Recordkeeping, Reporting, and Testing
 Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

<p>MONITORING:</p> <p>Monitoring will be accomplished using the control panel. The facility personnel will conduct monthly inspections for visible stack emissions and malodors. The stack emission observations will not be required to be performed by a person certified as a qualified observer under EPA Method 9 for Visual Determination of Opacity of Emission from Stationary Sources.</p>	<p>RECORDKEEPING:</p> <p>Record all upsets to the system. Visual inspection reports will be maintained on site in the control room.</p>
------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------------------------------

<p>REPORTING:</p> <p>Report to WVDEP all upsets sent to the flare.</p>	<p>TESTING:</p> <p>TBD</p>
-------------------------------------------------------------------------------	-----------------------------------

MONITORING: Please list and describe the process parameters and ranges that are proposed to be monitored in order to demonstrate compliance with the operation of this process equipment or air control device.

RECORDKEEPING: Please describe the proposed recordkeeping that will accompany the monitoring.

REPORTING: Please describe any proposed emissions testing for this process equipment on air pollution control device.

TESTING: Please describe any proposed emissions testing for this process equipment on air pollution control device.

45. Manufacturer's Guaranteed Capture Efficiency for each air pollutant.
 >98%

46. Manufacturer's Guaranteed Control Efficiency for each air pollutant.
 >98%

47. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty.
 See attached document



**Ionisationszündbrenner
Ionization pilot burner
Brûleur pilote à ionisation
ZAI**





Ionisationszündbrenner ZAI

- // a m sphärischer Zündbrenner
- // Leistung 3 kW (ca. 2500 kcal/h)
- // direktzündend und direkt überwacht

Anwendung

Zum sicheren Zünden und zur ionischen Absicherung von atmosphärischen Gasbrennern in Verbindung mit unseren Gasfeuerungsautomaten IFS... und PFS...



Fig. 1

Ionization pilot burner ZAI

- // a m spheric pilot burner
- // capacity: 3 kW (approx. 2500 kcal/h)
- // direct ignition and direct control

Application

For the safe ignition and flame protection of a m spheric burners in conjunction with our automatic burner controls IFS... and PFS



Brûleur pilote à ionisation ZAI

- // brûleur a m sphérique
- // puissance: 3 kW (environ 2500 kcal/h)
- // allumage direct et rôle d'ionisation

Application

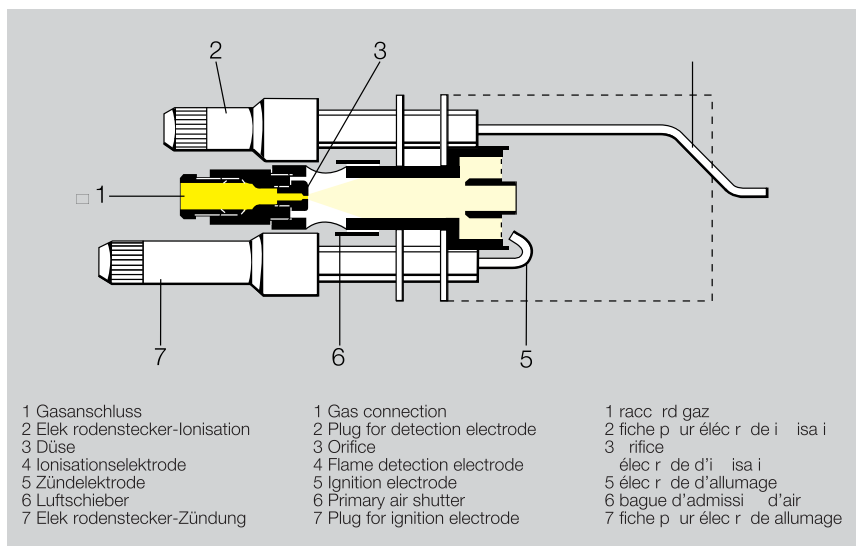
Pour l'allumage et la détection par ionisation des brûleurs à gaz ou à air soufflé, utilisé avec nos boîtiers de sécurité, IFS... et PFS



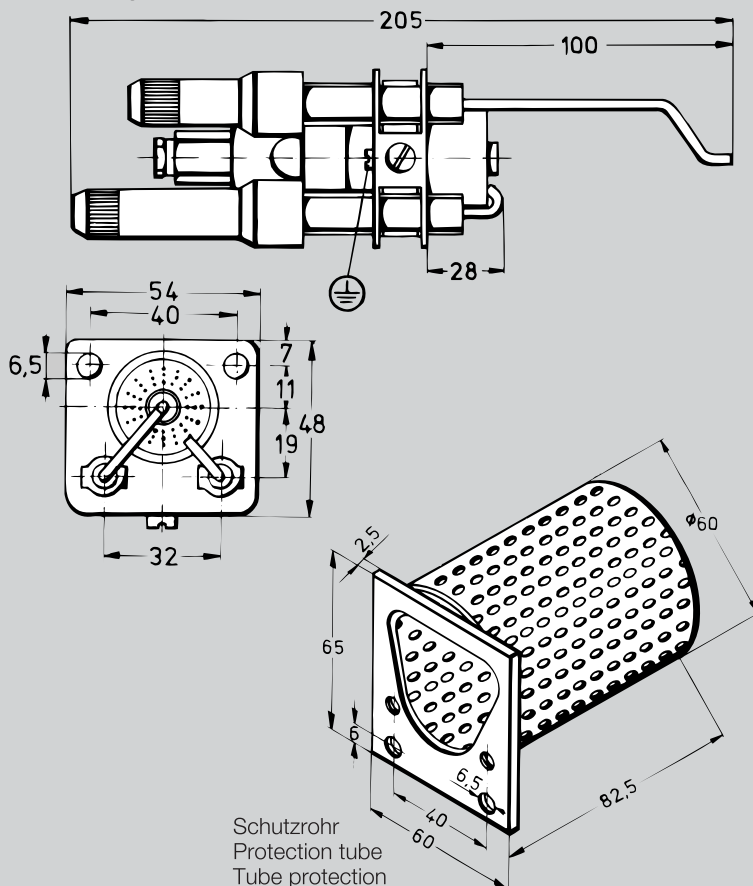
Gasart Type of gas Type de gaz	Düse Orifice Orifice Ø mm	Druckbereich* Pressure range* Pressi am * mbar	Volumenstrom Throughput Débit p mbar l/h
Erdgas Natural gas Gaz naturel	1,3	12-30	20 3 0
Flüssiggas (Propan) LPG (propane) Gaz liquéfié (propane)	0,7	30-50	50 90

* für abweichende Drücke Düsen-Ø auf Anfrage
* for pressures other than the above Ø of orifice on request
* pour les pressions différentes, Ø d'orifice sur demande

Fig. 2



Abmessungen/Dimensions



Technische Daten

Zü dbrer ZAI für Erdgas u d Pr pa
A dtere Gasar auf A frage
Auslieferu g: Erdgasei s ellu g (Fig 2)
Max Umgebu gs empera ur: 500 °C
Gasa schluss: Cu-R hr 8 x 1
Schu zar : IP 20

Ausfüh ung

Zü derk pf aus S ahl, verzi k
Hal eblech aus S ahl, verzi k
Zü d- u d l isa i selek r de aus Ka -
hal A-1
Zü delek r de s ecker - brau , fu kent-
s ör
l isa i selek r de s ecker - schwarz

Technical Data

Pil bur er ZAI f r a ural gas a d pr pa-
e O her gases reques
S a dard versi : a ural gas (Fig 2)
Max ambie empera ure: 500 °C
Gas c ec i : Cu- ube 8 x 1
Pr ec ive grade: IP 20

Const uction

Ig i i head - s eel, galva ized
Fixi g pla e - s eel galva ized
Ig i i a d i isa i elec r des - Ka -
hal A-1
Plug c ec r f r ig i i elec r de -
br w (suppressed)
Plug c ec r f r flame rec ifica i elec-
r de - black

Ca acté istiques Techniques

Brûleur pil e ZAI p ur gaz a urel e pr -
pa e Au res ypes de gaz sur dema de
Exécu i livrée: aju s ée, p ur gaz a urel
(Fig 2)
Tempéra ure ambie e max : 500 °C
Racc rd p ur gaz: ube e cuivre 8 x 1
Type de pr ec i : IP 20

Const uction

Tête d'allumeur e acier, galva isé
Plaque de supp r e acier, galva isé
Elec r des d'allumage e d'i isa i en
Ka hal A-1
Fiche p ur élec r des d'allumages - bru ,
a iparasi age
Fiche p ur élec r des d'i isa i - ir



Fig. 3

Zubehö

Zü dbre er mi Schu zr hr (Fig 1)
Schu zr hr:
L chblech, Ma erial 1 8 1
Schu zr hr Bes -Nr 7 5 3 7010
2 Befes igu gsschraube M 6 x 8
Bes -Nr 03 522 138

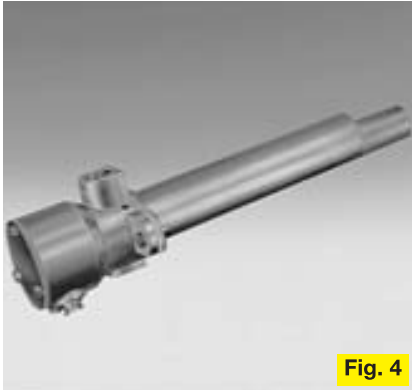


Fig. 4

Weite e Zündb enne und B enne

Typ ZMI 1,5 bis 3, kW (Fig 3)
(1,2 bis 2,9 Mcal/h)
Typ ZKIH 7 kW (Fig)
(6 Mcal/h)
Typ ZIO, BIO, 20 bis 5000 kW (Fig 5)
(17 bis 300 Mcal/h)
Typ BIC 15 bis 50 kW (Fig 6)
(13 bis 386 Mcal/h)

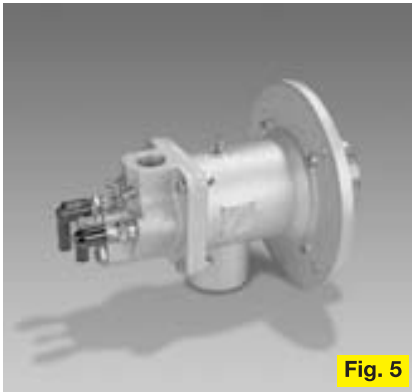


Fig. 5

Accesso ies

Pil bur er wi h draugh pr ec i ube (Fig 1)
Pr ec i ube made f perf ra ed pla e, ma erial 1 8 1
Order N 7 5 3 7010
2 fas e i g screws M 6 x 8
Order N 03 522 138

Othe pilot bu ne s and bu ne s

Type ZMI 1 5 3 kW (Fig 3)
(1 2 2 9 Mcal/h)
Type ZKIH 7 kW (Fig)
(6 Mcal/h)
Type ZIO, BIO, 20 5000 kW (Fig 5)
(17 300 Mcal/h)
Type BIC 15 50 kW (Fig 6)
(13 386 Mcal/h)

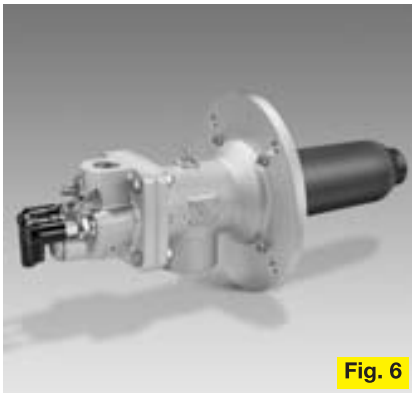


Fig. 6

Accesso ies

Brûleur avec ube pr ec i (Fig 1)
Tube pr ec i :
e ôle perf rée, ma erial 1 8 1
réf N 7 5 3 7010
2 vis de fixa i M 6 x 8
réf N 03 522 138

D'aut es b ûleu s d'allumage et b ûleu s

Type ZMI 1,5 à 3, kW (Fig 3)
(1,2 à 2,9 Mcal/h)
Type ZKIH 7 kW (Fig)
(6 Mcal/h)
Type ZIO, BIO, 20 à 5000 kW (Fig 5)
(17 à 300 Mcal/h)
Type BIC 15 à 50 kW (Fig 6)
(13 à 386 Mcal/h)

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2019/07/19

Specification sheet

Equipment type: Stack
Equipment name: Stack
Project: 1131-MedRecycler

Design velocity (m/s)	20
Design exhaust flow (m ³ /hr)	25890
Material of construction	mild steel, painted
Inner diameter (mm)	720
Total height above ground (mm)	15000
Height from ground to air inlet (mm)	2000
Distance insulated from air inlet (mm)	2000
Outer diameter insulated zone (mm)	1020
Rain hood	none

914,296.721 cf/hr
15,238.29 cf/min

Disclaimer: values are subject to change.

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1141 – General Operations and Maintenance

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Introduction

Project Overview

The Project as a commercial Plant using advanced conversion technology in the nature of a waste acceptance facility using plastics with moisture content of 35% from which a clean syngas is produced and subsequently combusted in reciprocating engine generator sets to produce electricity for export.

The Project comprises of a macerator, rotary thermal dryer, 2 sets of pyrolysers , 3 sets of syngas clean-up equipment, a hydrochloric acid recovery system, gas bladder (syngas accumulator), reciprocating engine generators, thermal oxidiser, a stack and flare. The Facility is a 3 tph swallowing capacity plastics to renewable energy power plant producing baseload electricity for export to the grid. The Project is operated on a continuous basis and is designed with sufficient plant redundancy to negate any single point total plant failures.

Waste heat is recovered from the exhaust of the engines and the Pyrolyser to dry the plastics once shredded. Site available natural gas provides start-up and standby thermal energy. The plant design and configuration is comprised of equipment that results in low life cycle costs, high operational efficiency and operational flexibility consistent with the results of the design reviews, RAM and HAZOP studies conducted during the project execution.

Supplier

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Plant and Equipment

This instruction manual relates to a WASTE TO ENERGY PLANT Scheme.
The design is for 900°C maximum process temperature.

It essentially comprises of a

- Shredder
- Dryer
- Pyrolysers
- Hydrochloric acid recovery system
- Gas clean-up system
- Gas temporary storage
- Engines
- Regenerative thermal oxidiser
- Stack and flare

Operating Philosophy

Overall process takes plastics, received by a transporting company, and thermally processes it in a pyrolysis system operating at 800°C - 900°C (1,472°F - 2,165°F). Organic matter from the plastics is evaporated forming a syngas that can directly be used as a fuel source for electrical generating engines. Oil and tar are produced where the oil is recycled through the pyrolysis system to make more syngas, and the tar is used to heat a vitrification system where solids from the process are vitrified and made inert. Exhaust from the engines are sent to a drying unit, where the plastics is dried prior to being introduced into the pyrolysis system. All gasses are sent to a Thermal Oxidizer operating at 850°C (1,562°F), after which they are conditioned for release to atmosphere via a stack.

Shredder Section

Plastics received at the facility will be in sealed containers about 2 feet square and they are not opened. Each box has an inventory, so Empire Green Generation knows what is in the box prior to being fed into the Pyrolysis System. Plastics in boxes are not stored on site but are processed as they arrive after cataloging the wastes.

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Sealed containers will be fed into the Macerator. In the Macerator, operating under negative pressure, the plastics in sealed containers will be reduced to 25 mm or less.

Drying Section

The drying of the feedstock is carried out in a direct heated, parallel flow, rotary twin drum type dryer using a combination of engine exhaust and, if necessary during start-up or unusual operating conditions, syngas and, as a last resort, natural gas.

Feedstock is transported from the dryer feed hopper into the dryer by means of a screw conveyor. Upon entering the dryer inner retort, the moist feedstock comes into direct contact with the parallel stream of hot flue gases.

Lifters and progression plates ensure intimate contact between the feedstock and flue gas therefore facilitating efficient drying and movement of feedstock along the retort.

Once both feedstock and flue gases reach the closed end of the dryer they are discharged from the inner concentric retort into the outer retort and return to the entry end of the dryer, discharging 10% moisture level feedstock into an expansion chamber. Coarse dry feedstock falls to the bottom of the chamber forming a heap on the conveyor located beneath.

The flue gas exhaust, contaminated with light particulate feedstock material, is also discharged from the expansion chamber and ducted to a bank of cyclones where separation occurs. Fine particulate falls to the bottom of each cyclone and is discharged via rotary valves into a common screw conveyor. The screw conveyor discharges the fine product onto the conveyor joining the dryer exit material and fine product. This conveyor transfers the combined dry feedstock streams onto a conveyor feeding an intermediate storage hopper that feeds both pyrolysers.

HCl Recovery System

This system is fed with dried feedstock from a thermal dryer via a live bottom screw hopper. Material is fed from a gas-tight, storage hopper into the horizontal pre-pyrolyser retort by a rotary screw. The feedstock passes through a pre-pyrolyser chamber where it is

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heated in an inert environment to allow gradual release of Chlorine. The gas is removed and condensed to form hydrochloric acid where after it is bottled.

Pyrolyser

The pyrolyser train is fed dried and partially reconstructed feedstock from the HCl recovery system as described in the previous section. The pyrolysis train consists of two identical pyrolysers. Per unit, the source of indirect heat is primarily hot exhaust flue gas from a furnace located beneath the pyrolysis retort. These hot flue gasses exit the pyrolysis retorts and then progress to the medium grade heat applications (Thermal dryer and during start up syngas cooler and tar condenser). Supplemental heating of the pyrolysis retort is being provided by firing a portion of the cleaned syngas. Natural gas is available for initial start-up or any start-up where insufficient syngas is available. After passing through the dryers the flue gas is progressed to the thermal oxidiser.

