Affidavit 5/31/23

Wednesday, May 31, 2023 9:58 AM

Andrews, Edward S <edward.s.andrews@wv.gov>

Affidavits - Thunder Mountain and Pratt & Whitney

1 message

Mink, Stephanie R <stephanie.r.mink@wv.gov> Wed, May 31, 2023 at 9:40 AM
To: Edward Andrews <edward.s.andrews@wv.gov>

Please see attached.

--

Stephanie Mink

Environmental Resources Associate

West Virginia Department of Environmental Protection

Division of Air Quality, Title V Permitting

601 57th Street SE

Charleston, WV 25304

Phone: 304-926-0499 x41281

2 attachments

ExTelegram-Pratt & Whitney affidavit-Ed.pdf
1473K

Jackson Star-Thunder Mtn affidavit-Ed.pdf
1519K

Jackson Star-Thunder Mtn affidavit-Ed

The JACKSON Star&Herald

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PUBLISHER'S CERTIFICATE

I, Carolyn Sizemore,
Classified Manager of THE JACKSON STAR NEWS, a newspaper of general circulation published in the city of Ripley, County and state aforesaid, do hereby certify that the annexed:

AIR QUALITY PERMIT NOTICE

was published in THE JACKSON STAR NEWS 1 time(s) commencing on 05/26/2023 and ending on 05/26/2023 at the request of

WEST VIRGINIA DEPT OF ENVIRONMEN.

Given under my hand this 05/26/2023.

The publisher's fee for said publication is: $34.54.

Carolyn Sizemore
Classified Manager of
THE JACKSON STAR NEWS

Subscribed to and sworn to before me this
05/26/2023

Tina Kocher
Notary Public in and for Jackson County, WV

My commission expires on
The 7th day of January 20 25

OFFICIAL SEAL
NOTARY PUBLIC
STATE OF WEST VIRGINIA
Tina Kocher
PO Box 38
Ravenswood, WV 26164
My Commission Expires January 07, 2025

AIR QUALITY PERMIT NOTICE
Notice of Intent to Approve

On June 2, 2022, Thunder Mountain Environmental Services LLC applied to the WV Department of Environmental Protection, Division of Air Quality (DAQ) for a permit to construct and operate a medical waste treatment facility using a gasifier unit located near Ravenswood, Jackson County, WV at latitude 39.923499 and longitude -81.795688. A preliminary evaluation has determined that all State and Federal air quality requirements will be met by the proposed facility. The DAQ is providing notice to the public of its preliminary determination to issue the permit as Permit R13-3563.

The following potential emissions will be authorized by this purposed permit at the facility: Particulate Matter less than 2.5 microns; 1.83 tons per year (TPY), Particulate Matter less than 10 microns, 2.13 TPY; Particulate Matter, 3.50 TPY; Oxides of Nitrogen, 0.35 TPY; Carbon Monoxide, 1.30 TPY; Sulfur Dioxide, 0.02 TPY; Volatile Organic Compounds, 3.86 TPY; and Total Hazardous Air Pollutants, 3.26 TPY of which 3.26 Tons is Hydrogen Chloride.

Written comments or requests for a public meeting must be received by the DAQ before 5:00 p.m. on Monday, June 26, 2023. A public meeting may be held if the Director of the DAQ determines that significant public interest has been expressed, in writing, or when the Director deems it appropriate.

The purpose of the DAQ's permitting process is to make a preliminary determination if the proposed construction will meet all state and federal air quality requirements. The purpose of the public review process is to accept public comments on air quality issues relevant to this determination. Only written comments received at the address noted below within the specified time frame, or comments presented orally at a scheduled public meeting, will be considered prior to final action on the permit. All such comments will become part of the public record.

Edward Andrews, P.E.
WV Department of Environmental Protection
Division of Air Quality
601 57th Street, SE
Charleston, WV 25304
Telephone: 304/926-0499, ext. 41244
Email: edward.s.andrews@wv.gov

Additional information, including copies of the draft permit, application and all other supporting materials relevant to the permit decision may be obtained by contacting the engineer listed above. The draft permit and engineering evaluation can be downloaded at:
https://dep.wv.gov/daq/permitting/Pages/NSR-Permit-Applications.aspx

DHHR 6/21/23

Monday, June 26, 2023 2:43 PM

Andrews, Edward S <edward.s.andrews@wv.gov>

Re: Thunder Mountain

1 message

Gorbey-Michael, Donna R <donna.r.gorbey-michael@wv.gov> Wed, Jun 21, 2023 at 3:38 PM
To: "Andrews, Edward S" <edward.s.andrews@wv.gov>

Thank you!

On Wed, Jun 21, 2023 at 3:31 PM Andrews, Edward S <edward.s.andrews@wv.gov> wrote:

Here is the latest version of Table 9.4.1. that I got out of TMES.

The emissions from the shedder are included in the material handling emissions in the table.

Here is a process flow diagram that notes the shredder. In my understanding of their application, no process heat was being added into the shredder other than the heat generated from shredding of the waste.

Please contact me if you have any questions.

Thanks.
Ed

On Wed, Jun 21, 2023 at 8:37 AM Gorbey-Michael, Donna R <donna.r.gorbey-michael@wv.gov> wrote:

Perfect! Thanks!

On Fri, Jun 16, 2023 at 1:10 PM Andrews, Edward S <edward.s.andrews@wv.gov> wrote:

I should be available Wednesday afternoon (after 2).

Call either 304-414-1244 or 304-444-8084.

Ed

On Fri, Jun 16, 2023 at 12:39 PM Gorbey-Michael, Donna R <donna.r.gorbey-michael@wv.gov> wrote:

Would you have time to talk with me next Wednesday about Thunder Mountain? I am going through your draft report and the information they gave to me and I (of course) have some questions. I am available any time that is convenient for you. Hope you have a great long weekend!

--
Donna Gorbey-Michael, R.S.
Infectious Medical Waste Program
Fairmont District Office
416 Adams Street, Suite 530
Fairmont, WV 26554
304.368.2530

--
Edward Andrews, P.E.
Engineer
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Fairmont, WV 26554
304.368.2530

Department of Health and Human Resources signed Applic...

West Virginia Department of Health and Human Resources
Bureau of Public Health
Office of Environmental Health Services
Infectious Medical Waste Program

Attention: Donna Gorby-Michael, B.S. West Virginia Department of Health and Human Resources Offices of Environmental Health Services Infectious Medical Waste Program, Fairmount District Office, 460 Adams Street, Suite 530

Subject: Thunder Mountain Environmental Services LLC

Application for alternative treatment technology evaluation and approval. Minor Source WVDEP Application No. R13-3563, Plant I.D. No. 036-00082

Reference E-Mail from Donna Gorby-Michael, B.S. from the West Virginia Department of Health and Human Resources Offices of Environmental Health Services Infectious Medical Waste Program, Fairmount District Office, 460 Adams Street, Suite 530

From: Narel Patel
217 Barefoot Beach Blvd.
Bonita Spring, FL 34134
E-Mail – npatel@iconconstructioninc.com
Phone – 937-545-4872
And
Mr. James Kelsh (Bowles Rice LLP)
600 Quartz Street
Charleston, WV 25301
E-Mail – jkelsh@bowlesrice.com
Phone – 304-347-1135

Dear Ms. Donna,

Please find the complete application for alternative treatment technology for the Thunder Mountain Environmental Services LLC.

Also See Annex-1 for the following details.

- Alternative Technology Details
- Thermal Gasifiers
  - Air Emission Discharge – Calculated and Submitted to WVDEP Analysis and other reports for reference fuel (RDF, TDF, MSW) are available.
  - Shredding System Details

If you need any future information, please let me know.

Sincerely, Narel Patel

West Virginia Department of Health and Human Resources
Bureau of Public Health
Office of Environmental Health Services
Infectious Medical Waste Program

APPLICATION FOR ALTERNATIVE TREATMENT TECHNOLOGY EVALUATION AND APPROVAL

Complete the following application and return it along with application data and evaluation fee of $500.00. Make check payable to: WV Bureau for Public Health. Use additional paper if necessary.

A. GENERAL

A1. Is treatment technology best suited for on-site use at point of generation or is it adaptable for use as a commercial or regional treatment process receiving waste from several generators?

__X__ On-Site _____ Commercial/Regional __X__ Both

A2. Is treatment technology specified for use at small generator facilities such as physicians, dental or veterinary offices or clinics?

_____ Yes __X__ No

A3. Has this treatment technology been approved/disapproved in any other state? If so, please indicate which state has issued a decision and submit copies of approved/disapprovals.

_____ Yes __X__ No

A4. Has the use of equipment resulted in any environmental or occupational safety violation (federal, state, or local)?

_____ Yes __X__ No

A5. Has the use of this equipment resulted in injuries or transmissions of a disease to any person?

_____ Yes __X__ No

If yes, please describe.

A6. Have all applicable West Virginia solid waste and medical waste regulations been reviewed for acceptance, treatment, and disposal of infectious medical waste?

__X__ Yes _____ No

A7. Are other permits required for the proposed technology? Please attach any other agency responses and/or requirements with the application. List all required permits and attach copies of any permit approvals.

__X__ Yes ____ No

See Draft Permit from WVDEP (Annex 1)

B. LEVEL OF TREATMENT

B1. Does the level of microbial inactivation achieved by the treatment process inactivate vegetative bacteria, fungi, lipophilic/hydrophilic viruses, parasites, and mycobacteria at a 6 Log10 reduction or greater?