As the material passes through the pyrolysis retort, it undergoes thermal degradation releasing volatile organic syngas compounds that is discharged from the retort. The crude syngas off-takes are collected into a common manifold that transfers the syngas to the syngas cleaning system.

The heavier particles, mainly comprising of ash and fixed carbon, collect in a specially designed high temperature de-acceleration chamber where the particles are collected and returned to the furnace for energy recovery.

Ash and carbonaceous residue produced by the pyrolysers drops off the dust from the aforementioned de-acceleration chamber screw conveyers, together with the main residue collected from the base of the pyrolyser into a refractory lined furnace fired by recovered tars (described below in the syngas cleaning equipment). The heat liberated by burning the tars and oils is sufficient to heat the ash from the pyrolysis units above their eutectic temperature with excess, preheated air to burn off the tars. The char is completely combusted into CO₂ and H₂O.

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Syngas Clean-up

Particulate Matter Clean-up

Raw syngas is removed from the pyrolysis retorts, as described above, and passes through a de-acceleration chamber and then hot cyclones. The cyclones are arranged for parallel flow to ensure maximum PM removal efficiency during start-up and shutdown as the flow varies. PM drops to specially designed hot screw conveyors and from there is directed to the vitrification furnaces described above.

Syngas Coolers

The partially cleaned, still hot, flue gas flows next through stainless steel tubular syngas coolers. The cooler is in essence a heat exchanger which indirectly transfers heat from syngas to the combustion air heaters.

Tar Condensers

The syngas from the coolers described above flows to a stainless-steel shell & tube heat exchanger/cooler that is cooled by an air blower system. Tars are condensed out and drop into heated troughs, the heat source of which is engine exhaust. Hot condensed tar is pumped to the vitrification furnaces described above. The common installed spare set of coolers uses engine exhaust flue gas to heat the heat exchangers and thereby cause the tars to drop into the heated trough below.

Oil Scrubbers

The syngas from the tar condensers described above flows to a scrubber with interconnected oil and water separator.

Dosing Scrubbers

From the oil scrubber the syngas flows through a high pressure drop venturi scrubber which is kept at a set pH to neutralise the gas before progressing to temporary storage.

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Gas Bladder (Syngas Storage Tank)

The syngas storage tank provides surge capacity of cleaned syngas to level out flow and composition variations. The bladder is contained within a demarcated area. The bladder will operate with an internal pressure of 30 to 40 millibar gauge.

Thermal Oxidiser

All flue gasses enter a thermal oxidiser comprising of a rectangular box shaped furnace. The internal dimensions are determined by the total volume that needs to be raised to 850°C and maintained for 2 seconds.

Stack and Flare

The stack and flare comprises of the following:

1. Induced Draft Fan
2. Flare Stack (combined with plant stack) and
3. Plant Stack (5 m above nearest building x 720 mm dia.)

The treated hot gasses progress through the stack and disperses into the atmosphere after passing through the thermal oxidiser.

Gas Engines

Each syngas engine is a fully packaged unit complete with all associated components and auxiliaries. These engines are of robust design and have been proven on low and medium calorific value gas fuels.

The engine package allows the engine to start, synchronise, operate continuously at base or part load and shut down.

The syngas engines are situated in containers as indicated on the plant layout and engine cooling will occur by means of external radiators.

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Maintenance

Scheduled Maintenance

It is assumed that the plant will be subject to the same general routine maintenance discipline, in respect of cleanliness, neatness corrosion control etc. as the other plant and equipment in the factory.

General

- Work to be done must be cleared with the operator or his designee before commencement.
- Ensure the area is clean and free of contamination.
- Inspect labels and warning signs location, clear visibility and damage. Repair / replace if necessary.
- Inspect the equipment for any signs of build up or deposits.
- Check that all fasteners and mounting hardware is in place.
- Always stand to the side when observing interior or opening the Pyrolyser to avoid sudden exposure to heat.
- Frequent visual inspection of the equipment should be done. Any leaks, in piping, tanks, equipment casings, covers and all associated equipment or loose connections must be reported.
- If any fault occurs, analyse and permanently remove the cause. Do not remain on temporary repair.
- Immediately report any signs of abnormal equipment operation or unusual instrument readings.

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-
- After maintenance, ensure that all bolts, fittings, guards and other fasteners are correctly tightened.
 - Metal parts must be painted to avoid corrosion. Where painting is not possible suitable oil or grease must be utilized

Maintenance Tasks

The maintenance schedule specifies the frequency of the inspections and checks that are expected under normal operating conditions. In the event that the prevailing conditions are abnormal, appropriate adjustments could be expected.

Weekly Maintenance

- Check seal integrity on front and rear pre-Pyrolyser and Pyrolyser bellows
- Check seal integrity on knife gate valves
- Check limit switches and/or proxy switches ensuring holding bolts are tight
- Check striker arms on limit switches are secure
- Check thermocouples are secure
- Check for uneven movement / misalignment of mechanisms
- Check temperature controller and over temperature controller for proper operation
- Check retort rollers are tight and no excessive wear is taking place
- Grease wheels with high temperature graphite grease
- Listen for undue mechanical noise from the installation, investigate and repair if necessary
- Check all seals and gaskets for possible leaks on the hydraulic system.
- Check that all bearings are properly greased and operating correctly.

Monthly Maintenance

- Repeat weekly scheduled maintenance
- Check all bolts are tight, tighten if necessary

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-
- Ensure all guards, louvers, brackets are in place and secure.
 - Visually inspect modules and insulation blankets are properly in position and secure, repair / replace if necessary.
 - Check ducts for foreign materials causing obstruction.
 - Check structural steelwork for signs of corrosion and paint damage. Metal parts must be painted to avoid corrosion.
 - Check blower impeller by hand to ensure free rotation. Check that there is not fouling between rotating and stationary components.
 - Check that all blower fasteners are secure and that all components are in good order at the cooling section.
 - Ensure that the blower guard is in place and secure.
 - Keep electric motors' air inlets and outlets free and clean. The air blown out by the motor shall not enter again. The distance between the air inlet and the wall must be approximately ¼ of the inlet opening diameter.
 - Check retort mechanism main track roller for alignment
 - Check all pre-Pyrolyser and Pyrolyser in feed system for any possible obstructions and charge clearances
 - Check knife gate valves and proxy switch positions
 - Check all pre-Pyrolyser and Pyrolyser front and rear door seal
 - Check all booster fan clearance and rotation direction

Three Monthly Maintenance

- Repeat Monthly Maintenance
- Clean booster fan and clean all interconnecting pipes

Six Monthly Maintenance

- Repeat Three Monthly Maintenance
- Booster Fan Maintenance:

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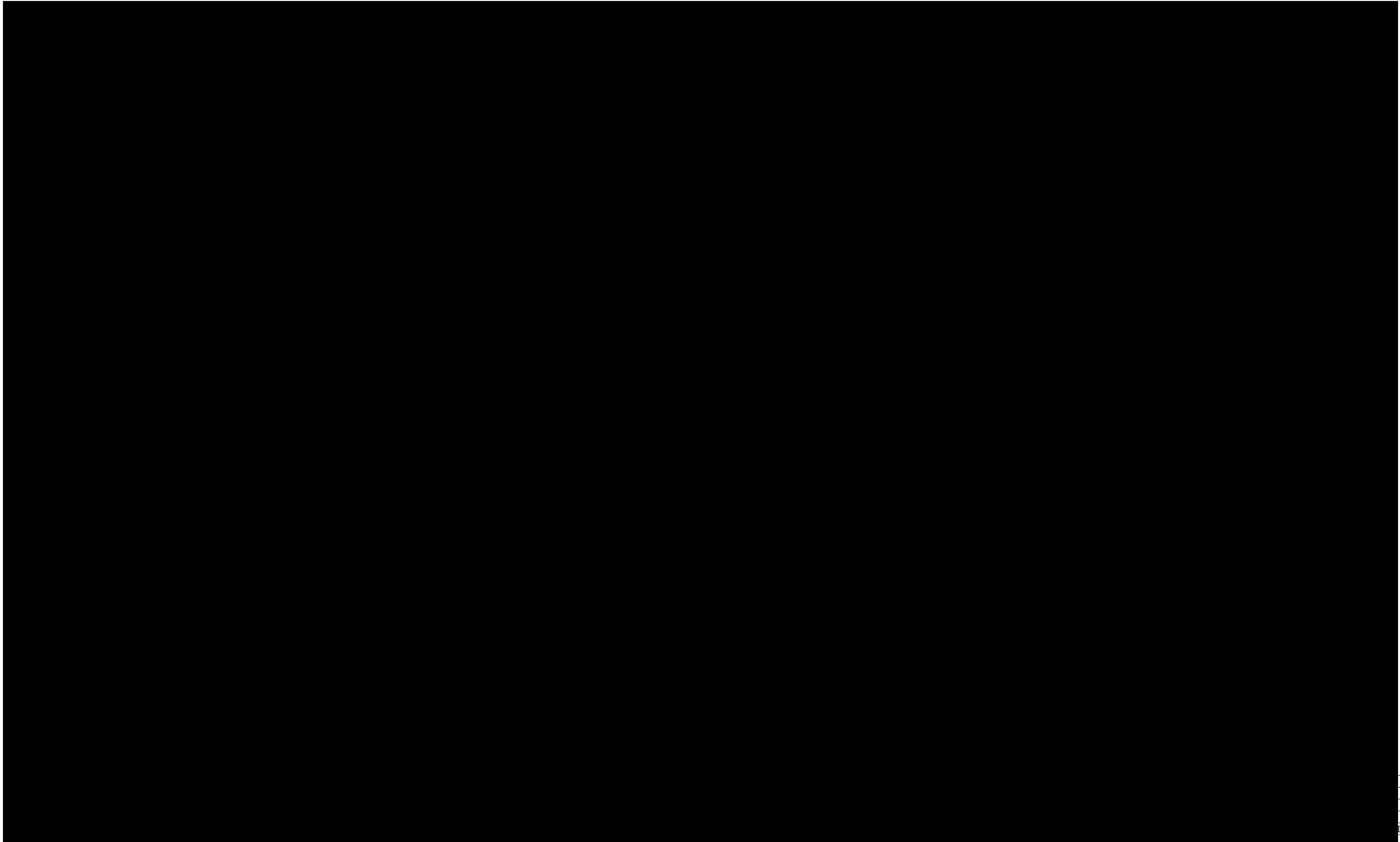
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-
- Refer to the suppliers' manual for details.
 - After initial cleaning it should be re-checked after 250 operating hours and should be checked every 3000 to 4000 operating hours depending on the operating conditions or at least every 6 months.

Annual Maintenance

- Lubricate all bearings including rollers and bearings. For high temperature applications mix high temperature grease with 20% graphite powder.
- Refer to the bearing supplier's manual for details.



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					<p>THIS DWG PRINTED:</p>		<p>J.P. SPANGENBERG APPROVED CHIEF ENGINEER APPROVED DATE</p>				<p>ORIG/SCALE DWG No PROJECT PHASE/STEAM AREA TYPE SEQ No SHEET REV A1 AS SHOWN 1131-700-STX-001 1 OF 1 A</p>											
<p>REVISIONS</p> <table border="1"> <thead> <tr> <th>REV No.</th> <th>DATE</th> <th>DESCRIPTION</th> <th>DRAWN</th> <th>CHKD</th> </tr> </thead> <tbody> <tr> <td>165</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>					REV No.	DATE	DESCRIPTION	DRAWN	CHKD	165												
REV No.	DATE	DESCRIPTION	DRAWN	CHKD																		
165																						

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ATTACHMENT M – INTERNAL COMBUSTION ENGINE DATA SHEET

Complete this data sheet for each internal combustion engine at the facility. Include manufacturer performance data sheet(s) or any other supporting document if applicable. Use extra pages if necessary. *Generator(s) and microturbine generator(s) shall also use this form.*

Emission Unit ID# ¹		GE-1, GE-2, GE-3, GE-4					
Engine Manufacturer/Model		TGS159D32					
Manufacturers Rated bhp/rpm		429, 1500/1800					
Source Status ²		NS					
Date Installed/ Modified/Removed/Relocated ³		2022					
Engine Manufactured /Reconstruction Date ⁴							
Check all applicable Federal Rules for the engine (include EPA Certificate of Conformity if applicable) ⁵		<input checked="" type="checkbox"/> 40CFR60 Subpart JJJ <input type="checkbox"/> JJJ Certified? <input type="checkbox"/> 40CFR60 Subpart IIII <input type="checkbox"/> IIII Certified? <input type="checkbox"/> 40CFR63 Subpart ZZZZ <input type="checkbox"/> NESHAP ZZZZ/ NSPS JJJJ Window <input type="checkbox"/> NESHAP ZZZZ Remote Sources	<input type="checkbox"/> 40CFR60 Subpart JJJ <input type="checkbox"/> JJJ Certified? <input type="checkbox"/> 40CFR60 Subpart IIII <input type="checkbox"/> IIII Certified? <input type="checkbox"/> 40CFR63 Subpart ZZZZ <input type="checkbox"/> NESHAP ZZZZ/ NSPS JJJJ Window <input type="checkbox"/> NESHAP ZZZZ Remote Sources	<input type="checkbox"/> 40CFR60 Subpart JJJ <input type="checkbox"/> JJJ Certified? <input type="checkbox"/> 40CFR60 Subpart IIII <input type="checkbox"/> IIII Certified? <input type="checkbox"/> 40CFR63 Subpart ZZZZ <input type="checkbox"/> NESHAP ZZZZ/ NSPS JJJJ Window <input type="checkbox"/> NESHAP ZZZZ Remote Sources			
Engine Type ⁶		4SLB					
APCD Type ⁷		A/F					
Fuel Type ⁸		syngas					
H ₂ S (gr/100 scf)		Varies with Feed					
Operating bhp/rpm		1500/1800rpm					
BSFC (BTU/bhp-hr)		8.70E-9					
Hourly Fuel Throughput		3,136	ft ³ /hr gal/hr		ft ³ /hr gal/hr		ft ³ /hr gal/hr
Annual Fuel Throughput (Must use 8,760 hrs/yr unless emergency generator)		25.6	MMft ³ /yr gal/yr		MMft ³ /yr gal/yr		MMft ³ /yr gal/yr
Fuel Usage or Hours of Operation Metered		Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Calculation Methodology ⁹	Pollutant ¹⁰	Hourly PTE (lb/hr) ¹¹ (EACH ENGINE)	Annual PTE (tons/year) ¹¹ (EACH ENGINE)	Hourly PTE (lb/hr) ¹¹	Annual PTE (tons/year) ¹¹	Hourly PTE (lb/hr) ¹¹	Annual PTE (tons/year) ¹¹
MD/AP	NO _x	0.68	2.55				
MD/AP	CO	1.37	5.09				
MD/AP	VOC	0.48	1.78				
MD/AP	SO ₂	0.002	0.01				
MD/AP	PM ₁₀	0.03	0.10				
MD/AP	Formaldehyde	0.20	0.89				
MD/AP	Total HAPs	0.28	1.21				
MD/AP	GHG (CO ₂ e)	441.30	1,642				

PLEASE NOTE: ALL EMISSION VARY BY FEED AND ARE ROUTED TO THE RTO PRIOR TO BEING EMITTED TO THE ATMOSPHERE. PLEASE SEE GENERATOR EMISSIONS CALCULATIONS.

1 Enter the appropriate Source Identification Number for each natural gas-fueled reciprocating internal combustion compressor/generator engine located at the compressor station. Multiple compressor engines should be designated CE-1, CE-2, CE-3 etc. Generator engines should be designated GE-1, GE-2, GE-3 etc. Microturbine generator engines should be designated MT-1, MT-2, MT-3 etc. If more than three (3) engines exist, please use additional sheets.

2 Enter the Source Status using the following codes:

NS	Construction of New Source (installation)	ES	Existing Source
MS	Modification of Existing Source	RS	Relocated Source
REM	Removal of Source		

3 Enter the date (or anticipated date) of the engine's installation (construction of source), modification, relocation or removal.

4 Enter the date that the engine was manufactured, modified or reconstructed.

5 Is the engine a certified stationary spark ignition internal combustion engine according to 40CFR60 Subpart IIII/JJJJ? If so, the engine and control device must be operated and maintained in accordance with the manufacturer's emission-related written instructions. You must keep records of conducted maintenance to demonstrate compliance, but no performance testing is required. If the certified engine is not operated and maintained in accordance with the manufacturer's emission-related written instructions, the engine will be considered a non-certified engine and you must demonstrate compliance as appropriate.

Provide a manufacturer's data sheet for all engines being registered.

6 Enter the Engine Type designation(s) using the following codes:

2SLB	Two Stroke Lean Burn	4SRB	Four Stroke Rich Burn
4SLB	Four Stroke Lean Burn		

7 Enter the Air Pollution Control Device (APCD) type designation(s) using the following codes:

A/F	Air/Fuel Ratio	IR	Ignition Retard
HEIS	High Energy Ignition System	SIPC	Screw-in Precombustion Chambers
PSC	Prestratified Charge	LEC	Low Emission Combustion
NSCR	Rich Burn & Non-Selective Catalytic Reduction	OxCat	Oxidation Catalyst
SCR	Lean Burn & Selective Catalytic Reduction		

8 Enter the Fuel Type using the following codes:

PQ	Pipeline Quality Natural Gas	RG	Raw Natural Gas /Production Gas	D	Diesel
----	------------------------------	----	---------------------------------	---	--------

9 Enter the Potential Emissions Data Reference designation using the following codes. Attach all reference data used.

MD	Manufacturer's Data	AP	AP-42	
GR	GRI-HAPCalc TM	OT	Other	(please list)

10 Enter each engine's Potential to Emit (PTE) for the listed regulated pollutants in pounds per hour and tons per year. PTE shall be calculated at manufacturer's rated brake horsepower and may reflect reduction efficiencies of listed Air Pollution Control Devices. Emergency generator engines may use 500 hours of operation when calculating PTE. PTE data from this data sheet shall be incorporated in the *Emissions Summary Sheet*.