__X__Yes _____No

If no, specify.

C. CHARACTERIZATION OF PROPOSED TREATMENT PROCESS

C1. Check the appropriate categories that best describe methods of the proposed technology. **More than one (1) category may be checked.**

__X__Chemical	__X__Mechanical	_____Encapsulation
_____Microwave	_____Grinder	_____Plasma Arc
__X__Hammer Mill	____Radio wave	__X__Heat
_____Shredder	_____Irradiation	_____Other (specify)

TME Thermal Gasification Unit (Thermal Combustion) operates in two distinct stages. The first stage of combustion involves the gasification of all gaseous components in the fuel (Medical Waste) form solid matrix. The second stage in the combustion process takes these gaseous fuels and extracts all the available energy through controlled oxidation. The energy can be used to produce steam to generate electricity in the combined cycle plant.
Combustion is the process by which carbon-based matter is converted to CO2, water, and energy. In contrast gasification is direct thermal decomposition of organic and inorganic components in a reduced oxygen environment to form useful products such as low to medium energy fuel gases or synthesis gas (syngas).
Gasification is the chemical change brought about by heat when gasification is conducted at set temperature and time (600° F. to 1652° F. – 315° C. to 900° C.) and 30 minutes. It is capable of inactivating microbial bacteria under these conditions.

D. WASTE COMPATIBLITY WITH PROPOSED TREATMENT PROCESS

Please identify if the proposed system is compatible or non-compatible with the following types of waste.

Type of Waste	Compatible	Non-Compatible
D1. Cultures and Stocks of Infectious Agents and associated biologicals	X	
D2. Liquid human and animal waste including blood products and body fluids.	X	
D3. Pathological waste	X	
D4. Contaminated waste from animals	X	

D5. Sharps X

D6. Other: Regulated Medical Waste X

Please refer to the state infectious medical waste regulations for further definition of the medical waste categories and prescribed medical waste management requirements. "TME will follow WV Emission Regulations.

D7. What waste characteristics present the most challenge to the proposed treatment process?

Organic materials No Liquids Yes 30% and above
Density/compaction No Other characteristics Yes regulated medical waste
Specify: 25% and above 40 lb/cu.ft. Chloride percentage of Chloride other than 30%

D8. Describe by composition (i.e., material and percentage) those medical wastes that pose a challenge to the proposed technology. Why?

Chloride more than 30% (See attached composition)

Waste Composition

Waste Composition wt%	Percentage Range (varies) %
Carbon-C	25-60
Hydrogen-H	4-10
Oxygen O	0-30
Nitrogen-N2	0-5
Sulfur (S, SO2, H2So4)	0-5
Chlorine (Cl, HCL)	0-15
Voc (THC)	
Oxides	(0-40)
Metals	(1-5)
H2O	1-20
HHV (Btu(16))	4,500-15,000

Challenge of medical waste: Heavy Metals such as Lead and Mercury
Toxic Chemicals such as PFAS and Dioxins
Medical Solid Waste/Medical Waste (MSW/MW) – Process Steps

D9. Describe the physical or chemical components of medical waste that interfere, cause mechanical breakdown, or compromise the treatment process or microbial inactivation efficacy.

a. MSW Sorting, Transport, and Shredding
Sorting and separation is performed by the generator; certified transporter will transfer the initially prepared waste to TME. TME will perform shredding at the site, will reduce the size of large homogenous items. (One to two inches in size), thereby making them suitable for further handling and feeding system.

Shredding is used for fragmenting inhomogeneous waste into small normally homogeneous parts. In the shredding process, the temperature of shredded items may reach several hundred degrees. Shredding will cause emissions to air depending on the system. The exhaust will be directed to APCD system - Egress Point EP-001
Chemical components of concern are high chloride mixing homogenizing and testing will control.

b. Treatment-Units
The Gasification unit is designed to operate on a continuous basis which consists of feed stock and surge hopper, feeder, (MFG8) thermal gasifier -with three feed conveyor, firetube waste heat boiler and air pollution control system.

The gasifier is designed for processing multiple forms of hydrocarbon-based fuel such as RDF, TDF and HMSW, with energy content 5000-15000 btu/lb. Feed stock input 7-20 tons per day (TPD) through various temperature zones in the gasification chamber. The rated capacity of gasifier is 8.4 mm btu/hr. (Ref . Dwg. 22-200-05M4).

E. MICROBIAL TEST PROCEDURES

Any proposed treatment method shall be capable of inactivating vegetative bacteria, fungi, of yeasts, parasites, lipophilic/hydrophilic viruses, and mycobacteria at a 6 Log reduction or greater. Bacterial spores shall be inactivated at a 4 Log reduction or greater. A representative from each of the following microbial groups is required for testing.

E1. Listed below are several test organisms which have been used as microbial indicators to determine the effectiveness of a given treatment method. If there is any data either to support or refute the inactivation of any of the biological indicators using the proposed treatment process under normal operating conditions, please check the appropriate space next to the indicator.

The thermal processing and finding ways to reduce the number of microbial bacteria, time and temperature measurements of microbial bacteria reduction is determined by 'D' value, meaning how long it would take to reduce the microbial bacteria population by 90% or one Log1 at a given temperature.

Microbial death refers to the ability of reproduction under standard environment state. Several factors affect microbial death, such as osmotic pressure, temperature, the concentration of oxygen.

Typical overkill or conservative heat processing conditions sterility assurance level.

Table 11.4 (Ref.)

Conditions	Minimum B1 D-Value	Temperature	12D Hold Time	Typical Cycle
Moist Heat	1-5 Min. @ 121° C.	121° C. (248° F.)	18 Min.	Gravity Displacement 30 Min.
		132° C. (270° F.)	10.4 Min.	Pedalium 4 Min.
		160° C. (328° F.)	24 Min.	120 Min.
Dry Heat	1-5 Min. @ 121° C.	180° C. (356° F.)	2 -4 Min.	3 Min.
		250° C. (482° F.)	NA	30 Min. dehydrogenation

TME Thermal Gasification Operates at Higher Temperature and for a Minimum of 60 minutes

Log 10 D-Value 130° C. O-1
Reference: Microbial inactivation kinetic and heat disinfection

Patrick J. McCormick, James J. Kaiser, and Michael J. Schoeme

Microorganisms associated with health care waste.

The presence of various microorganisms such as pathogenic viruses and bacteria. A number of opportunistic pathogenic bacteria including pseudomonas, SPP, lactobacillus supp macrobacterium oxygens and Propionibacterium acres were reported from various medical waste.

Microbial Diseases Associated with Health Care Waste
Microbial Group Type of Disease Caused

Bacterial – Tetanus, gas gangrene and other wound infections, anthrax, cholera, other diarrhea diseases, enteric fever, shigellosis, plague, etc.

Viral – Various hepatitis, poliomyelitis, HIV infections (HBV, TB, STD, Rabis, etc.)

Parasitic -Amoebiasis, Giardiasis, Ancyloinastomiasis, Taeniasis, Echinococcosis, Malaria, etc.

Fungal Infection – Various fungal infections like candidiasis, cryptococcoses, etc.

"Thermal processing and Kinetic of Microbial Death"

"Microbial Death Kinetics during Thermal Processing"

- When suspension of microorganisms is heated at constant temperatures, the decrease in number of viable organisms follows a first-order reaction.
- Nutritional loss during thermal processing is also treated as first-order of reaction.

Note: If protocols utilized by the applicant to generate microbial inactivation data are deemed unacceptable by the Department, the Department reserves the right to request that the applicant resubmit data generated from Department approved protocols. If data has not yet been procured to support the inactivation of the listed biological indicators below, please contact the Department before initiating efficacy testing to ensure research protocols are in accordance with the Department requirements.

Vegetative Bacteria	Staphylococcus aureus (ATCC 6538)	X	Level I
	Pseudomonas aeruginosa (ATCC 15442) 6 Log10		
Fungi			
	Candida albicans (ATCC 18804) 6 Log10	X	Level I
	Penicillium chrysogenum (ATCC 24791)		
	Aspergillus niger		
Viruses			
	Polio 2 or Polio 3 6 Log10	X	Level I
	MS-2 Bacteriophage (ATCC 15597-B1)		
Parasites			
	Cryptosporidium spp. oocysts Log10		
	Giardia spp. Cysts		
	Effluent treated with FeCl3		
Mycobacteria			
	Mycobacterium terrae 6 Log10	X	Level II
	Mycobacterium phlei	X	
	Mycobacterium bovis (BCG) ATCC 35743	X	
Bacterial Spores			
	B. stearothermophilus 6 Log10	X	Level III, Level IV
	B. subtilis (ATCC 19659) 4 Log 10	X	

E2. Were the results certified by an independent public health or certified testing laboratory?

_____Yes ___X___No

If yes, indicate the name, address, and telephone number of the certifying laboratory and attach the test protocol, results and an explanation of any available data not supporting the reduction factors references above.

Note: Above data are based on technical review (1) Thermal Gasification process based on time, temperature, and turbulence. (2) as required by agency – system will be tested to meet requirements by certified testing laboratory.

F. BY-PRODUCTS AND DISCHAGES OF THE TREATMENT PROCESS

F1. Please indicate all by-products and discharges (to air, water, or land) which may be generated as a result of this alternative treatment technology.