11 PTE for engines shall be calculated from manufacturer's data unless unavailable.

**Engine Air Pollution Control Device
(Emission Unit ID# , use extra pages as necessary) N/A**

Air Pollution Control Device Manufacturer's Data Sheet included?
 Yes No
 N/A

NSCR SCR Oxidation Catalyst

Provide details of process control used for proper mixing/control of reducing agent with gas stream:

Manufacturer:	Model #:
Design Operating Temperature: °F	Design gas volume: scfm
Service life of catalyst:	Provide manufacturer data? <input type="checkbox"/> Yes <input type="checkbox"/> No
Volume of gas handled: acfm at °F	Operating temperature range for NSCR/Ox Cat: From °F to °F
Reducing agent used, if any:	Ammonia slip (ppm):

Pressure drop against catalyst bed (delta P): inches of H₂O

Provide description of warning/alarm system that protects unit when operation is not meeting design conditions:

Is temperature and pressure drop of catalyst required to be monitored per 40CFR63 Subpart ZZZZ?
 Yes No

How often is catalyst recommended or required to be replaced (hours of operation)?

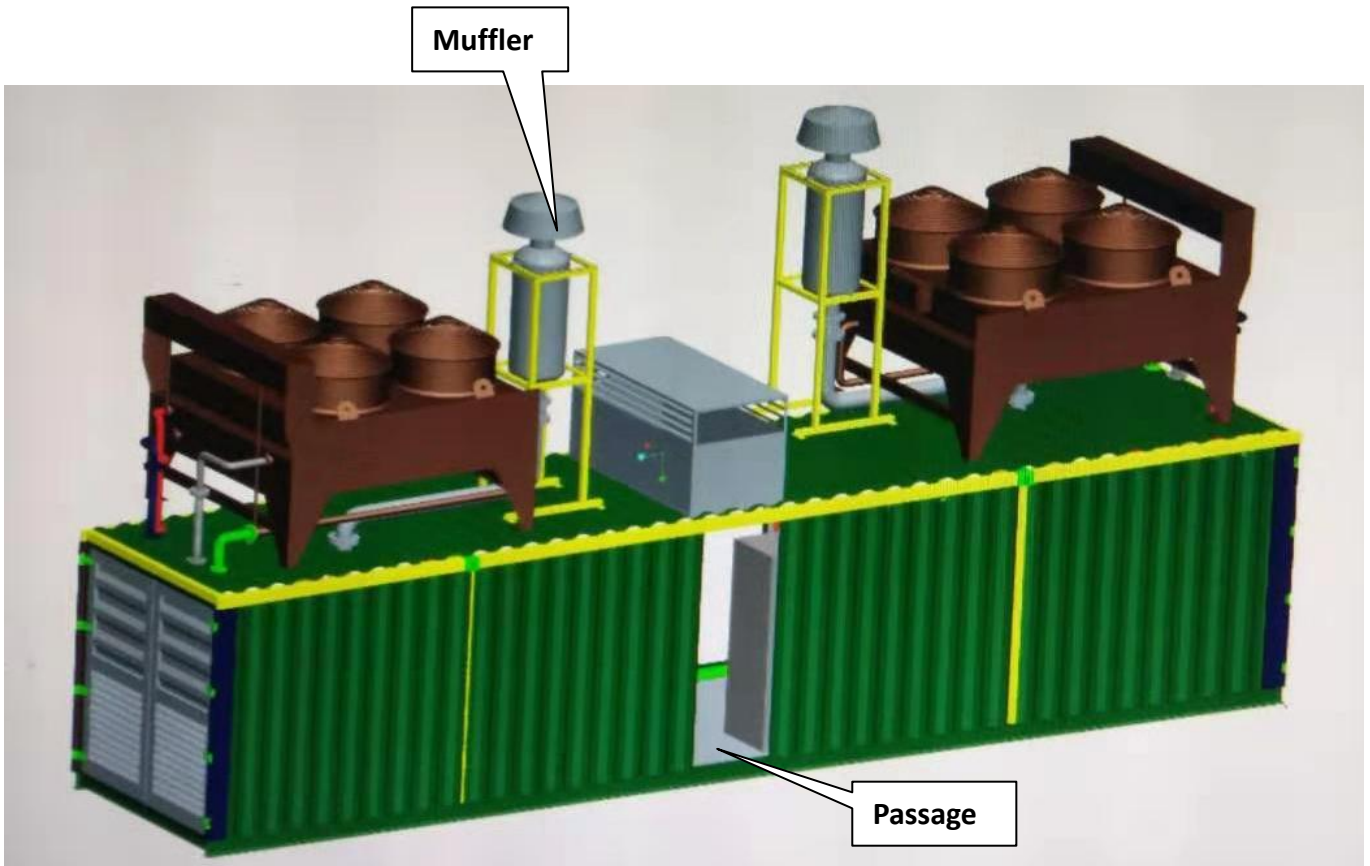
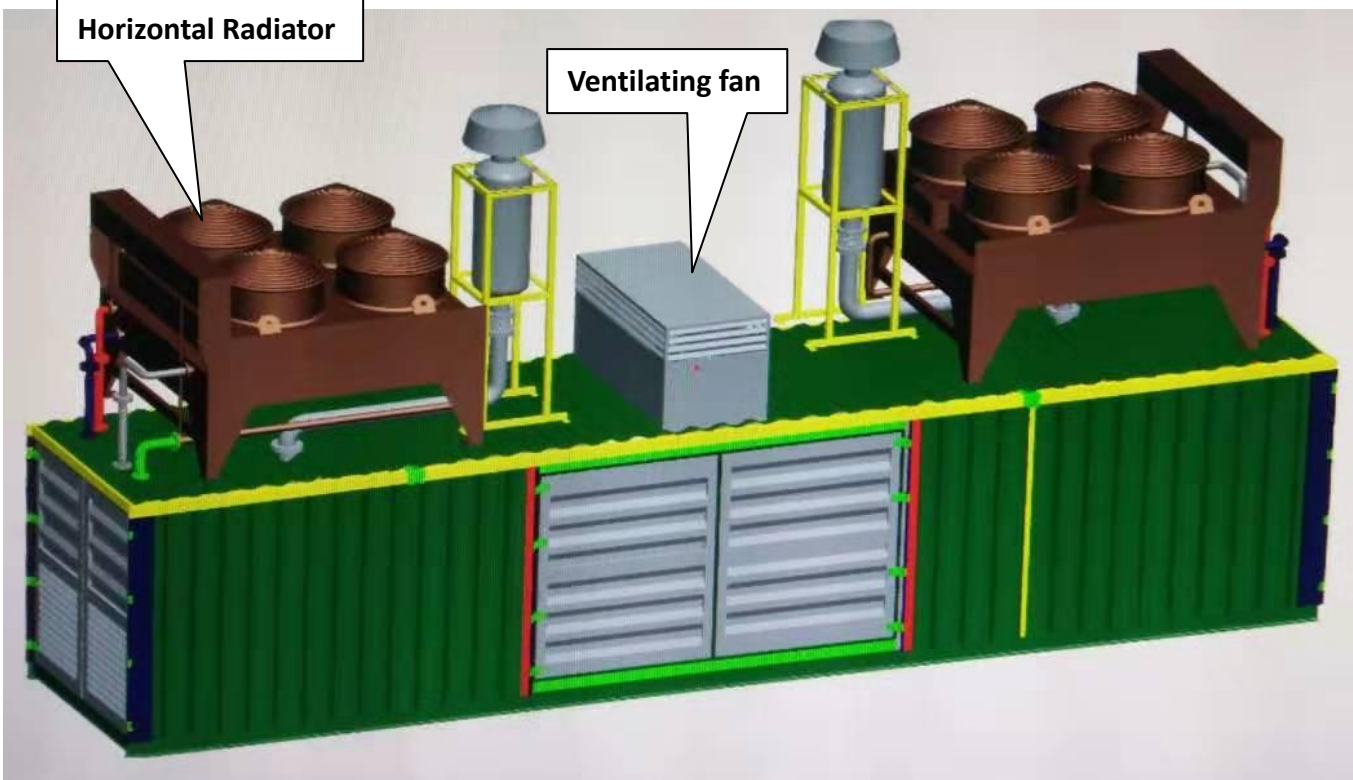
How often is performance test required?
 Initial
 Annual
 Every 8,760 hours of operation
 Field Testing Required
 No performance test required. If so, why (please list any maintenance required and the applicable sections in NSPS/GACT,

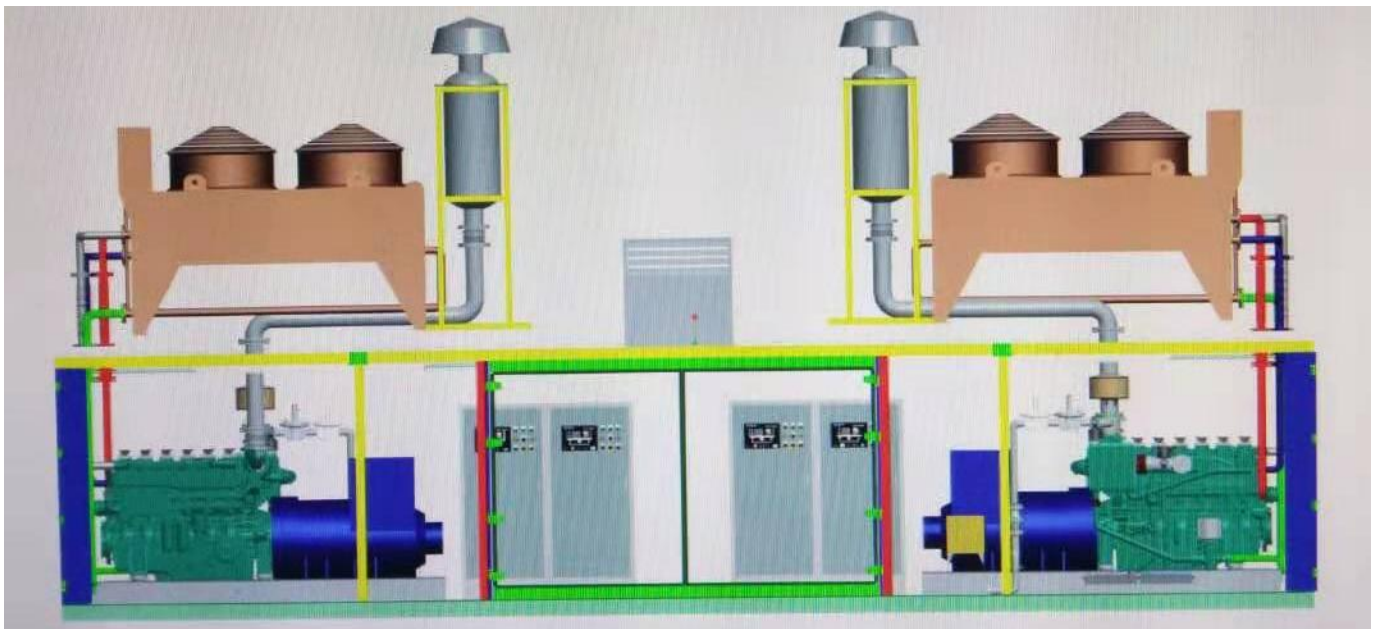
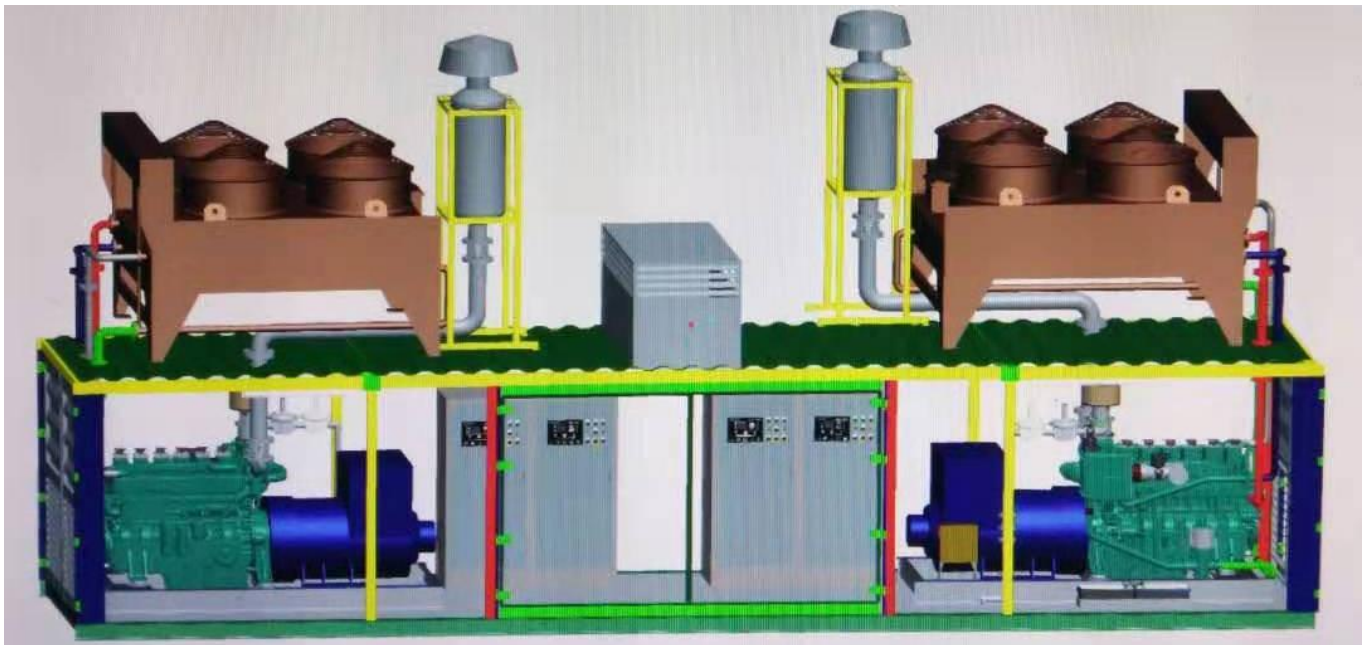
Operation and Maintenance Manual for Technotherm Gas Generating Sets

Notice(1): Engine overhaul period is related to use conditions, quality of lubricating oil, maintenance quality, load, install quality, fuel quality

TGS series natural gas genset

Genset Model		300TGS
Structure		Integrated
Exciting Mode of Alternator		Brushless/AVR
Rated Power(kW)		300
Rated Current (A)		540
Rated Voltage (V)		400/460
Rated Frequency (Hz)		50/60
Rated Power Factor		0.8LAG
No Load Voltage Range		95%-105%
Stable voltage regulation rate		≤±1%
Instantaneous voltage regulation rate		≤-15%—+20%
Voltage recover time		≤3s
Voltage fluctuation rate		≤±0.5%
Instantaneous frequency regulation rate		≤±10%
Frequency stabilization time		≤5s
Line-voltage waveform Sinusoidal distortion rate		≤2.5%
Engine	Type	TGS159D32
	Model	V-type、 water cooled、 4 strokes、 electric control ignition、 turbocharged and intercooled lean burn
	Cylinder Number	8
	Bore × Stroke (mm)	132×145
	Total Displacement(L)	15.9
	Compression Ratio	11.5
	Rated Power (kW)	320
	Rated Speed (r/min)	1500/1800
	Speed Regulation Mode	Electrical
	Starting Mode	Electrical
	Fuel	Natural gas or biogas
	Max Gas Consumption(m ³ /h)	88.8
Noise dB(A)		<91
Overhaul cycle (h)		2,5000 ⁽¹⁾
Overall dimension (L×W×H)(mm)		3250X1550X1950
Net Weight (kg)		2850





Container size: (L*W*H) 11.5m*2.2m*2.45m
3 containers in total .