Aerosols____ Leachate_____ Smoke___ Ash X (Bottom and Fly Ash)
Stack Emissions__X___ Chemical Residue_____ Odor___ Dust_X__(Fly Ash)
Slag_____ Steam___X_Used to produce power Vapor or Fumes
Heat__X___ Bottom Ash Sludge_____ Other, specify.
TME thermal gasifiers have the following by-products:

F2. If any of the above by-products or discharges are indicated, how will they be controlled?

Bottom ash sludge approved by WVDEP and EPA to landfill.
Dust (Fly ash) approved by WVDEP and EPA with pollution-controlled system.
Heat to generate steam power generation utility.

Ash – Two kinds of ash (1) bottom ash (2) fly ash. Bottom ash: TME thermal gasification process includes the preparation of medical waste, mixing and shredding prior to charging it into the gasifier to reduce the size of the ash. Bottom ash will be collected into a high temperature quench bath at the end of each twenty-four-hour cycle. It will be pumped to sedimentation system and treated for "PH", adjustments, and ferrous chloride for microbial deactivation. The treated water will be recycled, the sludge will be cement solidification technology, if required by USEPA and WVDEP then transferred to an approved landfill.
Incinerator bottom ash as described earlier; bottom ash is unregulated. It will transfer to WVDEP and USEPA approved landfill.
Fly ash is collected in dry form from the baghouse (dust cleaning filter) and after treatment it will be disposed in a WVDEP and USEPA approved landfill.

- Heat: Exothermic Heat. TME thermal gasifier is a waste-to-energy unit so the heat will be used to create steam/power, also as utilities.

- Stack Emissions: Thermal gasifier is equipped with an appropriate pollution abetment control system; The system will control emissions to meet WVDEP and USEPA requirements. Sound engineering control of thermal gasifier operation.

Acid Gases: Acid gas concentrations of hydrogen chloride (Hcl) and sulfur dioxide (SO2) in min. flue gases are directly related to the chloride and sulfur content of the waste. Most of the (Cl2) chloride, which is chemically bond within the waste in the form of polyvinyl chloride (PVC) and other chlorinated compounds, will be converted to Hcl. Sulfur is also chemically bond within the materials making up medical waste when it is oxidized during combustion to form SO2.

The most frequently used control devices are wet scrubbers, fabric filters (FFS), also in addition to wet scrubbing, dry sorbent injection (DSI) and spray dryer (SD) absorbers have been used for acid gas control.

Dry sorbent injection (DSI) is used by TME for controlling acid gases. In the DSI process, a dry alkaline material is injected into the flue gas, into a dry venturi within the duct work or into the ductwork ahead of the particulate control device.

- Activated Carbon will be injected into the ductwork to control mercury, dioxin-furns and other pollutants.

The alkaline material reacts with and neutralizes acids in the flue gas. Fabric filter downstream of DSI to:

1. PM generated by the gasifier.
2. Capture the DSI reaction products and unreacted sorbent.
3. Increase sorbent/acid gas contact time.

Hydrogen chloride (Hcl) is the principal acid gas of concern for medical waste gasifier. This is because medical waste contains a high percent of plastics, typically from 15 to 20 percent of waste stream, and PVC plastic (which contains chloride) make up approximately 10% of the total plastic waste stream, PVC plastics in the presence of available hydrogen in the combustion chamber, converts to Hcl. Approximately one pound of Hcl is generated from 2-3 pounds of PVC plastics.

Sulfur dioxide generation is similar to Hcl; most of the sulfur in the waste feed is converted to SO2 during combustion. Since medical waste typically contains less sulfur than chloride, SO2 generation is less of a problem.

Table 1.0
Uncontrolled Emission Factors for Medical Waste

	Pounds per ton of waste		
	Max	Min	Average
Particulates	5.4	1.4	4.1
Hydrogen Chloride	66	7	9.4
Sulfur Dioxide	3	1.5	2.7
Nitrogen Oxide	7.8	4.6	6.2
Carbon Monoxide	1.7	1.3	1.5
Mercury - pounds per million tons of waste	4000	2000	3000

Source carb test of St. Agnes Medical Center Frenso, CA

Reference: Medical Waste Incinerator - Emission and Air Pollution Control

David Corbus Cert - 89-247 1988-1989 Part of the EPA

F3. If there are no by-products or discharges indicated, how was this determined?

Chemical/Physical material analysis balance
Material Balance – Input and Output – Technical calculation and stack test.

F4. Are any of the by-products or discharges USEPA listed hazardous wastes (40 CFR Part 261), biohazardous, etc?

__X__Yes _____No

If yes, explain necessary controls, personal protective equipment, storage, disposal, etc.

TME Thermal Gasifier will create the following Waste:

Gasifier Bottom Ash (GBA): The medical waste treatment plant will generate 2.0 TPD (or 750 TPY) and it will be tested and approved by WVDEP and EPA for transferred to WVDEP & EPA approved landfill.

Air pollution control residue or Fly Ash (NWGFA): The medical waste treatment plant will generate approximately 25 to 50 pounds per hour (0.3 to 0.6 TPD) 110 TPY to 220 TPY. TME may use cement solidification technology to meet EPA/WVDEP landfill requirements.

Currently, no national reporting requirement or mechanisms exist to report the amount of toxic chemical in fly ash or bottom ash or whether a medical waste gasifier would meet their thresholds. Bottom ash will be tested regularly to assure that the waste is safely contained to prevent toxic substances from mitigating into ground water supplies, to determine whether it is hazardous or not.

G. ENVIRONMENTAL EFFECTS OF THE TREATMENT PROCESS

G1. Are any negative effects on the environment anticipated from the use of the treatment process and/or disposal of the treated waste from the treatment process?

_____Yes ___X___No

G2. What environmental, occupational, and/or public health hazards would be associated with a malfunction of the treatment process? Specify.

The feed stock conveyor shuts down, the bypass stack dampers open and the emission discharge is less than the regular pollution control system.

G3. If the treatment process includes the use of water, steam, or other liquids, how will this waste discharge be handled (i.e., sewer, recycled, etc.)? Specify.

Water: Bottom Ash quench bath, after sludge is dewatered and treated it will be recycled.
Steam: To generate power.

G4. What are the physical characteristics of the waste residues generated from the treatment process (i.e., wet, dry, shredded, powdered, etc.)? Specify.

Wet, Bottom Ash – Sludge, Dry, Fly Ash – Powdered bind with addictive for disposal.

G5. How will the treated medical waste from this process be disposed (i.e., landfill, incineration, recycled, etc.)?

After treatment the waste will be disposed of at an approved WVDEP/USEPA landfill.

G6. Are any by-products classified as hazardous waste (40 CFR Part 261)?
_____Yes ___X___No Complete Item A6.

H. OCCUPATIONAL HAZARDS

H1. What are the potential hazards associated with the treatment process?

Worker handling of the waste on site, for example needle stick injuries, back strain due to manual handling, possible infection by pathogens including tetanus and leptospirosis. Exposure to harmful gas, hazard class 6 division 6.6, EPA's regulation 40 CFR hazardous waste characteristic properties: ignitability, corrosivity reactivity or toxicity (40 CFR 261.21 – 261.24)

H2. What hazard abatement/reduction strategies will be used during the operation of this treatment process (include engineering controls, personal protection equipment, etc.)?

Sound engineering control for waste transfer, storage, shredding, feeding, gasification and emissions operations.

H3. What training will the operator(s) of the treatment process receive?

The primary goal of the training program is to provide an acute level of understanding of MWG (Medical Waste Gasification). Operators to successfully complete the operator certification examination of the ASME standards for qualification and certifications of medical waste (incinerator or similar) gasification operators (ref. ASME QMO-1). Training will be preapproved by USEPA, WVDEP and WVDHHR. The necessary examination will be taken and passed by TME – gasification operator.

Additional training will include the following:

1. Equipment calibration procedures (where applicable).
2. Inspection and maintenance of the HM/WG, air pollution control devices and continuous emission monitoring systems.
3. Action to correct malfunctions or conditions that may lead to malfunctions.
4. Bottom Ash and Fly Ash characteristics and handling procedures.
5. Applicable federal (EPA), state and local regulations.
6. Work safety procedures
7. Pre-Startup inspection and record keeping requirements.
8. Personal Protection Equipment (PPE) Requirements.
   The following PPE is required to be worn during gasification operation.

Flame Retardant Clothing, including gloves, arm guards' jackets and overalls, safety glasses, ear protection and heavy-duty boots.
The following PPE is required to be worn for waste handling operations.
Face Mask or safety Visor to protect eyes and mouth, heavy duty gloves, arm guards' jackets and overalls, safety glasses, ear protection, and heavy-duty boots.

I. CRITICAL FACTORS OF THE TREATMENT PROCESS

I1. What are the critical factors that influence the specific treatment technology? Specify.

1.0 Shredding and sizing of medical waste.
2.0 Gasifier Combustion and operations.
3.0 Temperature control.
4.0 Air pollution controls and function

I2. What are the consequences if these factors are not met? Specify.

Operational shutdown.

I3. Explain the ease and/or difficulty of operation of the medical treatment system.

The gasifier is compact and simple to operate.

I4. What type of ongoing maintenance is required in the operation of the treatment system? Specify.

After every cycle clean and wash system and routine checks of all operating electrical and mechanical units.

I5. What emergency measures would be required in the event of a malfunction? Specify

The primary objectives of these emergency and contingency response plans are: To prevent of minimize biological and/or chemical agents released and exposed to the equipment operator or support or maintenance personnel.

To develop contingency medical waste treatment or disposal alternatives for untreated or inadequately treated medical waste.

I6. How are these measures addressed in an emergency plan or in the operations protocol?

TME process system is equipped with an emergency by-pass, this by-pass diverts emissions to a relief stack whenever there is an equipment malfunction or a power outage. TME also has an emergency generator.

The emergency bypass cuts off the waste feed until operation returns to normal. These bypass events usually last less than 5-10 minutes.

Pollution levels during bypass events are extremely low due to the short-term nature of the bypass event.

I7. What is the maximum amount of waste to be treated by this process per cycle?

In a twenty-four-hour cycle there is 20 to 25 tons of waste at a hourly feed rate of 1650-2000 pounds per hour.

I8. How long is a cycle?

Twenty-four hours.

J. CHEMICAL TREATMENT PROCESS

J1. If the treatment process involves the use of chemical inactivation.

No chemical treatment occurs in the process, it is a thermal treatment.

a. What is the name of the active ingredient?
b. What concentration must be used and maintained?
c. At what pH is the chemical agent active?
d. What is the necessary contact time?
e. If there is any incompatibility with specific materials and surfaces, specify.
f. What is the pH of any end products (i.e., liquid effluents)? pH 6 to 7. (min to none)
g. List any additional factors or circumstances that may interfere with the chemical's inactivation potential.

J2. What is the active life of the chemical agent after it has been exposed to air or contaminated medical waste?

J3. Have studies been conducted relative to the long-term effectiveness of the chemical agent while in use? If yes, please attach a copy of the study and test results.

J4. What health and safety hazards may be associated with the chemical (present and long-term)? Specify.

NA

J5. Is the chemical agent registered for this specific use with the Environmental Protection Agency (USEPA) Pesticide Registration Division? _____Yes __X___No
If yes, provide the USEPA registration number and a copy of the EPA approved label instruction for use.

J6. Is the spent chemical agent classified as a hazardous waste by the USEPA (40 CFR Part 261) or by other state criteria? _____Yes __X___No

J7. Is an environmental impact study for the chemical agent available? ____Yes __X____No

K. QUALITY ASSURANCE AND VERIFICATION OF MICROBIAL ACTIVATION

K1. How is the quality assurance of the treatment process addressed?

EPA test methods (CTM 025), Microbial survivability test for medical waste, Gasification ash condition test method (CTM 025, 026).

K2. What is the recommended frequency that a microbiological indicator should be used to confirm effectiveness of the system? Specify.

Daily at the beginning of the gasification system, after approved by USEPA/WVDEP it will be tested as specified.

K3. Other than the biological indicators listed in section E, what other indicators, integrators, or monitoring devices would be used to show that the treatment unit or process was functioning properly? (Please describe and explain).

None.

K4. How is it determined that the process waste has received proper treatment? Check appropriate item)

Temperature Indicator	__X__ Visual	__X__ Continuous	__X__ Both
Pressure Indicator	__X__ Visual	_____ Continuous	__X__ Both
Tune Indicator	_____ Visual	_____ Continuous	_____ Both
Chemical Concentration Indicator	_____ Visual	_____ Continuous	__X__ Both

Other: Please specify. Time, Temperature and Turbulence

K5. How have the treatment process monitors been correlated with the biological indicators to ensure effective and accurate monitoring of the treatment process? Specify.

Gasification Time, Temperature and Turbulence

K6. What is the established process monitor calibration schedule and what is its frequency of calibration?

Continuous monitoring of temperature, time and turbulence. The calibration shall be checked every new cycle (daily).

K7. How are process monitors interfaced to the system's operations to effect proper treatment conditions?

Time and Temperature are integral parts of the gasification process. Emission volume, temperature and operating parameters.

K8. How are the process monitor controls secured to prevent operator over-ride of the process before treatment is adequately affected? Explain.

When the gasification unit is in operation the automatic set controls are in place and cannot be overridden or the system will shut down.

K9. What failure mode and effect analyses have been performed on the treatment system?

Failure Mode – Waste Feed System Stop and Emergency Bypass opens and sounds alarm.

L. POST TREATMENT RESIDUE DISPOSAL, RECLAMATION OR RECYCLING

L1. How will the treated medical waste from this process be disposed of?

X Burial in approved landfill _____ Incineration ____ Recycled

L2. If the waste is to be recycled, provide additional evidence regarding this strategy.

If it is approved by WVDEP and EPA it may be recycled for commercial purpose.

L3. If the waste is to be recycled, what percentage of the treated waste will be recycled? How will the remainder of the waste be disposed?

If it is approved by WVDEP and EPA only 8 to 10% will be recycled.

M. POTENTAIL ENVIRONMENTAL BENEFITS

M1. Has an energy analysis been conducted on the proposed technology?

__X__Yes _____No If yes, specify and provide analysis results.

The gasification system is a waste to energy generation system, it is tested on RDF & TDF fuels. It is available.

M2. Has an economic analysis been performed on the proposed technology?

_____Yes __X____No If yes, specify and provide analysis results.

Only analytically calculated power generation 0.5 to 1 MW.

M3. How does this treatment technology improve existing medical waste treatment and disposal methods? Specify.

Efficient, simple and generates energy, Waste disposal is very minimal and meets WVDEP and USEPA requirements.

M4. What is the potential of this proposed technology for waste volume reduction? Specify.

The potential is it avoids transportation of waste to treatment plant, it can be used at generator. It reduces bottom ash, fly ash and power requirements and feasible fuel use.

N. OTHER RELEVENT INFORMATION AND COMMENTS

All approvals or denials received from other states, counties or agencies concerning any aspect of equipment operation and efficacy as well as all safety, competency or training requirements for the users/operators, etc. must be included.

As I know we have not received any denials from other states for medical waste. We have received approvals for the following fuels: RDF, TDF and Municipal Waste Operations, Emissions, Fly Ash, and Bottom Ash from PA, and other states.

CERTIFICATION STATEMENT

I certify that the information requested and contained in this document is accurate and complete and that all existing documents requested in this document for this system or similar systems is provided. The Vendor, identified below, agrees to provide the West Virginia Infectious Medical Waste Program with all results of all studies conducted by or for any state, company, agency or country, or any other person, and all results of all studies which the vendor conducts, or is in any way aware of, to determine the operational performance of any aspect of the equipment for which authorization to operate in this state is requested on the filing of this application. I am aware that infectious medical waste management systems to be operated in this state for infectious medical waste treatment and/or destruction must be identical to the system described in this application for authorization to operate in this state and for which operational data is presented in the application for the West Virginia Infectious Medical Waste Program's review. Any and all changes in the system and related equipment after this application submittal and West Virginia Infectious Medical Waste Program review and authorization to operate must be submitted in writing prior to use.

The West Virginia Infection Medical Waste Program's permitting conditions or other agency's authorization granted to operate this system to treat and /or destroy infectious medical waste will be reviewed periodically to ensure specifically authorized infectious medical waste technology system meet currently accepted standards for infectious medical waste management. The West Virginia Infectious Medical Waste Program may modify system operational or performance requirements for systems that received prior authorization to operate, if warranted to protect human health and the environment.

I am further aware that on reviewing the completed application and the required attachments, West Virginia Infectious Medical Waste Program may have additional questions and require submissions of data and other deemed necessary regarding this or related medical waste disposal systems. Failure to provide all the existing requested information will result in delays in processing the request for authorization to operate. Failure to provide all required information as outlined in the application, or willfully withholding information, may be cause for the West Virginia Infectious Medical Waste Program to deny or rescind authorization to operate if it is determined that the information not submitted would have been in any way relevant to its review or this technology.

Name of System/Equipment:

Effective Renewable Technologies, Inc.

8060 Cleary Blvd. Unit 606 Plantation, FL 33324

Mr. Bryan Fennell

Model Number – MFG-8

Bryan J Fennell

Title: President

May 22, 2023

Signature of Mr. Craig Watkins (Vice President)

Date: 5/22/2023

Name of person completing application: Naren R. Patel

Title: President/Application Engineer

Name of Vendor (Company): Icon Construction/Datel Engineering

Phone: 937-545-4872

Name of Division: Engineering/Construction

E-Mail: npatel@iconconstructioninc.com

Address: 217 Barefoot Beach Blvd.