Attachment M
Air Pollution Control Device Sheet
(WET COLLECTING SYSTEM-SCRUBBER)

Control Device ID No. (must match Emission Units Table):

Equipment Information

<p>1. Manufacturer: Poly Processing Model No. 5' X 5" Scrubber</p>	<p>2. Method: <input type="checkbox"/> Packed Bed <input type="checkbox"/> Venturi <input type="checkbox"/> Spray Tower <input type="checkbox"/> Cyclone <input type="checkbox"/> Mechanical <input type="checkbox"/> Orifice <input checked="" type="checkbox"/> Other, specify</p>
<p>3. Provide diagram(s) of unit describing capture system with duct arrangement and size of duct, air volume, capacity, horsepower of movers. If applicable, state hood face velocity and hood collection efficiency.</p>	
<p>4. Provide a scale diagram of the scrubber showing internal construction. Please include packing type and size, spray configurations, baffle plates, and mist eliminators.</p>	
<p>5. What type of liquid entrainment eliminators or system will be used? Submit a schematic diagram showing thickness, mesh, and material of construction.</p>	
<p>6. Describe the scrubber's construction material: Polyethelene (XLPE tank with PVC internals and exterior piping. Water with NaOH is added to the vessel above the set level. Vent gas from the HCl tank passes through the gas diffuser where HCl fumes are neutralized before the scrubbed gas is vented from the top.</p>	
<p>7. What will be the power requirements of the collector?</p> <p style="text-align: center;">Fan NO HP Inlet scrubbing liquid pump: NA HP</p>	
<p>8. What type of fan(s) will be used?</p> <p>Type of fan blade: None Number of blades: None Diameter of blade: None in. Also supply a fan curve for each fan to be used.</p>	
<p>9. Estimated gas pressure drop at maximum flow rate: 1 inches H₂O</p>	

Scrubbing Liquor Characteristics

<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 50%;">Composition</th> <th style="width: 50%;">Weight %</th> </tr> <tr> <td>1 Water</td> <td style="text-align: center;">99</td> </tr> <tr> <td>2 NaOH</td> <td style="text-align: center;">1</td> </tr> <tr> <td>3</td> <td></td> </tr> <tr> <td>4</td> <td></td> </tr> </table>	Composition	Weight %	1 Water	99	2 NaOH	1	3		4		<p>11. Scrubbing liquor losses (evaporation, etc.): 0.5 gal/1000 ACF gas</p> <p>12. Liquor pressure to scrubber: 0.25 PSIA</p> <p>13. Pressure drop through scrubber: 6 in. H₂O</p>
Composition	Weight %										
1 Water	99										
2 NaOH	1										
3											
4											
<p>14. Source of liquor (explain): Batch liquid added to tank</p>	<p>15. Liquor flow rates to scrubber: Design maximum: 1,000 gal/min Average expected: 500 gal/min</p>										
<p>16. Describe system to be used to supply liquor to collector: Manual drain and re-fill process</p>											
<p>17. Give the expected solids content of the liquor: No suspended solids will be created. The ssystem will convert HCl gas vaporst will react with NaOH to form water (H₂O) and sald (NaCl). Water will be changed out well before NaCl concentration reaches saturation.</p>											

18. If the liquor is to be recirculated, describe any treatment performed:

19. Data for Venturi Scrubber: Throat Dimensions: NA (Specify Units) Throat Velocity: Na ft/sec	20. Data for Packed Towers: Type of Packing: NA Superficial Gas Velocity through Bed:
-------------------------------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------

Gas Stream Characteristics

21. Gas flow into the collector: 1000 ACF @ 20 °F and 14.2 PSIA	22. Gas stream temperature: Inlet: ambient °F Outlet: ambient °F
-----------------------------------------------------------------------------------	----------------------------------------------------------------------------------

23. Gas flow rate: Design Maximum: 135 ACFM Average Expected: 67 ACFM	24. Particulate Grain Loading in grains/scf: Inlet: NA Outlet: NA
-----------------------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------

25. Emission rate of each pollutant (specify) into and out of collector:					
Pollutant	IN		OUT		Guaranteed Minimum Collection Efficiency
	lb/hr	grains/acf	lb/hr	grains/acf	
A HCl	0.03lb/hr		0.0003lb/hr		99
B					
C					
D					
E					

26. Type of pollutant(s) controlled: SO_x Odor
 Particulate (type): Other: HCl

27. By what method were the uncontrolled emissions calculated? Material Balance Stack Test
 Pilot Test Other:

28. Dimensions of stack: Height 4'-9" ft. Diameter 5'-1" ft

29. Supply an equilibrium curve and/or solubility data (at various temperatures) for the proposed system.

30. Supply a curve showing proposed collection efficiency versus gas volume from 25 to 100 percent of design rating of collector.

Particulate Distribution

31. Complete the table:		Particle Size Distribution at Inlet to Collector	Fraction Efficiency of Collector
Particulate Size Range (microns)		Weight % for Size Range	Weight % for Size Range
0 – 2		NA, vapor to liquid solvent conversion.	
2 – 4			
4 – 6			
6 – 8			
8 – 10			
10 – 12			
12 – 16			
16 – 20			
20 – 30			
30 – 40			
40 – 50			
50 – 60			
60 – 70			
70 – 80			
80 – 90			
90 – 100			
>100			
32. Describe any air pollution control device inlet and outlet gas conditioning processes (e.g., gas cooling, gas reheating, gas humidification):			
33. Describe the collection material disposal system: Neutralized HCl gas will become a salt brine that will be disposed of in accordance with local, state (PADEP), and federal regulations.			
34. Have you included Wet Collecting (Scrubber) Control Device in the Emissions Points Data Summary Sheet? Yes			

35. Proposed Monitoring, Recordkeeping, Reporting, and Testing

Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING:	RECORDKEEPING:
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REPORTING:	TESTING:
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MONITORING: Please list and describe the process parameters and ranges that are proposed to be monitored in order to demonstrate compliance with the operation of this process equipment or air control device.

RECORDKEEPING: Please describe the proposed recordkeeping that will accompany the monitoring.

REPORTING: Please describe any proposed emissions testing for this process equipment on air pollution control device.

TESTING: Please describe any proposed emissions testing for this process equipment on air pollution control device.

36. Manufacturer's Guaranteed Capture Efficiency for each air pollutant.

37. Manufacturer's Guaranteed Control Efficiency for each air pollutant.
0.99%

38. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty.

Attachment L
EMISSIONS UNIT DATA SHEET
BULK LIQUID TRANSFER OPERATIONS

Furnish the following information for each new or modified bulk liquid transfer area or loading rack, as shown on the *Equipment List Form* and other parts of this application. This form is to be used for bulk liquid transfer operations such as to and from drums, marine vessels, rail tank cars, and tank trucks.

Identification Number (as assigned on <i>Equipment List Form</i>):				
1. Loading Area Name:				
2. Type of cargo vessels accommodated at this rack or transfer point (check as many as apply):				
<input type="checkbox"/> Drums <input type="checkbox"/> Marine Vessels <input type="checkbox"/> Rail Tank Cars <input type="checkbox"/> Tank Trucks				
3. Loading Rack or Transfer Point Data:				
Number of pumps				
Number of liquids loaded				
Maximum number of marine vessels, tank trucks, tank cars, and/or drums loading at one time				
4. Does ballasting of marine vessels occur at this loading area?				
<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does not apply				
5. Describe cleaning location, compounds and procedure for cargo vessels using this transfer point:				
6. Are cargo vessels pressure tested for leaks at this or any other location?				
<input type="checkbox"/> Yes <input type="checkbox"/> No				
If YES, describe:				
7. Projected Maximum Operating Schedule (for rack or transfer point as a whole):				
Maximum	Jan. - Mar.	Apr. - June	July - Sept.	Oct. - Dec.
hours/day				
days/week				

weeks/quarter				
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8. Bulk Liquid Data (add pages as necessary):						
Pump ID No.						
Liquid Name						
Max. daily throughput (1000 gal/day)						
Max. annual throughput (1000 gal/yr)						
Loading Method ¹						
Max. Fill Rate (gal/min)						
Average Fill Time (min/loading)						
Max. Bulk Liquid Temperature (°F)						
True Vapor Pressure ²						
Cargo Vessel Condition ³						
Control Equipment or Method ⁴						
Minimum control efficiency (%)						
Maximum Emission Rate	Loading (lb/hr)					
	Annual (lb/yr)					
Estimation Method ⁵						
¹ BF = Bottom Fill SP = Splash Fill SUB = Submerged Fill						
² At maximum bulk liquid temperature						
³ B = Ballasted Vessel, C = Cleaned, U = Uncleaned (dedicated service), O = other (describe)						
⁴ List as many as apply (complete and submit appropriate <i>Air Pollution Control Device Sheets</i>): CA = Carbon Adsorption LOA = Lean Oil Adsorption CO = Condensation SC = Scrubber (Absorption) CRA = Compressor-Refrigeration-Absorption TO = Thermal Oxidation or Incineration CRC = Compression-Refrigeration-Condensation VB = Dedicated Vapor Balance (closed system) O = other (describe)						
⁵ EPA = EPA Emission Factor as stated in AP-42 MB = Material Balance						

TM = Test Measurement based upon test data submittal
 O = other (describe)

9. Proposed Monitoring, Recordkeeping, Reporting, and Testing

Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING

RECORDKEEPING

REPORTING

TESTING

MONITORING. PLEASE LIST AND DESCRIBE THE PROCESS PARAMETERS AND RANGES THAT ARE PROPOSED TO BE MONITORED IN ORDER TO DEMONSTRATE COMPLIANCE WITH THE OPERATION OF THIS PROCESS EQUIPMENT OPERATION/AIR POLLUTION CONTROL DEVICE.

RECORDKEEPING. PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.

REPORTING. PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.

TESTING. PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT/AIR POLLUTION CONTROL DEVICE.

10. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty



101 FAIRVIEW AVENUE
PITTSBURGH, PA 15238

EMAIL: SALES@V-SYST.COM
WEB: WWW.V-SYST.COM

TELEPHONE: 412-826-9200
FAX: 412-826-8168

Quote #2023-560-H-R

July 26, 2023

Mr. Farley R. Wood, P.E.
Vice President of Engineering
Empire Diversified Energy
1400 Main Street
Follansbee, WV 26037

Subject: Chemical System - Scrubber -- Quote #2023-560-H-R

Dear Mr. Wood,

Please find attached our proposal for the above referenced equipment/project. We appreciate the opportunity to provide a quote for this opportunity.

You will also find our most recent line card attached for your reference. I hope you will think of us during your next project. If you would have any questions or require additional information, please give us a call at (412) 826-9200.

Sincerely,

Russell C. Huffmyer
President & CEO
V-Systems, Inc.
101 Fairview Avenue
Pittsburgh, PA 15238

Enclosure

arsr





101 FAIRVIEW AVENUE
PITTSBURGH, PA 15238

EMAIL: SALES@V-SYST.COM
WEB: WWW.V-SYST.COM

TELEPHONE: 412-826-9200
FAX: 412-826-8168

Quotation:

Project Name: Chemical System - Scrubber **Contact Name:** Farley Wood
Company Name: Empire Diversified Energy **Email/Fax:** fwood@empirede.com
Address/Street: 1400 Main Street **Phone:** 304-914-2624
City/State/Zip: Follansbee, WV 26037 **Date:** July 21, 2023 / Revised July 26, 2023
Quote Number: 2023-560-H-R

Thank you for the opportunity to provide you with the following quote:

Quantity	Item Description	Net Price Each	Total Net Price
<u>Tag: Scrubber Tank</u>			
1	PolyScrub Scrubber Tank, 700 Open Top, Rated: 1.90 Specific Gravity Wall Thickness, Material: Crosslinked Polyethylene (XLPE)◆, Color: Natural (yellowish white) <ul style="list-style-type: none"> • (1) Lid/Manway - 61" Cover Assembly Open Top /Stainless Steel/Pe • (1) Vent - 6" U-Vent PVC • (1) Outlet / Overflow - 1" Scrubber Outlet/Overflow PVC/litharge Viton /c-276 • (1) Scrubber - 6" Scrubber Assembly PVC/litharge Viton • (1) Fill - 1" Bulkhead Fitting Assembly Socket x thread PVC/litharge Viton • Warranty - 5 Years, Full Replacement, Non-Prorated Includes Product Engineering / Permitting Support for Permit Application	\$16,500.00	\$16,500.00
<u>Tag: Tank</u>			
1	10,305-Gallon Vertical Tank, Rated: 1.90 Specific Gravity Wall Thickness, Material: Crosslinked Polyethylene (XLPE)◆, Color: Natural (yellowish white) <ul style="list-style-type: none"> • (1) Lid/Manway - 24" Manway Cover 24" Fume Tight /Stainless Steel/pe • (1) Fill - 2" Bulkhead Fitting Assembly Socket x thread PVC/EPDM • (2) Dome Fitting - 2" Bulkhead Fitting Assembly Socket x thread PVC/EPDM • (3) Sidewall Fitting - 2" Bolted Flange Fitting Socket PVC/c-276/EPDM • (1) Vent - 6" U-vent with Bolted Flange PVC/c-276/EPDM • WARRANTY:5 Years, Full Replacement, Non-Prorated 	\$39,675.00	\$39,675.00

V-SYSTEMS

COMMERCIAL | INDUSTRIAL | MUNICIPAL

101 FAIRVIEW AVENUE
PITTSBURGH, PA 15238

EMAIL: SALES@V-SYST.COM
WEB: WWW.V-SYST.COM

TELEPHONE: 412-826-9200
FAX: 412-826-8168

Tag: Pump

2	March Model # TE-10K-MD 3PH 10 HP - Inlet: 3"MPT, Outlet: 2"MPT, Wet End: Natural Kynar (Front Housing, Rear Housing), Glass Filled Kynar (Impeller) with 6.625" Impeller Trim, Viton (Gasket), Carbon (Bushing), Ceramic (Shaft, Thrust Washers), and driven by a 10 HP, 3500 RPM, 3/60/230/460, TEFC Motor	\$7,920.00	\$15,840.00
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Note:

- Lead Time is currently 1 Week, A.R.O.
- FOB out of March in IL (must ship by LTL due to size and weight)

Tag: VFD(s)

2	Xylem, Variable Frequency Drives, 10 HP, 460-3-60, NEMA 3R, BACnet	\$7,780.00	\$15,560.00
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Note:

- Lead Time is currently at 7 Weeks, A.R.O.

Tag: Chem Feed Skid

1	SS1-C_FLOOR_050_PVCEPDM_PD PP/PE Prominent Skid for solenoid driven pumps, (20"W x 18"D x 40"H) 1/2" PVC/EPDM socket weld pipe and fittings Wye strainer 500ml PVC calibration column 164ml CPVC/EPDM pulsation dampeners Pressure relief valves Pressure gauge with isolator Back pressure valve Plumbing and components rated at 150 PSI regardless of pump pressure.	\$21,505.00	\$21,505.00
---	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-------------	-------------

- (1) GMXA0708PVT2Q000UDC1300EN Prominent Gamma/X 2 GPH/102PSI, PVDF/PTFE, bleed valve w/spring, 4-20mA output
- (1) Prominent CP1 ONE PUMP 120VAC SCADA PANEL

Total Quoted Amount:	\$109,080.00
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QUOTED BY: RUSS HUFFMYER

If you need further information concerning the products that have been included in the quote, please feel free to contact me at 412-826-9200 and/or rhuffmyer@v-syst.com.

We appreciate the opportunity to provide you with this quote and look forward to working with you on this important project.

Thank you,



Russell C. Huffmyer
President & CEO

arsr



101 FAIRVIEW AVENUE
PITTSBURGH, PA 15238

EMAIL: SALES@V-SYST.COM
WEB: WWW.V-SYST.COM

TELEPHONE: 412-826-9200
FAX: 412-826-8168

THIS QUOTATION OR SELLER'S ACCEPTANCE OF THIS ORDER IS EXPRESSLY LIMITED TO, AND EXPRESSLY MADE CONDITIONAL ON, BUYER'S ACCEPTANCE OF THE V-SYSTEMS-TEC, INC. STANDARD TERMS AND CONDITIONS OF SALE. A COPY OF THESE TERMS AND CONDITIONS IS AVAILABLE AT <https://v-syst.com/terms-and-conditions-of-sale-and-service>. SELLER OBJECTS TO ANY DIFFERENT OR ADDITIONAL TERMS.

General Comments

Warranty applies per Sales & Service Terms and Conditions if the following are met:

- Equipment installed per industry standards and manufacturer instruction manual.
- Operation of equipment in accordance with manufacturer instruction manual.
- Maintenance and lubrication per manufacturer instruction manual. Note, maintenance log showing dates required.
- Equipment must be stored per manufacturer instruction manual and protected from the weather.

If warranty items occur, V-Systems needs to be contacted in writing before any repairs are made, whereas a mutual course of action will be performed. Equipment cannot be disassembled without V-Systems being present.

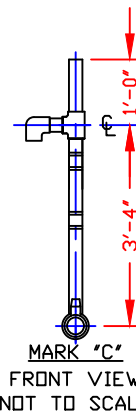
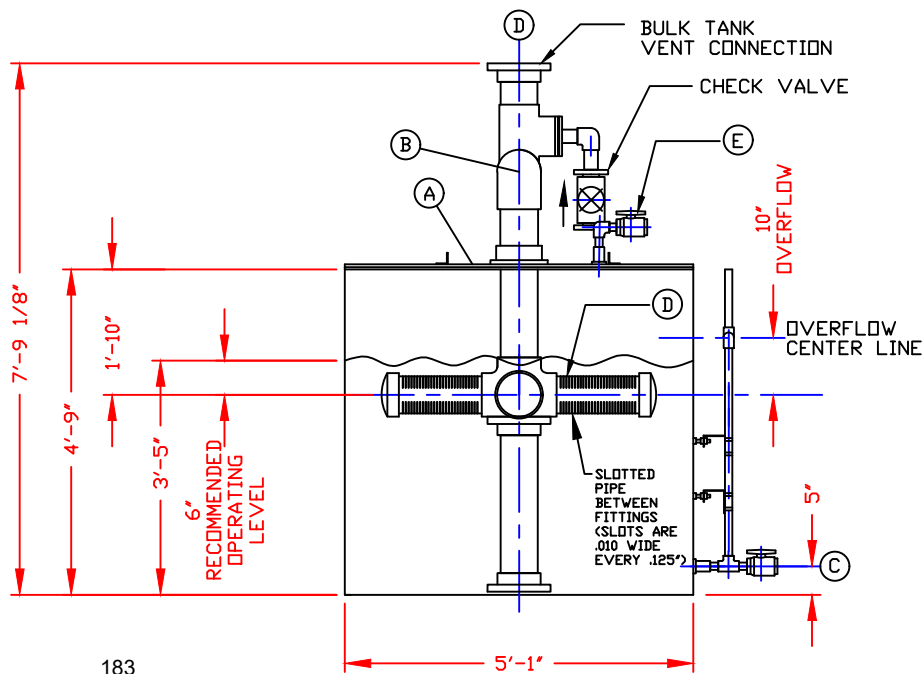
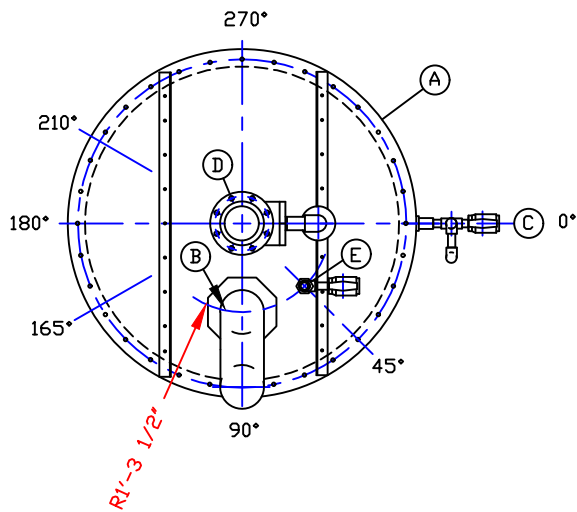
Acknowledged and Accepted by Buyer:

Name: _____ *Tax Exempt? Yes _____ No _____

Signature: _____ PO #: _____

Date: _____ Ship To: _____

*IF APPLICABLE, please send a copy of your company's tax-exempt form. Otherwise, our accounting department will assume that this order is taxable.