City, State & Zip Code: Bonita Springs, FL 34134

Appendix A

Minor Source Construction Permit Application

PERMIT APPLICATION No. R13-3563

PLANT I.D. No. 036-00082

Thunder Mountain Environmental Services LLC (TMES)

Icon Project 22-200-05

Medical Solid Waste Gasification

Appendix A

Icon Construction Inc.
42 Pinehurst Place,
Springboro, Ohio 45458
Ph: 937-885-2299
Cell: 937-545-4872
Email: npatel@iconconstructioninc.com

Thunder Mountain Environmental Services LLC
Icon Project No. 22-200
Medical Solid Waste Gasification
Minor Source Construction Permit App. No. 13-3563

TME Proposed HMIWI - Thermal Gasifier Emission Control System Summary Table Based on Five Step BACT Analysis				
Summary Table B				
BACT Analysis				
Controlled Technology/Infeasible Technology/Feasible Technology				
Emissions	All Control Technology	Infeasible Control Technology	Efficiency %	Feasible or Selected Control Technology
(NOx) - Nitrogen Oxide	SNCR	SNCR	30-50	
	SCR	SCR	60-80	
	Wet Scrubber	Wet Scrubber	Cost	
	Ozone Injection	Ozone Injection	Cost of Operation	
	Thermal Oxidizer -See Section	Thermal Oxidizer -See Section	Operation Energy Cost	
	Good Combustion Practice			Good Combustion Practice
(CO) - Carbon Monoxide	CO Oxidation Catalysts	CO Oxidation Catalysts		Good Combustion Practice
	Thermal Oxidizer	Thermal Oxidizer		
	Good Combustion Practice			Good Combustion Practice
Particulate Matter PM, PM10 and PM2.5	Electrostatic Precipitator (ESP)	Electrostatic Precipitator (ESP)		
	Cyclone/Multi Clone	Cyclone/Multi Clone		Baghouse
	Wet Venturi Scrubber	Wet Venturi Scrubber		
	Baghouse			
Mercury (Hg)	Activated Carbon Injection			Activated Carbon Injection
	WHh/Alkali Injection			
	Carbon Bed System			
	Wet Scrubbing			
Sulfur Dioxide (SO2)	Dry Sorbent Injection		98 +	Dry Sorbent Injection
	Scrubber/Baghouse	Scrubber/Baghouse		
	Wet Scrubber	Wet Scrubber		
	Wet Gas Absorber	Wet Gas Absorber		
	Gas Phase Oxidation/NH3 Reaction	Gas Phase Oxidation/NH3 Reaction		
Dioxin/Furans COD/CDF/TDF/TEQ	Activated Carbon Injection w/Baghouse			Activated Carbon Injection w/Baghouse
	Baghouse w/ Catalyst Impregnated Bags	Baghouse w/ Catalyst Impregnated Bags		
	Baghouse			
Hydro-Chloride (HCL)	Dry Sorbent Injection Scrubber w/Baghouse			Dry Sorbent Injection Scrubber w/Baghouse
	Wet Scrubber	Wet Scrubber		
	Wet Gas Absorber	Wet Gas Absorber		
Cadmium (cd)	Activated Carbon w/Alkaline Sorbent Scrubbing			Activated Carbon w/Alkaline Sorbent Scrubbing
Lead (Pb)	Activated Carbon w/Alkaline Sorbent Scrubbing			Activated Carbon w/Alkaline Sorbent Scrubbing
	Estimate is included for information which is used also for the selection of technology			

BACT Evaluation Table "C" - Emission Technology Brief Analysis

Equipment	Pollutant(s)	BACT Control	Emission Limitation(s)
Hospital Medical Waste Gasification (Incineration)	See Section 5.0, Subsection 5.3.7 (D) and (E) & Nitrogen Oxide (NOx). **Option 4**	**Good Combustion Practices** - HMIWI or Gasification with good combustion tuning have uncontrolled NOx in the range of 50 to 110 PPMV. **Option 4**	140 parts per million by volume (PPMBV) TME is already controlling CO emissions through good combustion practices. Minimizing NOx while simultaneously minimizing CO through good combustion practice. **Option 4**

Thunder Mountain Environmental Services LLC
Icon Project No. 22-200
Medical Solid Waste Gasification
Minor Source Construction Permit App. No. 13-3563

BACT Evaluation Table "C" - Emission Technology Brief Analysis

Equipment	Pollutant(s)	BACT Control	Emission Limitation(s)
HMIWI - Thermal Gasifier	**Nitrogen Oxide (NOx)** Also see Section 5.0, Subsection 5.3.7 (B) and (C). **Options 1, 3 & 5**	**Selective Non-Catalytic Reduction (SNCR)** SNCR is a post combustion technology which uses the injection of urea or ammonia at high furnace temperatures. NOx reduction as high as 30 to 50 percent are possible before ammonia slips starts.	Not selected therefore, no applicable emission limits
	Also see Section 5.0, Subsection 5.3.7 (A). **Options 1,3 & 5**	**Selective Catalytic Reduction (SCR)** SCR technology works on the same principle as SNCR with the addition of a catalytic converter section and can achieve NOx reduction rates as high as 60 to 80 percent before ammonia slip becomes a problem. The catalytic used in SCR must be operated downstream of the particulate control device to avoid fouling of the catalyst. This plant design does not allow for this type of catalyst to be installed as SCR would be installed prior to the baghouse causing fouling of the catalyst.	Not selected therefore, no applicable emission limits
	Also see Section 5.0, Subsection 5.3.7 (A). **Options 1,3 & 5**	**Wet Scrubber** Wet scrubbing is the most complex of the possible control options and would require significant operator labor. Wet scrubbing would require large quantities of reagent to control NOx. The capital investment is estimated at $530,000, which results in an annualized cost of approximately $10,600 per ton of NOx removed.	Not selected due to cost; therefore, no applicable emission limit.

BACT Evaluation Table "C" - Emission Technology Brief Analysis

Equipment	Pollutant(s)	BACT Control	Emission Limitation(s)
HMIWI - Thermal Gasifier	**Carbon Monoxide (CO)** See Section 5.0, Subsection 5.3.2 (A) & (B). **Option 4**	**Good Combustion Practices** These practices increase efficiency of the combustion process, which reduces the emissions of CO by minimizing incomplete combustion with thermal oxidation (efficiency 98% to 99.99%). **Option 4**	11 ppmv
	Carbon Monoxide (CO) See Section 5.0, Subsection 5.3.2 (A) & (B). **Option 1**	**CO Oxidation Catalysts** These catalysts provide add-on control for CO emissions and are typically only effective for large emissions streams of CO such as turbines and power producer. These have also not been applied to HMIWI units as the CO emissions are very low 1.066 tpy in this case.	This is a small emission source for CO therefore no requirement for installation of oxidation catalysts.

Thunder Mountain Environmental Services LLC
Icon Project No. 22-200
Medical Solid Waste Gasification
Minor Source Construction Permit App. No. 13-3563

BACT Evaluation Table "C" - Emission Technology Brief Analysis

Equipment	Pollutant(s)	BACT Control	Emission Limitation(s)
HMIWI - Thermal Gasifier	**Particulate Matter (PM/PM10/PM2.5)**, lead, cadmium, and particulate phase **Mercury** See Section 5.0 Subsection 5.3.1 **Lead** (Pb) See Section 5.0 Subsection 5.3.9 **Cadmium** (cd) See Section 5.0 Subsection 5.3.10 **Mercury** (Hg) See Section 5.0 Subsection 5.3.11	**Baghouse** A baghouse utilizes specially designed bags to capture particulate and heavy metal emissions as the gas passes through the bags. Baghouses are typically 99.9%+ efficient at removing these pollutants. **Options 2 & 4**	**PM/PM10/PM2.5** 18 mg/dscm 0.0080 gr/dscf **Lead** 0.00069 mg/dscm 0.00030 grains per thousand dry standard cubic feet (gr/10^3 dscf) Cadmium 0.00013 mg/dscm 0.000057 gr/10^3 dscf **Mercury** 0.0013 mg/dscm 0.00057 gr/10?3 dscf
		Electrostatic Precipitator ESP ESPs utilize the force of an induced electrical charge to remove particulate from the gas stream. An ESP is typically 95-99.0% efficient at removing these pollutants. **Options 1 & 5**	The ESP was not selected as a control measure and therefore, there is no applicable emission limitation.
		Wet Venturi Scrubber A wet venturi scrubber utilizes a specially designed duct shape in conjunction with a scrubbing liquid which contacts the gas stream and removes the pollutants from it. A wet scrubber is typically 80-90% efficient at removing these pollutants. **Options 1 & 5**	Not selected therefore, no applicable emission limits. **Options 1 & 5**
		Cyclone/Multi Clone A cyclone/multiclone removes particulates from the gas stream by rotating the gas at speeds that allow gravity to push the particulate matter to the outside and drop out. Cyclone/multi clones are typically 50%+ efficient at removing particulate matter. **Options 3 & 4**	Applicable emission limit.

Thunder Mountain Environmental Services LLC
Icon Project No. 22-200
Medical Solid Waste Gasification
Minor Source Construction Permit App. No. 13-3563

BACT Evaluation Table "C" - Emission Technology Brief Analysis

Equipment	Pollutant(s)	BACT Control	Emission Limitation(s)
HMIWI - Thermal Gasifier	**Mercury Hg** (gaseous phase)	**Carbon Injection** This control process involves injecting activated carbon into the gas stream to adsorb the gaseous mercury. Carbon provides additional surface area for adsorption of gaseous mercury. Use of carbon injection must be accompanied with use of a baghouse for dry particulate control. Some applications have estimated a very conservative control efficiency of 70-90%+ using carbon injection.	Mercury emission limitation is stated above and includes the control of Carbon Injection. .0013 Mg/dscfm 0.00057 gr/10^3 dscf
		Carbon Bed System This system uses activated carbon as an adsorption source to control gaseous mercury emissions. It is most effective when processing a "clean" gas stream usually following a scrubber or baghouse. Control efficiencies are estimated at 85%.	Not Selected
		Wet Scrubbing A wet scrubber utilizes a scrubbing liquid which contacts the gas stream and removes the pollutants from it. A wet scrubber is typically 80 to 85% efficient at removing gaseous mercury emissions.	Not selected; therefore, no applicable emission limit.

Thunder Mountain Environmental Services LLC
Icon Project No. 22-200
Medical Solid Waste Gasification
Minor Source Construction Permit App. No. 13-3563

BACT Evaluation Table "C" - Emission Technology Brief Analysis

Equipment	Pollutant(s)	BACT Control	Emission Limitation(s)
HMIWI - Thermal Gasifier	**Sulfur Dioxide (SO2) Hydrogen Chloride (HCl)**	**Dry Scrubber/Baghouse** A dry scrubber uses the injection of dry sorbent prior to a baghouse, so that the sorbent collects on the outside of the baghouse filter bags and creates a "cake" through which acid gases pass and are neutralized. This control method can achieve up to 80% plus control efficiency.	SO2 - 8.1 ppmv HCl 5.1 ppmv Dry sorbent injection followed by a dry scrubber/baghouse utilizes in series was selected as control.
		Wet Gas Absorber A wet gas absorber uses a caustic scrubbing liquid, which contacts the gas stream and neutralizes the acid gases.	Not selected

Thunder Mountain Environmental Services LLC
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Medical Solid Waste Gasification
Minor Source Construction Permit App. No. 13-3563

BACT Evaluation Table "C" - Emission Technology Brief Analysis

Equipment	Pollutant(s)	BACT Control	Emission Limitation(s)
HMIWI - Thermal Gasifier	**Dioxin/Furans (CDD/CDF)**	**Carbon Injection** Carbon injection involves injecting activated carbon into the gas stream to adsorb CDD/CDF that may be formed. Activated carbon may bind with CDD/CDF and is collected by a baghouse. This method can achieve up to 90% control efficiency.	**Dioxin/Furans** 9.3 Nanograms per dry standard cubic meter total dioxin/furans ng/dscm 4.1 grains per billion dry standard cubic feet (gr/10^9 dscf) or 0.035 ng/dscm TEQ 0.015 gr/10^9 dscf TEQ Note: Emissions levels are achieved using Carbon Injection and a Baghouse.
		Baghouse with Catalyst-Impregnated Bags Specially designed bags entrained with a catalyst to capture particulate matter emission, including activated carbon containing adsorbed CDD/CDF, as the gas passes through. Control efficiencies are above 99.99%.	This technology is ruled out as the expense of the catalyst-impregnated bags exceeds a reasonable cost per ton removal expense ($190,000,000 per ton of CDD/CDf removed for bags only).
		Baghouse Uses specially designed bags to capture particulate matter emission, including activated carbon containing adsorbed CDD/CDF, as the gas passes through. Control efficiencies are above 99.99%.	This technology was accepted for control of particulate matter (PM/PM10/PM2.5), lead, cadmium, and particulate phase mercury. The respective emissions limits are found above. The emission limits for activated carbon containing adsorbed CDD/CDF can be achieved using carbon injection along with the baghouse.

BACT Evaluation Table "C" - Emission Technology Brief Analysis

Equipment	Pollutant(s)	BACT Control	Emission Limitation(s)
Emergency Generator Engine See Section 9.6.2 for details	**PM10/PM2.5, NOx, CO and NMHC**	Compliance with 40 CFR 60 Subpart IIII and 40 CFR 63 Subpart ZZZZ combined with good combustion practices. Tier 4 engines provide an estimated 90% reduction of PM and NOx emissions. All emission rates are below 0.5 tons per year.	Installation of engine Natural Gas fired engine see more information in the question 12 answer ref. 9.6.2

BACT Evaluation Table "C" - Emission Technology Brief Analysis

Equipment	Pollutant(s)	BACT Control	Emission Limitation(s)
Dry Sorbent Silo	**PM10/PM2.5**	**Baghouse** A baghouse has a collection efficiency of 99% or greater. This operation in intermittent to account for pneumatic loading of dry sorbent.	Installation of a baghouse is not required as the expense of power and the unit itself far outweighs the benefit of particulate emission removal.
		Bin Vent A bin vent is very similar to a baghouse but is installed on a silo to capture exhaust air from pneumatic loading of dry sorbent. The collection efficiency of a bin vent is 99%.	A bin vent was selected as BACT and will be installed on the Dry Sorbent Silo. No emission limitation is necessary for a minimal source of particulate emission. 10% opacity will serve as a necessary BACT requirement.

Revised Tables 9.4.1 and 9.4.1A

Thunder Mountain Environmental LLC
Minor Source Air Permit Application
Ref. WV Office of Air Quality - 40CFR 266 Sub-Part H
Table 9.4.1 and 9.4.1A

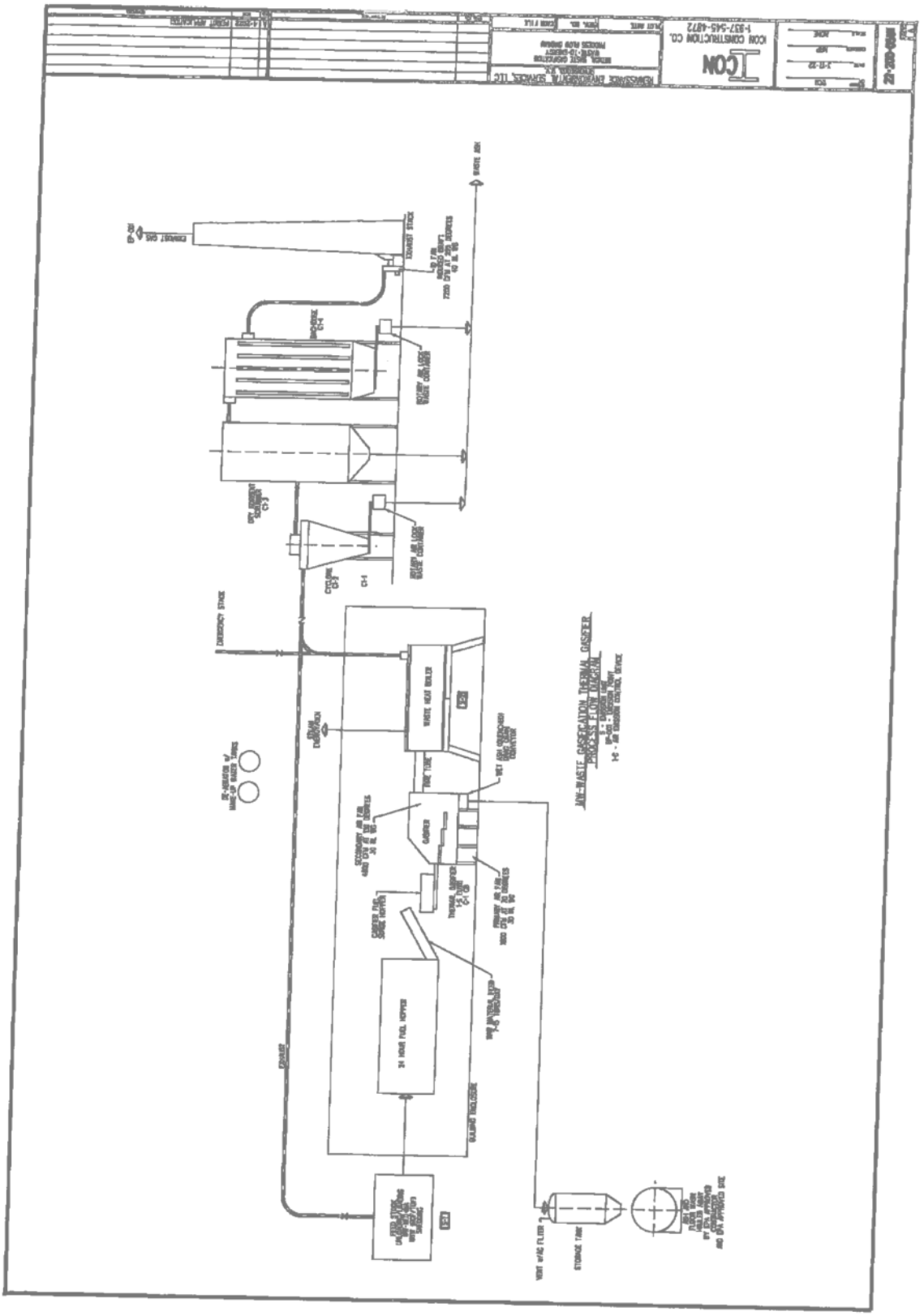
Table 9.4.1 - Facility Wide Emissions - Controlled

Unit I.D.	Emission "Controlled" - lb/hr																	ITYY	EUDS Emission Unit Data Sheet
	PM	PM10	PM2.5	CO	VOC	Total CCD	Total TCDD	Total CDF	Total TCDF	HCL	SO2	SO3	NoX	Pb	Cd	Hg	HAP's	Operating Hours	
1-S	0.087	0.087	0.087	0.286	0.88	5.43E-09	3.55E-11	9.22E-09	3.35E-08	0.7433	1.46E-03	8.76E-04	0.0693	5.03E-07	3.79E-06	3.46E-05	0.168	8760	Thermal Gasifier - WVDEP 1-S (From - I)
Fugitive Emissions	0.24	0.24	0.24	Round Numbers Ref Table 9.3.1 Fugitive (FG), Ref Table 9.3.1 - Average and Ref Table 9.2.1 - Material Handling (MH)															Fugitive Emission
Material Handling	0.101	0.0739																	Materail Handling
5-EGS		0.151		0.476	0.159						0.008		0.635					100	Emergency Generator - Calculates 8760 Hours
Sub-Total LB/HR	0.428	0.5519	0.327	0.762	1.039	5.428E-09	3.55E-11	9.215E-09	3.348E-08	0.7433	9.46E-03	8.76E-04	0.7043	5.03E-07	0.00000379	3.46E-05	0.168		Sub-Total LB/HR
Sub-Total TPY	1.8745	2.4171	1.4321	3.3373	4.5504	2.3772E-08	1.5548E-10	4.0358E-08	1.4663E-07	3.2554	4.1431E-02	3.8365E-03	3.0846	2.2029E-06	1.6599E-05	1.5153E-04	0.2600		Sub-Total TPY