NOTE: INCOMING VENT PIPE MUST BE INDEPENDENTLY SUPPORTED
ELEVATIONS ONLY--
NOZZLES & ACCESSORIES ROTATED INTO VIEW--
FOR TRUE ORIENTATION SEE PLAN VIEW

NOTES

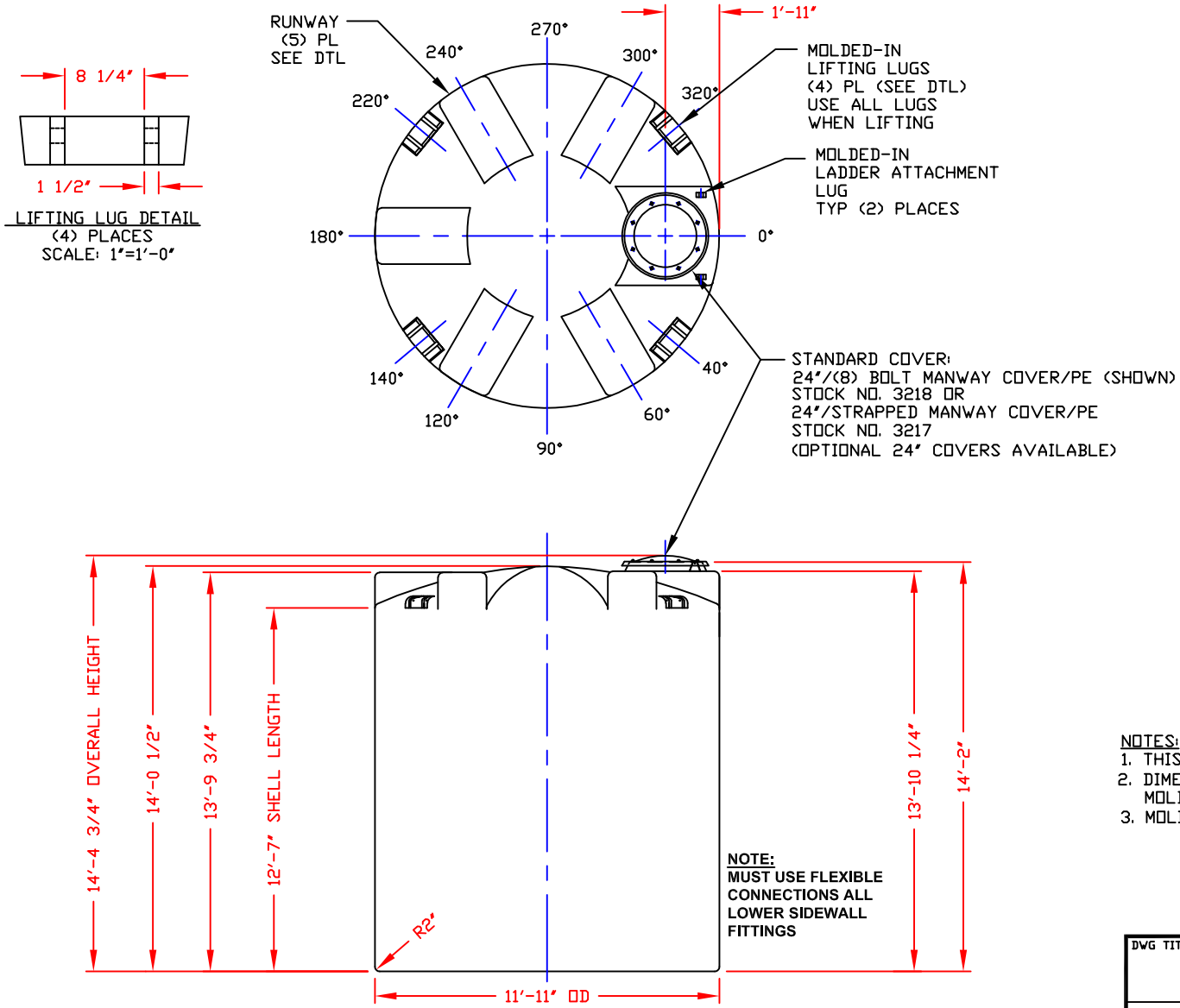
1. THIS IS A COMPUTER GENERATED DWG. DO NOT REVISE BY HAND.
2. DIMENSIONS WILL VARY $\pm 3\%$ DUE TO VARIATIONS IN MULTIPLE MOLDS & CONDITIONS PREVALENT DURING MANUFACTURE & USAGE.
3. TANK DESIGNED FOR 1.9 SpG MAT'L @ 100°F/ATMOS PRESSURE.

183

CALCULATED CAPACITY TO OPERATING LEVEL
~515 GALLONS

DWG TITLE		POLYSCRUB BASIC 5' X 5' SCRUBBER	
SERVICE: SCRUBBER MEDIA		1.9 SpG/XLPE/NATURAL	
SCALE: 1/2"=1'-0"			DR: B. HARPER
DATE: 4/12/2021			CK:
SHEET		COMPUTER FILE	REV
1 OF 1		POLYSCRUB BASIC	

NON-CONTROLLED COPY
 INFORMATION SUBJECT TO CHANGE WITHOUT NOTICE
 VERIFY REV LEVEL OF PAPER COPY WITH REV LEVEL ON PPC WEB SITE



- NOTES:**
- THIS IS A COMPUTER GENERATED DWG. DO NOT REVISE BY HAND.
 - DIMENSIONS WILL VARY ±3% DUE TO VARIATIONS IN MULTIPLE MOLDS & CONDITIONS PREVALENT DURING MANUFACTURE & USAGE.
 - MOLDED IN GALLONAGE MARKERS @ APPROX 3 1/2" UP TO 9200 GAL.

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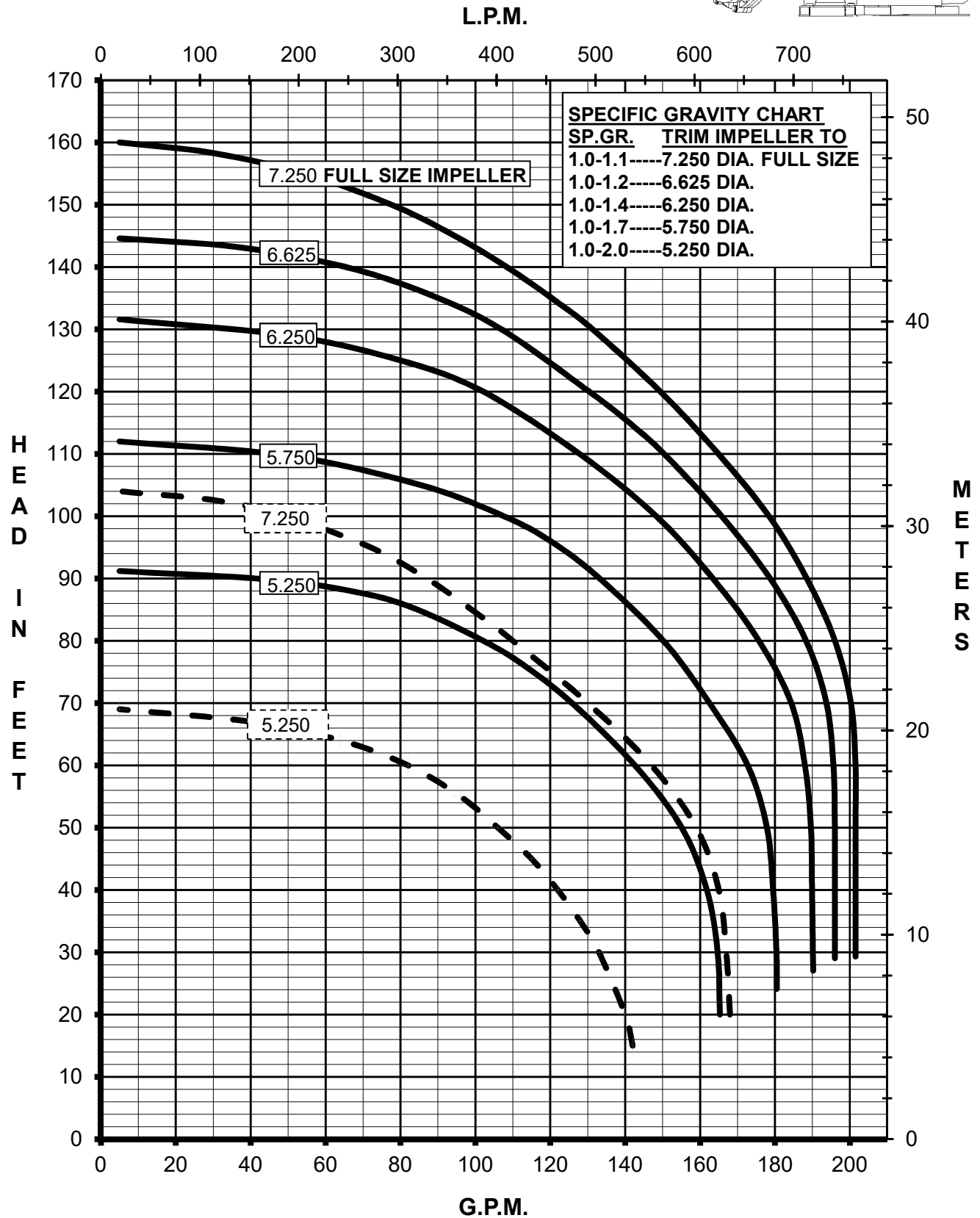
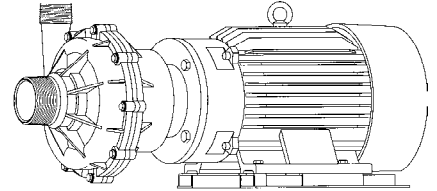
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MARCH PUMPS

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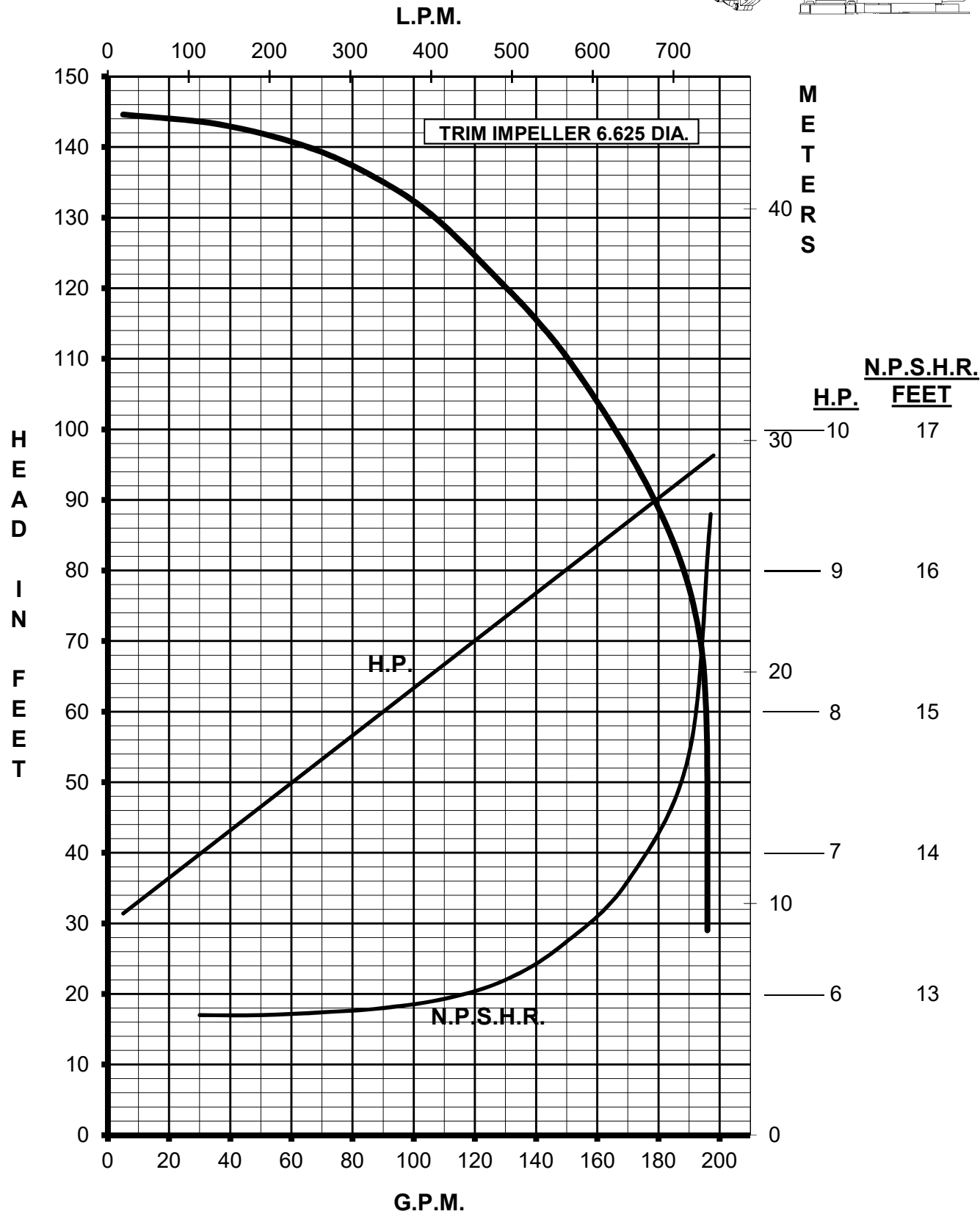
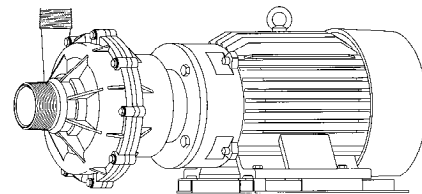


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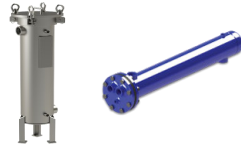
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ATTACHMENT N

Supporting Emission Calculations

1. OVERALL EMISSIONS CALCULATIONS ALL DEVICES

Plastic waste has significant variation in form and quantity. It seems the best way to describe it as a heterogeneous mixture of solids and semi-solids. Literature review showed a References to the papers are given at the end of this section. They state a heterogeneous plastic waste composition based on the is repeated in Table 2. Municipal Solid Waste (MSW) data by Stepien, et.al.,^{[2]16} given for comparison purposes.

Table 2. Range of Heterogeneous Properties of Plastics^[1].

Plastic Waste Composition	Bayer Waste Range (wt, %)
C	50.5
H2	3
O2	21.1
N2	1.9
S	0.46
-Cl	1.2
Oxide	
Metal	
H2O	21.54
HHV (Btu/lb)	

Composition of the plastic waste and the pyrolysis output are shown in Table 3. Pyrolysis emissions are also shown for plastic waste by Durcharme^[3] and MSW by Technotherm^[4].

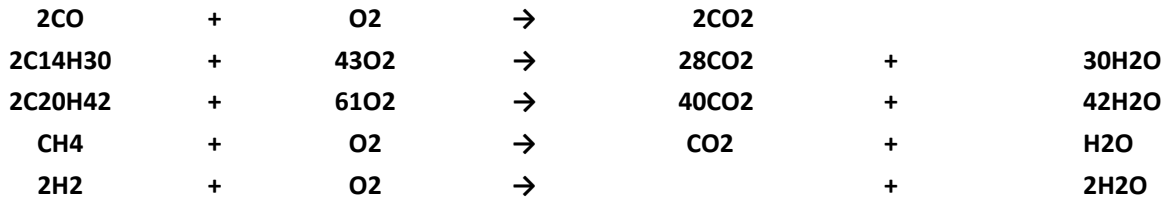
Table 3. Plastic Composition and Pyrolysis Output

Component Plastics	Plastics Composition (Wt, %)	Pyrolysis Component	Pyrolysis Syngas, (Wt, %)	Pyrolysis ^[3] Syngas, (Wt, %)	Pyrolysis ^[4] Syngas, (Wt, %)
O2	22.78	O2	1.54	2.64 ^[3]	4.21
C	20.50	CO2	19.25	18.2	34.77
H2	20.50	CO	30.80	27.9	30.81
N2	2.85	CH4	2.16	1.8	21.49
CaO	1.59	H2	11.55	37.8	3.47
K2O	1.52	C14H30 (oil)	3.85		
S	2.85	C20H42 (tar)	3.85		
Na2O	4.58	N2	2.19		3.47
Cl	8.54	CaO	1.23		
MgO	2.39	K2O	1.93		
Fe2O3	1.48	Na2O	4.38		
H2O	2.03	HCl	6.58	0.03	
C2H4	8.39	H2O	4.38		
		MgO	1.84		
		Fe2O3	2.28		
		SO2	2.19		
Total	100		100		

***Rounding errors may apply.

Pyrolysis syngas and solids can vary about 30% or greater based on the input feed. An attempt was made to produce a syngas composition where some of the elements and compounds were near the middle and greater than the middle of the feed composition shown in Table 2. Metal-oxides are shown as individual compounds instead of just the term "glass".