Table 9.4.1A - Facility Wide Emissions - Uncontrolled

Unit I.D.	Emission "Uncontrolled" - lb/hr																	ITYY	EUDS Emission Unit Data Sheet
	PM	PM10	PM2.5	CO	VOC	Total CCD	Total TCDD	Total CDF	Total TCDF	HCL	SO2	SO3	NoX	Pb	Cd	Hg	HAP's	Operating Hours	
1-S	3.85	1.125	1.125	2.43	2.00	1.75E-05	8.20E-07	5.94E-06	5.89E-05	2.77	1.79	8.00E-03	2.93	6.00E-02	1.40E-01	2.93E-04	-	8760	Thermal Gasifier - WVDEP 1-S (From - I)
Fugitive Emissions	0.32	0.32	0.32	-	-	-	-	-	-	-	-	-	-	-	-	-	-		Fugitive Emission
Material Handling	0.15	0.15	0.15	-	-	-	-	-	-	-	-	-	-	-	-	-	-		Materail Handling
5-EGS	-	0.1501	-	2.71	0.1725	-	-	-	-	-	0.008	-	3.81	-	-	0.381	0.168	100	Emergency Generator - Calculates 8760 Hours
Sub-Total LB/HR	4.32	1.7451	1.595	5.14	2.1725	1.75E-05	8.20E-07	5.94E-06	5.89E-05	2.77	1.798	-	6.74	6.00E-02	1.40E-01	0.381	0.168		Sub-Total LB/HR
Sub-Total TPY	18.92	7.643	5.55	22.51	9.515	6.65E-05	3.59E-05	2.067E-06	2.579E-04	12.13	7.875	-	29.52	2.63E-01	6.123E-01	1.28E-03	1.668		Sub-Total TPY

process_diagram



Defaulted Accounts Search 6/26/23

Monday, June 26, 2023 8:01 AM

UC Defaulted Accounts Search Results

Sorry, no records matching your criteria were found.

FEIN:
Business name: THUNDER MOUNTAIN
Doing business as/Trading as:

Please use your browsers back button to try again.

WorkforceWV	Unemployment Compensation	Offices of the Insurance Commissioner

Comments from FWAP 6/26/2023

Wednesday, July 19, 2023 2:42 PM

Andrews, Edward S <edward.s.andrews@wv.gov>

Draft Permit Comments & Request for Extension for Comments RE: Permit #R13-3563

1 message

Leatra Harper <wewantcleanwater@gmail.com> Mon, Jun 26, 2023 at 4:37 PM
To: edward.s.andrews@wv.gov
Cc: OVE Advocates <oveadvocates@gmail.com>, Heather Sprouse <hsprouse@wvrivers.org>

Dear Mr. Andrews,

Please see the attached draft air permit comments for the subject medical waste incineration facility proposed for Ravenswood, WV. A few additional comments to put our concerns into context are below:

Please enter into the record the attached PowerPoint presentation by Eric Beckman, PhD. Dr. Beckman, an expert in Polymer Science and Engineering, and Co-director of the Mascaro Center for Sustainable Innovation at the University of Pittsburgh, who presents a thorough exploration of the complexities tied to safely pyrolyzing waste with significant plastic content. His presentation not only highlights the need for detailed sorting to ensure complete combustion and protect public health, but also addresses the essential requirements for proper handling of wastewater from the pyrolysis process and the cleaning of associated equipment.

As you may already know, a comparable initiative to establish a pyrolysis-based medical waste treatment facility has been underway in Follansbee, WV. This project has given rise to numerous concerns within the community, necessitating an extensive investigation. Initially, the proposal revolved around the establishment of a medical waste treatment plant using pyrolysis, an idea that met with strong community resistance due to environmental and health apprehensions. However, following community research and the dissemination of transparent information, the proposal for medical waste feedstock has reportedly been rescinded. Consequently, the project's focus has shifted to plastics as the feedstock for the pyrolysis recycling facility. We are concerned the same tactic may be used in Ravenswood.

In light of the many unknown variables, including an analysis by DHHR, it is crucial that a timeline extension be granted for this project of at least 45 days. This will afford communities like Ravenswood and Follansbee the necessary time to conduct in-depth research, consult with industry experts such as Dr. Eric Beckman, and amass the resources needed to thoroughly understand the pyrolysis/incineration process. This understanding would include its potential environmental impact and the particulars of the planned plant. The earlier opposition to the medical waste plant proposal and the community's diligent engagement clearly demonstrate their investment in comprehending the possible ramifications of this project, including the massive amounts of trash that must be transported and stored.

Moreover, extending the timeline would provide these communities with an opportunity to voice detailed comments and articulate their position on the project. Such feedback could significantly influence the council's final decisions. The timeline extension could foster transparency, stimulate community engagement, and assure residents that their concerns are heard and duly considered. In addition, it could pave the way for a thorough exploration of alternatives and the establishment of effective strategies to mitigate potential adverse impacts.

A timeline extension is indispensable for informed decision-making, fostering community involvement, and prioritizing environmental and public health within the context of the Follansbee Pyrolysis Project. In addition, a public hearing should be held so community members have the chance to learn the facts and ask questions.

Please see new articles pertaining to the ongoing efforts by the City of Follansbee in opposition to the pyrolysis facility being established.

- https://www.heraldstaronline.com/news/local-news/2023/01/follansbee-council-asked-to-block-medical-waste-treatment-plant/
- https://wtov9.com/news/local/medical-waste-plant-not-coming-to-follansbee
- https://www.weirtondailytimes.com/news/local-news/2023/06/council-advised-to-seek-information-on-recycling/

We are hopeful this additional background information about the proposed incineration facilities for the Ohio Valley region are reviewed in the larger context of the lack of adequate data and USEPA policies. Follansbee is not the only community that would not want a waste incinerator near their community that would bring in tons of trash and toxic materials, emitting harmful contaminants into air, water and soil. It appears West Virginia is being targeted for these facilities that will locate in disenfranchised communities and will not bring in many desirable jobs, only massive tons of waste to the state.

Thanks in advance for filing the attached comments along with the attachments here. Please advise if the permit comment period can be extended and if a public hearing will be held so we can assemble additional comments.

Best,

Lea Harper
Managing Director
FreshWater Accountability Project
www.fwap.org
419-450-7042

Frank Rocchio
Director
Ohio Valley Environmental Advocates
www.oveadvocates.org
724-579-4498

3 attachments

Pyrolysis for Recycling.pdf
1957K

US Briefing on Chemical Recycling.pdf
1255K

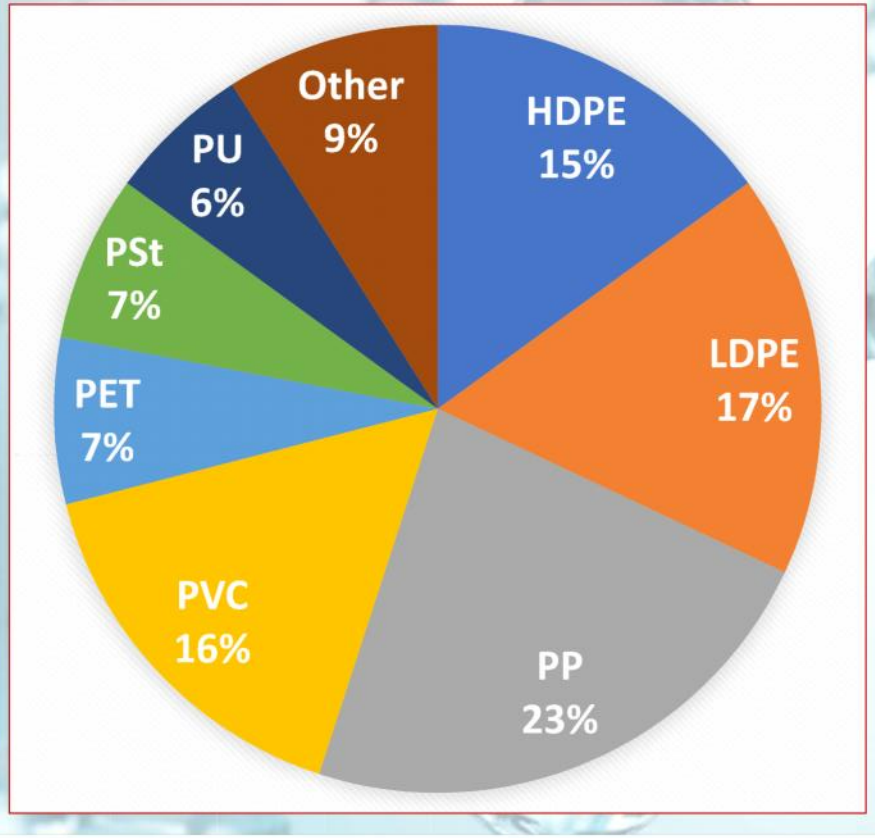
Ravenswood draft air permit comments.docx
22K

Pyrolysis for Recycling

A Primer on Pyrolysis for Chemical Recycling of Polymers

Eric Beckman, Chemical Engineering Dept., University of Pittsburgh

The "Big Seven" Polymers make up over 90% of annual 350 million tons – polyolefins over half of total.