Once a syngas was established within the variations described, the next step was to combust those available compounds through the Engine, Vitrifier and Thermal Oxidizer. Stoichiometric combustion equations are shown below:



Emissions for all devices are shown in Figure 2 (see Attachment 2, end of this TAB) and are shown as an expanded Block Flow Diagram in the following narrative.

The daily throughput for the pyrolysis process system shall be 70 U.S. tons per day and will operate twenty-four (24) hours a day, seven (7) days a week, for 310 days per year. This equates to 85% availability for processing equipment. All calculations are based on 70 tons/day which equate to only four (4) tractor-trailer loads. All major chambers have the design life of twenty (20) years before replacement.

Throughput calculations are as follows:

Calculation 1: Throughput

- Hourly Throughput: $(2,646.703 \text{ kg/hour}) / (2.204 \text{ lb/kg}) = 5,833.33 \text{ lb/hr}$
- Annual Throughput
 $5,833.33 \text{ lb/hr} \times 24 \text{ hr/day} \times 310 \text{ days/year} \times 1 \text{ ton}/2000 \text{ lb} = 21,699.99 \text{ tons/year} \rightarrow 21,700 \text{ Tons/year}$
- **Annual Throughput: 21,700 Tons/year**
 $(\text{lbs/hr} \times 24 \text{ hr/day} \times 310 \text{ day/yr}) / 2000 \text{ lbs/ton} = \text{tons/year (annual output)}$

Table 5: Hourly, Daily and Annual Emission Outputs (from model results Figure 2)

Offgas/Solids Component	kg/hour	lbs/hr	lbs/day	US tons/yr
CO2	2,546.81	5,613.18	134,716.31	20,881.03
H2O	5,725.07	12,618.06	302,833.41	46,939.18
N2	22,861.83	50,387.47	1,209,299.24	187,441.38
Ar	293.33	646.51	15,516.18	2,405.01
CAO	3.25×10^{-7}	7.16×10^{-7}	1.72×10^{-5}	2.66×10^{-6}
K2O	5.11×10^{-6}	1.13×10^{-7}	2.70×10^{-6}	4.19×10^{-7}
NA2O	1.16×10^{-7}	2.56×10^{-7}	6.14×10^{-6}	9.51×10^{-7}
HCl	1.74×10^{-6}	3.84×10^{-6}	9.21×10^{-5}	1.43×10^{-5}
H2O	0.0116	0.0256	0.0614	0.0951
MgO	4.87×10^{-6}	1.07×10^{-7}	2.58×10^{-6}	3.99×10^{-7}
FE2O3	6.03×10^{-6}	1.33×10^{-7}	3.19×10^{-6}	4.95×10^{-7}
SO2	5.80×10^{-6}	1.28×10^{-5}	3.07×10^{-4}	4.76×10^{-5}
NO	3.00×10^{-5}	6.61×10^{-5}	2.69×10^{-3}	4.12×10^{-4}
NO2	4.00×10^{-5}	8.82×10^{-5}	3.66×10^{-3}	5.68×10^{-4}
TOTAL	31,427.06	69,265.24	1,662,365.77	257,666.69
SOLIDS OUTPUT				
CAO	32.46	71.54	1,717.06	266.14
K2O	51.06	112.53	2,700.67	418.60
NA2O	116.04	255.75	6,137.88	951.37
MgO	48.74	107.41	2,577.91	399.58
FE2O3	60.35	133.00	3,192.02	494.76
NACL	280.22	617.60	14,822.52	2,297.49
NA2SO3	129.54	285.51	6,852.15	1,062.08
TOTAL	718.39	1,583.34	38,000.21	5,890.03

Calculations Used:

- $\text{kg/hr} \times 2.204 \text{ lbs/kg} = \text{lb/hr}$

CLIENT Empire Green Generation, LLC	DATE 9/6/2023
-------------------------------------	---------------

SUBJECT Empire Green Generation Plastics Pyrolysis Facility - Syngas Emissions from Pyrolysers

Pyroliser Syngas Emissions

Component	mol %	Molecular weight (kg/kmol)	60°F, 14.7psig Density (lb/scf)	wt%	normalized wt%	lb/hr	tpy	kJ/kg of component	kJ/kg
Oxygen	0.18	32	0.08441	0.18	0.37	7.77	28.90	0	0
Carbon dioxide	20.00	44.01	0.11666	27.48	56.49	1186.19	4412.6	0	0
Carbon monoxide	10.60	28.01	0.073866	9.27	19.05	400.14	1488.5	10122	1928.69
Methane	18.40	16.04	0.042358	9.22	18.95	397.99	1480.5	55530	10523.9
Hydrogen	12.00	2	0.0053104	0.75	1.54	32.37	120.43	141790	2185.87
Nitrogen	2.00	28.013	0.07386	1.75	3.60	75.54	281.01	0	0
Overall	63.18	150.073	0.0652	48.65	100.00	2092	7783.1		14638.4

Syngas Speciation Results/Inputs	
Gross Calorific Value	31,626 kJ/kg
	13,567.54 Btu/lb
Gas Yield	36 % mass
Feed Input to Facility	70 tpd plastics
Gas Produced	25.2 tpd gas produced

Source: Provided by Technotherm. See Overall Emission Calculations
 Note: All Gases will be routed to the engine and/or RTO prior to release into the atmosphere.
 Density Source: <http://webbook.nist.gov/chemistry/fluid/>

6. Conversion Factors:
- 35.31 ft³/m³
 - 0.4536 kg/lb
 - 1.00E+06 scf/MMscf
 - 1.00E+06 Btu/MMBtu
 - 60 min/hr
 - 7440 hrs/yr (based on 310 days per yr as given by Technotherm)
 - 2.326 kJ/kg per Btu/lb
 - 2000 lb/ton

Calculations

Calculate the estimated amount of syngas produced from the pyrolysers in tpd.

$$FR_{Gas-tpd} = (mass\%_{syngas}) / (CF_{DecEq-wt\%}) * (FR_{Feed-tpd})$$

$$= \left| \frac{36 \text{ wt\%}}{100 \text{ wt\%}} \right| \left| \frac{1 \text{ DecEq}}{\text{day}} \right| \left| \frac{70 \text{ tons}}{\text{day}} \right| = 25 \text{ tpd syngas}$$

Calculate the maximum hourly emission rate for the components ER_{MaxHrly}.

Using O₂ as an example.

$$ER_{MaxHrlyO2} = (nwt\%_{O2}) / (CF_{DecEq-nwt\%}) * (FR_{Gas-tpd}) * (CF_{lb-ton}) / (CF_{hr-day})$$

$$= \left| \frac{0.37 \text{ nwt\%}}{100 \text{ nwt\%}} \right| \left| \frac{1 \text{ DecEq}}{\text{day}} \right| \left| \frac{25 \text{ ton}}{\text{day}} \right| \left| \frac{2000 \text{ lb}}{1 \text{ ton}} \right| \left| \frac{1 \text{ day}}{24 \text{ hrs}} \right| = 7.77 \text{ lb/hr O}_2$$

Calculations (continued)

CLIENT Empire Green Generation, LLC	DATE 9/6/2023
-------------------------------------	---------------

SUBJECT Empire Green Generation Plastics Pyrolysis Facility - Syngas Emissions from Pyrolyzers

3. Calculate the annual average emission rate for the components ER_{AnnAvg} .

Using O_2 as an example:

$$ER_{AnnAvgO_2} = (ER_{MaxHrlyO_2}) * (CF_{hours-year}) / (CF_{lb-ton})$$

$$= \left| \frac{7.77 \text{ lb}}{\text{hr}} \right| \left| \frac{7,440 \text{ hr}}{1 \text{ yr}} \right| \left| \frac{1 \text{ t}}{2,000 \text{ lb}} \right| = 28.90 \text{ tpy } O_2$$

4. Calculate the heat value of the syngas for each component in kJ/kg.

Using CO as an example:

$$HV_{CO} = (HV_{CO-kJ/kg}) * (nwt\%) / (CF_{DecEq-nwt\%})$$

$$= \left| \frac{10122 \text{ kJ}}{\text{kg}} \right| \left| \frac{19.1 \text{ nwt\%}}{100 \text{ nwt\%}} \right| \left| \frac{1 \text{ DecEq}}{100 \text{ nwt\%}} \right| = 1928.69 \text{ kJ/kg CO}$$

5. Calculate the gross calorific heat value of the syngas in Btu/lb.

$$Hvsyngas = \sum(HV_{components-kJ/kg}) / (CF_{kJ/kg-Btu/lb})$$

$$= \left| \frac{31625.96 \text{ kJ}}{\text{kg}} \right| \left| \frac{1 \text{ Btu/lb}}{2.326 \text{ kJ/kg}} \right| = 13596.72 \text{ Btu/lb}$$

**Empire Green Generation, LLC
Plastic Recycling Pyrolysis Facility
Generator Emissions Calculations**

Inputs/Assumptions

Number of Engines	4
Control Device	(none)
Gross Calorific Value	13,174.00 Btu/lb
Average Amount of Gas Produced	36 mass % gas
Amount of Plastics Processed	70 tpd plastics
Amount of Gas Produced per day	25.0 tpd of gas
Amount of Gas to Each Engine	520 lb/hr of gas
Fuel Consumption	6,849 Btu*1000/hr
Density	0.0844 lb/scf
Engine Rating	320 kW
Horse Power	429 HP
Annual Operating Hours	7,440 hours
Fuel Heat Value	1,112 Btu/scf
NOx Factor	1.09 g/HP-hr
CO Factor	2.18 g/HP-hr
VOC Factor	0.76 g/HP-hr
PM10 Factor	1.09E-02 lb/MMBtu
SO2 Factor	6.41E-04 lb/MMBtu
CO2 Factor	52.07 kg/MMBtu
N2O Factor	0.00320 kg/MMBtu
CH4 Factor	0.0006 kg/MMBtu

Pollutant	Per Engine		Total	
	lb/hr	tpy	lb/hr	tpy
NOx	1.03	3.84	4.12	15.34
CO	2.06	7.67	8.25	30.68
VOC	0.72	2.68	2.89	10.74
PM	0.07	0.28	0.30	1.11
SO2	0.004	0.02	0.02	0.07
CO2	786.23	2,925	3,145	11,699
N2O	0.05	0.18	0.19	0.72
CH4	0.01	0.04	0.04	0.14
CO2e	790.28	2,940	3,161	11,759

Notes

- 1) All engine emissions will be subjected to the Regenerative Thermal Oxidiser (RTO) prior to emitting to atmosphere.
- 2) Engines will run on syngas only.
- 3) NO_x, CO and VOC factors are from 40 CFR 60 Subpart JJJJ, Table 1 and adjusted for syngas using a ratio Heating Values. (per 40 CFR 60.4233(e))
- 4) PM and SO₂ factors are from AP-42, Table 3.2-2, 5th Edition, July, 2000 and adjusted for syngas.
- 5) Emission Factor for CO₂ is from 40 CFR 98, Table C-1 - Default CO₂ Emissions Factors
- 6) Emission Factor for N₂O and CH₄ are from 40 CFR 98, Table C-2, Default CH₄ and N₂O Emission Factors.
- 7) NO_x Emissions, lb/hr = Emission Factor, lb/MMBtu, x Fuel Consumption, Btu*1000/hr, / 1000 (MMBtu/Btu*1000)
- 8) CO₂ Emissions, lb/hr = Emission Factor, kg/MMBtu, x 2.2046 lb/kg, x Fuel Consumption, Btu*1000/hr, / 1000 (MMBtu/Btu*1000)
- 9) NO_x Emissions, tons/yr = NO_x Emissions, lb/hr, x 7,440 hrs/yr (310 days/yr), / 2,000 lb/ton
- 10) Fuel Consumption based on estimates provided by Technotherm. See Overall Emissions Calculations.
- 11) PM = PM, PM10, and PM2.5
- 12) CO₂e calculated using the following: (ER_{CO2} * 1) + (ER_{N2O} * 25) + (ER_{CH4} * 298)

**Empire Green Generation, LLC
Plastic Recycling Pyrolysis Facility
Generator Emissions Calculations**

Number of Engines:	4
Engine Type:	4SLB
15639	13,174
56.68	6,849
Amount of Plastics Processed per power (hp):	tpd plastics
Annual Aggregate Heat Input (MMBtu/yr):	90,230
Hourly Aggregate Heat Input (MMBtu/hr):	6.85

Pollutant	CAS	Emission Factor lb/MMBtu	Per Engine			Total		
			lb/hr	lb/yr	tons/yr	lb/hr	lb/yr	tons/yr
1,1,2,2-Tetrachloroethane	79-34-5	4.00E-05	2.74E-04	3.61E+00	1.80E-03	1.10E-03	1.44E+01	7.22E-03
1,1,2-Trichloroethane	79-00-5	3.18E-05	2.18E-04	2.87E+00	1.43E-03	8.71E-04	1.15E+01	5.74E-03
1,3-Butadiene	106-99-0	2.67E-04	1.83E-03	2.41E+01	1.20E-02	7.31E-03	9.64E+01	4.82E-02
1,3-Dichloropropene	542-75-6	2.64E-05	1.81E-04	2.38E+00	1.19E-03	7.23E-04	9.53E+00	4.76E-03
2,2,4-Trimethylpentane	540-84-1	2.50E-04	1.71E-03	2.26E+01	1.13E-02	6.85E-03	9.02E+01	4.51E-02
2-Methylnaphthalene	91-57-6	3.32E-05	2.27E-04	3.00E+00	1.50E-03	9.10E-04	1.20E+01	5.99E-03
Acenaphthene	83-32-9	1.25E-06	8.56E-06	1.13E-01	5.64E-05	3.42E-05	4.51E-01	2.26E-04
Acenaphthylene	203-96-8	5.53E-06	3.79E-05	4.99E-01	2.49E-04	1.52E-04	2.00E+00	9.98E-04
Acetaldehyde	75-07-0	8.36E-03	5.73E-02	7.54E+02	3.77E-01	2.29E-01	3.02E+03	1.51E+00
Acrolein	107-02-8	5.14E-03	3.52E-02	4.64E+02	2.32E-01	1.41E-01	1.86E+03	9.28E-01
Benzene	71-43-2	4.40E-04	3.01E-03	3.97E+01	1.99E-02	1.21E-02	1.59E+02	7.94E-02
Benzo(b)fluoranthene	205-99-2	1.66E-07	1.14E-06	1.50E-02	7.49E-06	4.55E-06	5.99E-02	3.00E-05
Benzo(e)pyrene	192-97-2	4.15E-07	2.84E-06	3.74E-02	1.87E-05	1.14E-05	1.50E-01	7.49E-05
Benzo(g,h,i)perylene	191-24-2	4.14E-07	2.84E-06	3.74E-02	1.87E-05	1.13E-05	1.49E-01	7.47E-05
Biphenyl	92-52-4	2.12E-04	1.45E-03	1.91E+01	9.56E-03	5.81E-03	7.65E+01	3.83E-02
Carbon Tetrachloride	56-23-5	3.67E-05	2.51E-04	3.31E+00	1.66E-03	1.01E-03	1.32E+01	6.62E-03
Chlorobenzene	108-90-7	3.04E-05	2.08E-04	2.74E+00	1.37E-03	8.33E-04	1.10E+01	5.49E-03
Chloroform	67-66-3	2.85E-05	1.95E-04	2.57E+00	1.29E-03	7.81E-04	1.03E+01	5.14E-03
Chrysene	218-01-9	6.93E-07	4.75E-06	6.25E-02	3.13E-05	1.90E-05	2.50E-01	1.25E-04
Ethylbenzene	100-41-4	3.97E-05	2.72E-04	3.58E+00	1.79E-03	1.09E-03	1.43E+01	7.16E-03
Ethylene Dibromide	106-93-4	4.43E-05	3.03E-04	4.00E+00	2.00E-03	1.21E-03	1.60E+01	7.99E-03
Fluoranthene	206-44-0	1.11E-06	7.60E-06	1.00E-01	5.01E-05	3.04E-05	4.01E-01	2.00E-04
Fluorene	86-73-7	5.67E-06	3.88E-05	5.12E-01	2.56E-04	1.55E-04	2.05E+00	1.02E-03
Formaldehyde	50-00-0	5.28E-02	3.62E-01	4.76E+03	2.38E+00	1.45E+00	1.91E+04	9.53E+00
Methanol	67-56-1	2.50E-03	1.71E-02	2.26E+02	1.13E-01	6.85E-02	9.02E+02	4.51E-01
Methylene Chloride	75-09-2	2.00E-05	1.37E-04	1.80E+00	9.02E-04	5.48E-04	7.22E+00	3.61E-03
n-Hexane	110-54-3	1.11E-03	7.60E-03	1.00E+02	5.01E-02	3.04E-02	4.01E+02	2.00E-01
Naphthalene	91-20-3	7.44E-05	5.10E-04	6.71E+00	3.36E-03	2.04E-03	2.69E+01	1.34E-02
Phenanthrene	85-01-8	1.04E-05	7.12E-05	9.38E-01	4.69E-04	2.85E-04	3.75E+00	1.88E-03
Phenol	108-95-2	2.40E-05	1.64E-04	2.17E+00	1.08E-03	6.58E-04	8.66E+00	4.33E-03
Pyrene	129-00-0	1.36E-06	9.31E-06	1.23E-01	6.14E-05	3.73E-05	4.91E-01	2.45E-04
Styrene	100-42-5	2.36E-05	1.62E-04	2.13E+00	1.06E-03	6.47E-04	8.52E+00	4.26E-03
Toluene	108-88-3	4.08E-04	2.79E-03	3.68E+01	1.84E-02	1.12E-02	1.47E+02	7.36E-02
Vinyl Chloride	75-01-4	1.49E-05	1.02E-04	1.34E+00	6.72E-04	4.08E-04	5.38E+00	2.69E-03
Xylenes	1330-20-7	1.84E-04	1.26E-03	1.66E+01	8.30E-03	5.04E-03	6.64E+01	3.32E-02
Total HAPS		0.49	6.511.54	3.26	1.98	26,046.16	13.02	

HAP Emissions based on AP-42, 5th ed. (July 2000) emission factors for 4SLB engine.

Please Note: All engine emissions will be subjected to the Regenerative Thermal Oxidiser (RTO) prior to emitting to atmosphere.

Hourly and Annual Aggregate Heat Input (MMBtu/hr, MMBtu/yr)

$$\frac{13174 \text{ hr}}{\text{yr}} \times \frac{6849 \text{ Btu} \times 1000}{\text{hr}} \times \frac{\text{MMBtu}}{1000 \text{ Btu} \times 1000} = 90230 \text{ MMBtu/yr}$$

$$\frac{6849 \text{ Btu} \times 1000}{\text{hr}} \times \frac{\text{MMBtu}}{1000 \text{ Btu} \times 1000} = 6.85 \text{ MMBtu/hr}$$

Sample Calculations for Formaldehyde

$$\frac{0.0528 \text{ lb}}{\text{MMBtu}} \times \frac{6.85 \text{ MMBtu}}{\text{hr}} = 0.36 \text{ lb/hr}$$

$$\frac{0.0528 \text{ lb}}{\text{MMBtu}} \times \frac{90230 \text{ MMBtu}}{\text{yr}} = 4764 \text{ lb/yr}$$

$$\frac{0.00111 \text{ lb}}{\text{MMBtu}} \times \frac{90230 \text{ MMBtu}}{\text{yr}} \times \frac{\text{ton}}{2000 \text{ lbs}} = 4764.15 \text{ tpy}$$

CLIENT Empire Pyrolysis		JOB NUMBER 212C-PB-02161.100	
SUBJECT Follansbee WV Unpaved Roads Particulate matter emissions			
BASED ON Client provided information		DRAWING NUMBER Roadway Layout.pdf	
BY VJPlachy	CHECKED BY AMO'Bradovich		DATE 4/7/2022

Objective: Calculate the Particulate Matter emissions associated with vehicle traffic.

Inputs and Assumptions:

1. WVDEP Input data

	Class 6 Truck		Ford F250	
	PM	PM-10	PM	PM-10
k =	0.80	0.36	0.80	0.36
s =	4.8	4.8	4.8	4.8
S =	5	5	5	5
W =	11.4	11.4	3.5	3.5
w =	10	10	10	10
p =	140	140	140	140
VMT/trip =	0.07	0.07	0.29	0.29
trips/hr =	10.0	10.0	4	4

2. Vehicle data:

no. Wheels = 10 4

3. AP-42 Fifth Edition - 13.2.2 Unpaved Roads

$$E = k * 5.9 * (s/12) * (S/30) * (W/3)^{0.7} * (w/4)^{0.5} * ((365 - p)/365) = \text{lb/VMT}$$

4. WVDEP emissions lb/hr

$$E(\text{lb/hr}) = (\text{lb/VMT}) * (\text{VMT/trip}) * (\text{trips/hr})$$

$$E(\text{tpy}) = (\text{lb/VMT}) * (\text{VMT/trip}) * (\text{trips/hr}) * (t/2,000 \text{ lb})$$

Calculations:

1. Calculate PM emission for Class 6 vehicle

$$E = k * 5.9 * (s/12) * (S/30) * (W/3)^{0.7} * (w/4)^{0.5} * ((365 - p)/365) = \text{lb/VMT}$$

	Class 6 Truck		Ford F250	
	PM	PM-10	PM	PM-10
k =	0.80	0.36	0.80	0.36
s =	4.80	4.8	4.80	4.8
S =	5	5	5	5
W =	11.4	11.4	3.5	3.5
w =	10	10	10	10
p =	140	140	140	140
E (lb/VMT) =	0.78	0.35	0.34	0.15
E (lb/hr) =	0.56	0.25	0.39	0.18
E (t/yr) =	0.0003	0.0001	0.0002	0.0001

Attachment L
EMISSIONS UNIT DATA SHEET
CHEMICAL PROCESS

For chemical processes please fill out this sheet and all supplementary forms (see below) that apply. Please check all supplementary forms that have been completed.

- Emergency Vent Summary Sheet*
- Leak Sources Data Sheet*
- Toxicology Data Sheet*
- Reactor Data Sheet*
- Distillation Column Data Sheet*

1. Chemical process area name and equipment ID number (as shown in *Equipment List Form*)
 Plastic to syngas plant.

2. Standard Industrial Classification Codes (SICs) for process(es)
 562920

3. List raw materials and attach MSDSs
 Plastic waste

4. List Products and Maximum Production and attach MSDSs

Description and CAS Number	Maximum Hourly (lb/hr)	Maximum Annual (ton/year)
Syngas	1091	9557160

5. Complete the *Emergency Vent Summary Sheet* for all emergency relief devices.

6. Complete the *Leak Source Data Sheet* and describe below or attach to application the leak detection or maintenance program to minimize fugitive emissions. Include detection instruments, calibration gases or methods, planned inspection frequency, and record-keeping, and similar pertinent information. If subject to a rule requirement (e.g. 40CFR60, Subpart VV), please list those here.

7. Clearly describe below or attach to application Accident Procedures to be followed in the event of an accidental spill or release.
 In the case of an accidental release the plant will be immediately shut down the source and cause of the leak will be located and repaired.

9. Waste Products - Waste products status: (If source is subject to RCRA or 45CSR25, please contact the Hazardous Waste Section of WVDEP, OAQ at (304) 926-3647.)			
9A. Types and amounts of wastes to be disposed:			
9B. Method of disposal and location of waste disposal facilities: N/A Carrier: _____ Phone: _____			
9C. Check here if approved USEPA/State Hazardous Waste Landfill will be used <input type="checkbox"/>			
10. Maximum and Projected Typical Operating Schedule for process or project as a whole (circle appropriate units).			
circle units:	(hrs/day) (hr/batch)	(days), (batches/day), (batches/week)	(days/yr), (weeks/year)
10A. Maximum			
10B. Typical	24/7		50 weeks per year
11. Complete a <i>Reactor Data Sheet</i> for each reactor in this chemical process.			
12. Complete a <i>Distillation Column Data Sheet</i> for each distillation column in this chemical process.			
13. Proposed Monitoring, Recordkeeping, Reporting, and Testing Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.			
MONITORING		RECORDKEEPING	
REPORTING		TESTING	
<p>MONITORING. Please list and describe the process parameters and ranges that are proposed to be monitored in order to demonstrate compliance with the operation of this process equipment operation or air pollution control device.</p> <p>RECORDKEEPING. Please describe the proposed recordkeeping that will accompany the monitoring.</p> <p>REPORTING. Please describe the proposed frequency of reporting of the recordkeeping.</p> <p>TESTING. Please describe any proposed emissions testing for this process equipment or air pollution control device.</p>			
14. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty			

INFORMATION REQUIRED FOR CHEMICAL PROCESSES

The notes listed below for chemical processes are intended to help the applicant submit a complete application to the OAQ; these notes are not intended to be all inclusive. The requirements for a complete application for a permit issued under 45CSR13 are designed to provide enough information for a permit reviewer to begin a technical review. Additional information beyond that identified may be required to complete the technical review of any individual application.

Process Description

Please keep these points in mind when completing your process description as part of this permit application.

1. Provide a general process overview. This brief, but complete, process description should include chemical or registered trademark names of chemical products, intermediates, and/or raw materials to be produced or consumed, and the ultimate use(s) of the product(s). A list of the various chemical compounds is helpful.
2. Describe each process step. Include the process chemistry and stoichiometrically balanced reaction equation or material mass balance on all components.
3. Describe the methods and equipment used to receive, store, handle, and charge raw materials.
4. Describe the methods and equipment used to handle, store, or package final products and intermediates.
5. Provide process flow diagrams or equipment layout drawings which clearly show the process flow relationships among all pieces of process and control equipment. Identify all air emission discharge points. Discuss instrumentation and controls for the process.
6. Discuss the possibilities of process upsets, the duration and frequency of upsets, and consequences (including air emissions) of these upsets. Include a description of rupture discs, pressure relief valves, and secondary containment systems.
7. Discuss any fugitive emissions and the methods used to minimize them.
8. Include the following plans for the process if available:
 - a. preventative maintenance and malfunction abatement plan (recommended for all control equipment).
 - b. continuous emissions (in-stack) monitoring plan
 - c. ambient monitoring plan
 - d. emergency response plan

Regulatory Discussion

The following state and federal air pollution control regulations may be applicable to your chemical process. You should review these regulations carefully to determine if they apply to your process. Please summarize the results of your review in your permit application along with any other regulations you believe are applicable.

- Title 45 Legislative Rule Division of Environmental Protection, Office of Air Quality contains West Virginia's air pollution control regulations, including the following promulgated rules which may require emissions reductions or control technologies for your chemical process:
 - a. 45CSR27 - Best Available Technology (BAT) for Toxic Air Pollutants (TAPs)
 - b. 45CSR21 - VOC emissions controls for ozone maintenance in Kanawha, Cabell, Putnam, Wayne, and Wood counties.
 - c. 45CSR13 (Table 45-13A) - plantwide emission thresholds for permitting for certain pollutants.
- Federal Guidelines for case-by-case MACT determinations under section 112(g) of the 1990 CAAA for individual and total HAPs greater than 10 and 25 tons per year, respectively.
- There are also subparts of the federal Standards of Performance for New Stationary Sources (NSPS), 40CFR60 60, and the National Emission Standards for Hazardous Air Pollutants (NESHAP) at 40CFR61 and 40CFR63, which apply to various chemical and nonchemical processes. These subparts are too numerous to list here, but these areas of the federal regulations should be consulted carefully to determine applicability to your process.

Emissions Summary and Calculations

Please keep these points in mind when submitting your emissions calculations as part of this permit application.

1. For each pollutant, provide the basis for the emissions estimate and for all emission reduction(s) or control efficiency(ies) claimed.
2. For all batch processes provide the following
 - a. Emissions of each pollutant in pound(s) per batch, from each process step
 - b. Annual emissions based on number of batches requested per year
 - c. The total time for each process step and the duration of the emissions during the process step
 - d. Total batch time, total emissions per batch (or per day), and annual emissions based on the number of batches requested per year.

EMERGENCY VENT SUMMARY SHEET

List below all emergency relief devices, rupture disks, safety relief valves, and similar openings that will vent only under abnormal conditions.

Emission Point ID ¹	Equipment to Relief Vent (type, ID if available) ²	Relief Vents (type) & Set Pressure (psig)	Name of Chemical(s) or Pollutants Controlled	Worst Case Emission per Release Event (lbs)
Pyrolyser A outlet	Pyrolyser A	Spring loaded explosion hatch set at 30psig	Syngas	29
Pyrolyser B outlet	Pyrolyser A	Spring loaded explosion hatch set at 30psig	Syngas	29

All routine vents (non-emergency) should be listed on the *Emission Points Data Summary Sheet*.
¹ Indicate the emission point, if any, to which source equipment normally vents. Do not assign emission point ID numbers to each emergency relief vent or device.
² List all emergency relief devices next to the piece of equipment from which they control releases.

LEAK SOURCE DATA SHEET

Source Category	Pollutant	Number of Source Components ¹	Number of Components Monitored by Frequency ²	Average Time to Repair (days) ³	Estimated Annual Emission Rate (lb/yr) ⁴
Pumps ⁵	light liquid VOC ^{6,7}				
	heavy liquid VOC ⁸				
	Non-VOC ⁹				
Valves ¹⁰	Gas VOC	186		1	10.7
	Light Liquid VOC				
	Heavy Liquid VOC				
	Non-VOC				
Safety Relief Valves ¹¹	Gas VOC	2		1	0.11
	Non VOC				
Open-ended Lines ¹²	VOC	0			
	Non-VOC				
Sampling Connections ¹³	VOC	25		1	1.44
	Non-VOC				
Compressors	VOC	3		2	0.17
	Non-VOC				
Flanges	VOC	440		1	25.3
	Non-VOC				
Other	VOC	220		1	12.69
	Non-VOC				

1 - 13 See notes on the following page.

Notes for Leak Source Data Sheet

1. For VOC sources include components on streams and equipment that contain greater than 10% w/w VOC, including feed streams, reaction/separation facilities, and product/by-product delivery lines. Do not include certain leakless equipment as defined below by category.
2. By monitoring frequency, give the number of sources routinely monitored for leaks, using a portable detection device that measures concentration in ppm. Do not include monitoring by visual or soap-bubble leak detection methods. "M/Q(M)/Q/SA/A/O" means the time period between inspections as follows:

Monthly/Quarterly, with Monthly follow-up of repaired leakers/Quarterly/Semi-annual/Annually/Other (specify time period)

If source category is not monitored, a single zero in the space will suffice. For example, if 50 gas-service valves are monitored quarterly, with monthly follow-up of those repaired, 75 are monitored semi-annually, and 50 are checked bimonthly (alternate months), with non checked at any other frequency, you would put in the category "valves, gas service:" 0/50/0/75/0/50 (bimonthly).
3. Give the average number of days, after a leak is discovered, that an attempt will be made to repair the leak.
4. Note the method used: MB - material balance; EE - engineering estimate; EPA - emission factors established by EPA (cite document used); O - other method, such as in-house emission factor (specify).
5. Do not include in the equipment count sealless pumps (canned motor or diaphragm) or those with enclosed venting to a control device. (Emissions from vented equipment should be included in the estimates given in the Emission Points Data Sheet.)
6. Volatile organic compounds (VOC) means the term as defined in 40 CFR §51.100 (s).
7. A light liquid is defined as a fluid with vapor pressure equal to or greater than 0.04 psi (0.3 Kpa) at 20°C. For mixtures, if 20% w/w or more of the stream is composed of fluids with vapor pressures greater than 0.04 psi (0.3 Kpa) at 20 °C, then the fluid is defined as a light liquid.
8. A heavy liquid is defined as a fluid with a vapor pressure less than 0.04 psi (0.3 Kpa) at 20°C. For mixtures, if less than 20% w/w of the stream is composed of fluids with vapor pressures greater than 0.04 psi (0.3 Kpa) at 20 °C, then the fluid is defined as a heavy liquid.
9. LIST CO, H₂S, mineral acids, NO, NO₂, SO₃, etc. DO NOT LIST CO₂, H₂, H₂O, N₂, O₂, and Noble Gases.
10. Include all process valves whether in-line or on an open-ended line such as sample, drain and purge valves. Do not include safety-relief valves, or leakless valves such as check, diaphragm, and bellows seal valves.
11. Do not include a safety-relief valve if there is a rupture disk in place upstream of the valve, or if the valve vents to a control device.
12. Open-ended lines include purge, drain and vent lines. Do not include sampling connections, or lines sealed by plugs, caps, blinds or second valves.
13. Do not include closed-purge sampling connections.

TOXICOLOGY DATA SHEET¹

Descriptor Name/CAS Number	OSHA Limits ²		Acute ³ TC _{LO} - Animal LC _{LO} - Animal LC ₅₀ - Animal	Chronic ⁴	Irritation ⁵	References
	TWA	CL				
Propane/74-98-6	1000 ppm		>20000 ppm			SDS
Synthetic Natural Gas/74-82-8	500 ppm		326 g/m ³ 2 hrs			SDS

¹ Indicate by "ND" where no data exists, in company's knowledge.
² Time Weighted Average, Ceiling Limit, or other, with units.
³ If inhalation data is not available, provide other data as available.
⁴ Relying on animal or human studies, indicate if any data suggests: C = carcinogenicity, M = mutagenicity, T = teratogenicity, O = oncogenicity.
⁵ Indicate if there are dermal or eye irritation effects and whether they are considered to be low, moderate, or severe.

REACTOR DATA SHEET

Provide the following information for each piece of equipment that is a potential or actual source of emissions as shown on the *Equipment List Form* and other parts of application.

Identification Number (as shown on <i>Equipment List Form</i>):							
1. Name and type of equipment (e.g. CSTR, plug flow, batch, etc.)							
2. Type of operation <input type="checkbox"/> Batch <input type="checkbox"/> Continuous <input type="checkbox"/> Semi-batch							
3. Projected Actual Equipment Operating Schedule (complete appropriate lines):							
hrs/day		days/week			weeks/year		
hrs/batch		batches/day, weeks (Circle one)			day, weeks/yr (Circle one)		
4. Feed Data Flow In = gal/hr, or gal/batch							
Material Name & CAS No.	Phase ^a	Specific Gravity	Vapor Pressure ^b	Charge Rate			Fill Time (min/batch, run) ^c
				Normal	Max	Units	
<p>a. S = Solid, L = Liquid, G = gas or vapor</p> <p>b. At feed conditions</p> <p>c. Total time that equipment is filling per batch or run (start-up), for tank or vessel-type equipment.</p>							
5. Provide all chemical reactions that will be involved (if applicable), including the residence time and any side reactions that may occur as well as gases that may be generated during these reactions. Indicate if the reaction(s) are exothermic or endothermic.							

6. Maximum Temperature	7A. Maximum Pressure 7B. Max. Set Pressure for venting
°C	mmHg
°F	mmHg psig

8. Output Data		Flow Out = gal/hr or gal/batch				
Material Name and CAS No.	Phase	Specific Gravity	Vapor Pressure	Hourly or Batch Output Rate		Units
				Normal	Maximum	

9. Complete the following emission data for equipment connected to a header exhaust system, giving emissions levels before entering header system (i.e. before control equipment).

Check here if not applicable

Emission Point ID (exhaust point of header system):

Material Name and CAS No.	Maximum Potential Emission Rate (lb/hr)	Method **

** MB - material balance; EE - Engineering Estimate; TM - Test Measurement (submit test data); O - other (Explain)

10. Provide the following information pertaining to each condenser that may be attached to this reactor. Attach additional pages as necessary if more than one condenser is used for this reactor. Complete the Condenser Air Pollution Control Device Sheet if necessary.

Check here if not applicable

10A. Cooling material

10B. Minimum and Maximum flowrate of cooling material (gal/hr)

10C. Inlet temperature of cooling material (°F)

10D. Outlet temperature of cooling material (°F)

10E. Pressure drop of gas to be condensed from inlet to outlet (psig)

10F. Inlet temperature of gas stream (°F)

10G. Outlet temperature of gas stream (°F)

10H. Number of passes

10I. Cooling surface area

11. Provide the following pertaining to auxiliary equipment that burns fuel (heaters, dryers, etc.):

Check here if not applicable

11A. Type of fuel and maximum fuel burn rate, per hour:

11B. Provide maximum percent sulfur (S), ash content of fuel, and the energy content using appropriate units:

%S

% Ash

BTU/lb, std. ft³/day, gal

(circle one)

11C. Theoretical combustion air requirement in SCFD per unit of fuel (circle appropriate unit) @ 70°F and 14.7 PSIA:

SCFD/lb, SCFD, gal (circle one)

11D. Percent excess air: %

11E. Type, amount, and BTU rating of burners and all other firing equipment that are planned to be used:

11F. Total maximum design heat input: ×10⁶ BTU/hr.

12. Proposed Monitoring, Recordkeeping, Reporting, and Testing

Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING

RECORDKEEPING

REPORTING

TESTING

MONITORING. PLEASE LIST AND DESCRIBE THE PROCESS PARAMETERS AND RANGES THAT ARE PROPOSED TO BE MONITORED IN ORDER TO DEMONSTRATE COMPLIANCE WITH THE OPERATION OF THIS PROCESS EQUIPMENT OPERATION OR AIR POLLUTION CONTROL DEVICE.

RECORDKEEPING. PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.

REPORTING. PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.

TESTING. PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT OR AIR POLLUTION CONTROL DEVICE.

13. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty

NOTE: An *AIR POLLUTION CONTROL DEVICE SHEET* must be completed for any air pollution device(s) (except emergency relief devices) used to control emissions from this reactor.

DISTILLATION COLUMN DATA SHEET

Identification Number (as assigned on <i>Equipment List Form</i>):		
1. Name and type of equipment		
#. Projected actual equipment operating schedule (complete appropriate lines):		
hrs/day	days/week	weeks/year
hrs/batch	batches/day, batches/week (circle one)	days/yr, weeks/yr (circle one)
2. Number of stages (plates), excluding condenser		
3. Number of feed plates and stage location		
4. Specify details of any reheating, recycling, or stage conditioning along with the stage locations		
5. Specify reflux ratio, R (where R is defined as the ratio of the reflux to the overhead product, given symbolically as $R=L/D$, where L = liquid down column, D = distillation product)		
6. Specify the fraction of feed which is vaporized, f (where f is the molal fraction of the feed that leaves the feed plate continuously as vapor).		
7A. Type of condenser used: <input type="checkbox"/> total <input type="checkbox"/> partial <input type="checkbox"/> multiple <input type="checkbox"/> other		
7B. For each condenser provide process operating details including all inlet and outlet temperatures, pressures, and compositions.		
8. Feed Characteristics		
A. Molar composition		
B. Individual vapor pressure of each component		
C. Total feed stage pressure		
D. Total feed stage temperature		
E. Total mass flow rate of each stream into the system		
9. Overhead Product		
A. Molar composition of components		
B. Vapor pressure of components		
C. Total mass flow rate of all streams leaving the system as overhead products		
10. Bottom Product		
A. Molar composition of all components		
B. Total mass flow rate of all streams leaving the system as bottom products		

11. General Information

- A. Distillation column diameter
- B. Distillation column height
- C. Type of plates
- D. Plate spacing
- E. Murphree plate efficiency
- F. Any other information necessary of describe the operation of this distillation column.

12. **Proposed Monitoring, Recordkeeping, Reporting, and Testing**
 Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING	RECORDKEEPING
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REPORTING	TESTING
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MONITORING. PLEASE LIST AND DESCRIBE THE PROCESS PARAMETERS AND RANGES THAT ARE PROPOSED TO BE MONITORED IN ORDER TO DEMONSTRATE COMPLIANCE WITH THE OPERATION OF THIS PROCESS EQUIPMENT OPERATION OR AIR POLLUTION CONTROL DEVICE.

RECORDKEEPING. PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.

REPORTING. PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.

TESTING. PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT OR AIR POLLUTION CONTROL DEVICE.

13. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty

NOTE: An *AIR POLLUTION CONTROL DEVICE SHEET* must be completed for any air pollution device(s) (except emergency relief devices) used to control emissions from this distillation column.

ATTACHMENT O

Monitoring/Recordkeeping/Reporting/Testing Plans

ATTACHMENT O - MONITORING, RECORDING, REPORTING, AND TESTING PLANS

Plan Type	Emission Unit	Pollutant	Requirements	Frequency	Method of Measurement	Regulatory Reference
Recordkeeping	Regenerative Thermal Oxidizer (100)	PM/PM _{2.5} /PM ₁₀ VOC and criteria pollutants	Control of visible particulate emissions Temperature monitoring	Daily Continuous	Visual	40 CFR 63, Subpart FFFFF 40 CFR 60.18
Recordkeeping	Pyrolyzers (300)	Syngas	Operate and maintain the source in a manner consistent with safety and good air pollution control practices to minimize emissions. Monitor for temperature.	Continuous during operations Weekly and monthly maintenance	Operate the control equipment in accordance with manufacturer's recommendations	N/A
Monitoring/ Recordkeeping	Scrubbers (420)	PM/PM _{2.5} /PM ₁₀ Solids	Pressure Drop monitoring	Hourly average Annual	The pressure drop across the system, PM production rate Catalyst Management Plan will monitor Catalyst Activity by pulling sample blocks and sending them to the laboratory for activity testing.	N/A

ATTACHMENT P

Public Notice

AIR QUALITY PERMIT NOTICE
Notice of Application

Notice is given that Empire Green Generation, LLC has applied to the West Virginia Department of Environmental Protection, Division of Air Quality, for a Modification of Permit R13-3555 for a Plastics Recycling Plant located on 801 Koppers Road, near Follansbee, in Brooke County, West Virginia. The latitude and longitude coordinates are: 40.338690 N, -80.605429 W

The applicant estimates the potential to discharge the following Regulated Air Pollutants will be less than 24.0 tons per year (tpy) of VOCs, 14.0 tpy of PM, 99.0 tpy of CO, 24.0 tpy of NO_x, 2.0 tpy of HAPs and 39.0 tpy of SO_x.

Startup of operation is planned to begin on or about the 15th day of July 2023. Written comments will be received by the West Virginia Department of Environmental Protection, Division of Air Quality, 601 57th Street, SE, Charleston, WV, 25304, for at least 30 calendar days from the date of publication of this notice. Written comments will also be received via email at DEPAirQualityPermitting@WV.gov.

Any questions regarding this permit application should be directed to the DAQ at (304) 926-0499, extension 41281, during normal business hours.

Dated this the (Day) day of (Month), (2023).

By: Empire Green Generation, LLC
Bernard Brown
Chief Technology Officer
1400 Main Street
Follansbee, WV 26037

AFFIDAVIT OF PUBLICATION

State of Florida, County of Orange, ss:

Kade Hill, being first duly sworn, deposes and says: That (s)he is a duly authorized signatory of Column Software, PBC, duly authorized agent of Weirton Daily Times, a newspaper printed and published in the City of Weirton, County of Hancock, State of West Virginia, and that this affidavit is Page 1 of 1 with the full text of the sworn-to notice set forth on the pages that follow, and the hereto attached:

PUBLICATION DATES:

Dec. 8, 2023

NOTICE ID: 07aRE3Xo856eRod3ETiq

PUBLISHER ID: LC6142

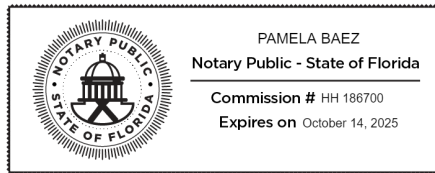
NOTICE NAME: Green Gen Public Notice Modification

Publication Fee: 42.15

(Signed) *Kade Hill*

VERIFICATION

State of Florida
County of Orange



Subscribed in my presence and sworn to before me on this: 12/11/2023

Notary Public
Notarized online using audio-video communication

**AIR QUALITY PERMIT NOTICE
Notice of Application**

Notice is given that Empire Green Generation, LLC has applied to the West Virginia Department of Environmental Protection, Division of Air Quality, for a Modification of Permit R13-3555 for a Plastics Recycling Plant located on 801 Koppers Road, near Follansbee, in Brooke County, West Virginia. The latitude and longitude coordinates are: 40.338690 N, -80.605429 W

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DEPAirQuality
Permitting@WV.gov.

Any questions regarding this permit application should be directed to the DAQ at

(304) 926-0499
extension 41281

during normal business hours.

Dated this the fifth day of December, 2023.

By: Empire Green Generation, LLC
Bernard Brown
Chief Technology Officer
1400 Main Street
Follansbee, WV 26037
WDT Dec 8, 2023

ATTACHMENT Q

Business Confidential Claims

November 16, 2023



Mr. Edwards Andrews, P.E.
West Virginia Department of Environmental Protection
Division of air Quality
601 57th Street, SE
Charleston, WV 25304

RE: Empire Green Generation Confidential Business Information

Dear Mr. Andrews,

Please find enclosed Empire Green Generation's submittal of Confidential Business Information for the modification application for permit number R13-3555. This claim of confidentiality is due to trade secrets and intellectual property. A redacted version of this submittal has been sent to you via email.

Sincerely,

Bernard R. Brown

Bernard Brown
Chief Operating Officer

Encl.

1,400 Main Street, Follansbee, WV 26037

304-914-4624

Precautionary Notice — Claims of Confidentiality

The person submitting this information may assert that some or all of the information submitted is entitled to confidential treatment as provided by West Virginia Legislative Rule 45CSR31, entitled “Confidential Information.” Information covered by such a claim will be disclosed by the Division of Air Quality (DAQ) only to the extent, and by means of the procedures, set forth in 45CSR31. Please contact the West Virginia Secretary of State’s Office at 304/558-6000 or <http://apps.sos.wv.gov/adlaw/csr/> to obtain a copy of 45CSR31 in order to ensure that all required procedures are followed.

Information concerning the “types and amounts of air pollutants discharged,” as that term is defined in WVCSR §45-31-2.4, shall not be claimed as confidential.

Any claim of confidentiality shall be made in accordance with the requirements of 45CSR31 and must accompany the information at the time it is submitted to the DAQ. **If no claim of confidentiality is made at the time of submission or is not made in accordance with the requirements of 45CSR31, the DAQ may make the information available to the public without further notice.**

Included below are procedures, and an example form, to be followed in submitting information claimed as confidential. This information is intended to assist a person with claiming confidential information and is not meant to relieve a person of his/her obligation to review the provisions of 45CSR31 and to comply with such rule. The procedures are as follows:

1. Indicate clearly the items of information claimed confidential by marking each page with the term “Claimed Confidential,” with the date of such claim of confidentiality. With the exception of documents of a size greater than 8½" x 14", information claimed confidential must be submitted on colored paper.
2. Include a cover document (See below) which justifies the claim of confidentiality in accordance with the specific criteria under WVCSR §45-31-4.1. A sample cover document is attached for your information and use. The cover document will be available for public disclosure and must include the following information:
 - (a) The identity of the person making the submission of information claimed confidential;
 - (b) The reason for the submission of information;
 - (c) The name, an address in the State of West Virginia and telephone number of the designee who shall be contacted in accordance with 45CSR31;
 - (d) Identification of each segment of information within each page that is submitted as confidential and the justification for each segment claimed confidential, including the criteria under WVCSR §45-31-4.1;

- (e) The period of time for which confidential treatment is desired (e.g., until a certain date, until the occurrence of a specified event or permanently); and,
 - (f) Signature of a responsible official or an authorized representative of such person.
3. At the same time as the information claimed confidential is submitted to the DAQ on colored paper, a complete set of the information, including the cover document previously required under paragraph 2, must be submitted with the information claimed to be confidential blacked or whited out and the words “Redacted Copy — Claim of Confidentiality” marked clearly on each such page, so that the information is suitable for public disclosure. In the case of drawings and blueprints, mark each page with the words “Redacted Copy — Claim of Confidentiality,” include the title or legend of the drawing, and black or white out the information claimed confidential. The redacted page may be 8½" x 11" in size.

4. In the case of a permit application or supplemental information to an application which contains confidential information, DAQ requires the “Redacted Copy – Claim of Confidentiality” pages and the cover document which justifies the claim of confidentiality to be submitted by e-mail as a PDF file to:
DEPAirQualityPermitting@wv.gov

See instructions at: <https://dep.wv.gov/daq/permitting/Pages/nsr-forms.aspx> OR
<https://dep.wv.gov/daq/permitting/Pages/TitleVGuidanceandForms.aspx>

5. “Claimed Confidential” pages **may not be e-mailed** and shall be submitted, as hardcopy, on colored paper and mailed to:

WVDEP – DAQ – Permitting
Attn: NSR *or* Title V Permitting Secretary *
601 57th Street, SE
Charleston, WV 25304

* For a 45CSR13 application, send to NSR Permitting Secretary. For a 45CSR30 application, send to Title V Permitting Secretary. If this is a combined NSR/Title V Permit Application, send one copy to the NSR Permitting Secretary and one copy to the Title V Permitting Secretary.

Sample Cover Document Confidential Information

This sample form contains each of the required elements for the cover document required under 45CSR31. The person submitting this form may wish to attach an additional page(s) to provide adequate justification under the “Rationale” section of the form.

Company Name	Empire Green Generation	Responsible Official	Bernard Brown
Company Address	1400 Main Street	Confidential Information Designee in State of WV	Name
	Follansbee, WV		Title
			Address
Person/Title Submitting Confidential Information			
			Phone
			Fax

Reason for Submittal of Confidential Information:

Identification of Confidential Information	Rationale for Confidential Claim	Confidential Treatment Time Period
	Provide justification that the criteria set forth in § 45CSR31-4.1.a - e have been met.	

Responsible Official Signature:	<i>Bernard R. Brown</i>
Responsible Official Title:	Chief Operating Officer
Date Signed:	11/30/2023

NOTE: Must be signed and dated in **BLUE INK**.

ATTACHMENT R

Authority Form

AUTHORITY OF LIMITED LIABILITY COMPANY (LLC)

TO: The West Virginia Department of Environmental Protection, Division of Air Quality

DATE: April 8, 2022

ATTN: Director

LLC's Federal Employer I.D. Number 87-3187526

The undersigned hereby files with the West Virginia Department of Environmental Protection, Division of Air Quality, a permit application and hereby certifies that the said name is a trade name which we are using in the conduct of an unincorporated business.

Further, we have agreed or certified as follows:

- (1) The undersigned is a member and in that capacity may represent the interests of the LLC and may obligate and legally bind all current or future members and the LLC.
- (2) The LLC is authorized to do business in the State of West Virginia.
- (3) The name and business address of each member:

Member: Frank Rosso
 Address: 401 East Las Olas Blvd., Suite 1400, Fort Lauderdale, FL 33301
 Telephone No.: 954-332-2423

Member: _____
 Address: _____
 Telephone No.: _____

Member: _____
 Address: _____
 Telephone No.: _____

- (4) If any other persons become members of the undersigned or our relations as such be altered in any way or if the business should become incorporated, the undersigned will notify you promptly.



 MEMBER OF LLC (Signature)

Address: 401 East Las Olas Blvd., Suite 1400
Fort Lauderdale, FL 33301
 Telephone No.: 954-332-2423

Frank J Rosso

 MEMBER OF LLC (Typed)

LIMITED LIABILITY COMPANY=S NAME

ATTACHMENT S

**Title V Permit Revision Information
(Not Applicable)**