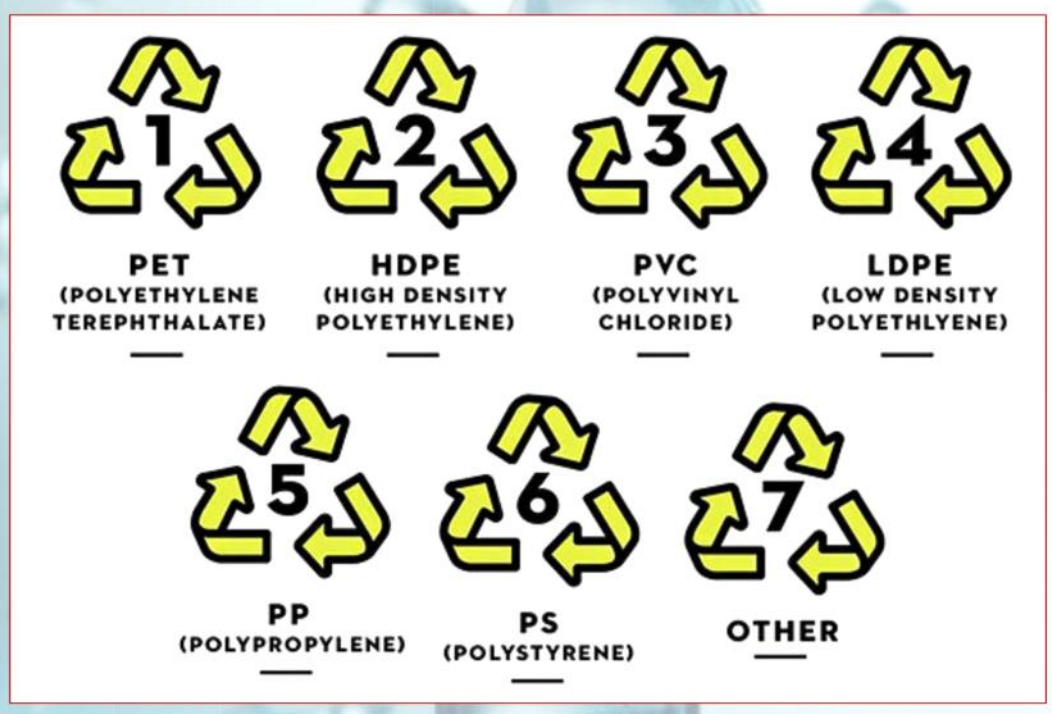


The Polyolefins:
- HDPE = High density polyethylene
- LDPE = Low density polyethylene
- PP = Polypropylene

PVC = Polyvinyl chloride
PSt = Polystyrene

PET = Polyethylene Terephthalate
PU = Polyurethane

In terms of those recycling codes…..



PET (#1): ~ 7%
Polyolefins (#'s 2+4+5) ~ 55%
PVC (#3): ~ 16%
PSt (#6): ~ 7%
The Rest (#7): ~ 15%

What is Chemical Recycling via Pyrolysis?

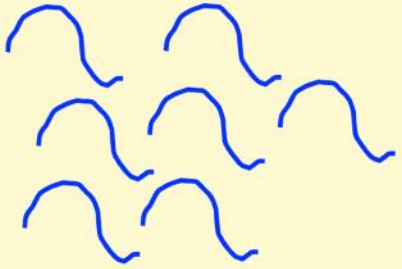
In chemical recycling, we start with polymer chains….then add heat ***without adding oxygen***:

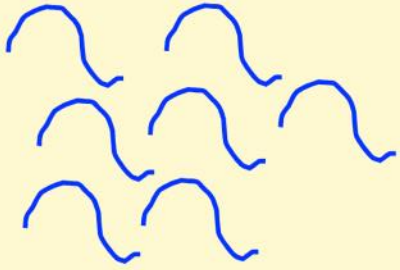
400 to 800C

Monomers ***or*** fragments that can be transformed to monomers ***or*** fragments that can be turned into high value products

Successful Chemical Recycling

1. Chemically fragment the polymer

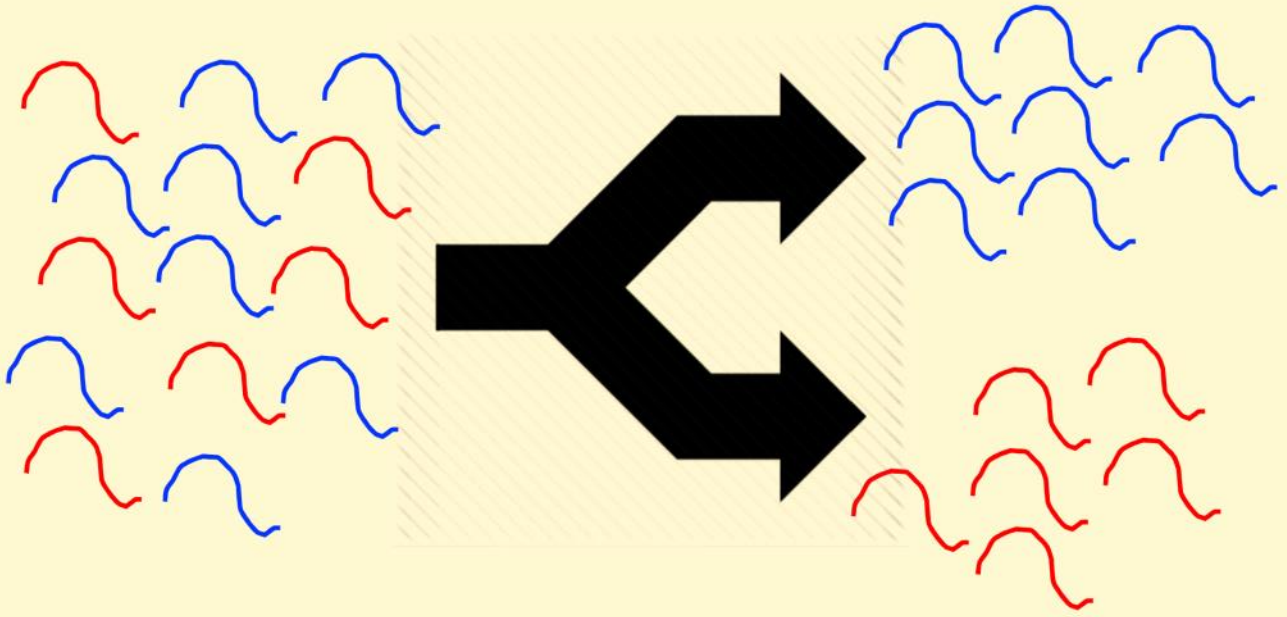




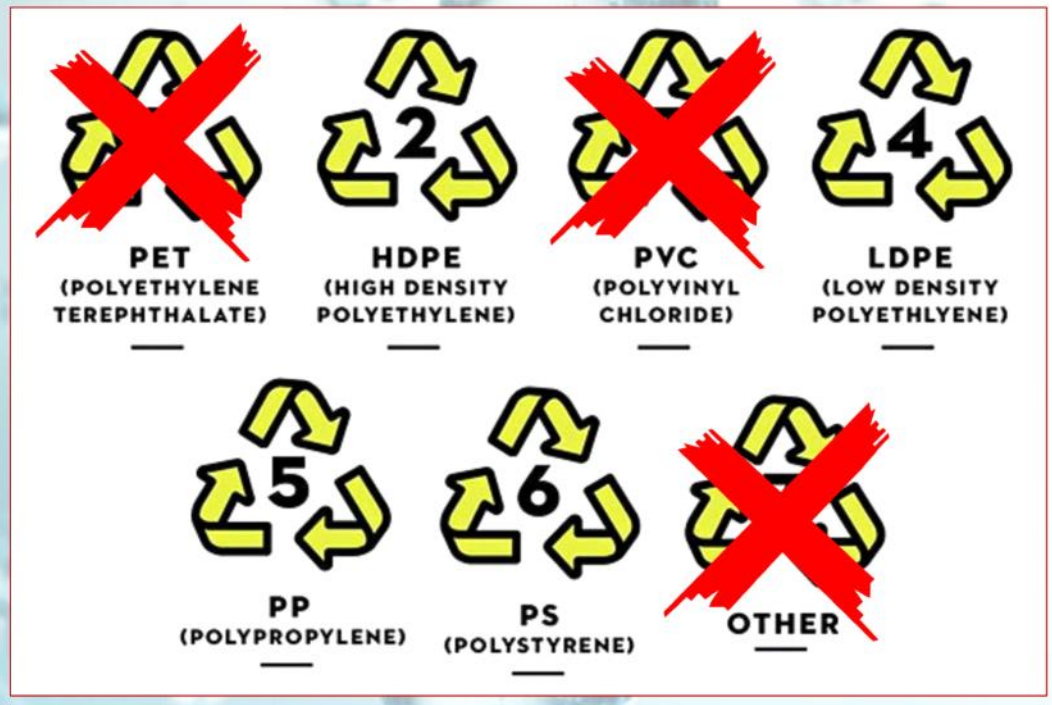
2. Separate fragments from the additives

Successful Chemical Recycling

3. Separate fragments from each other, as needed.

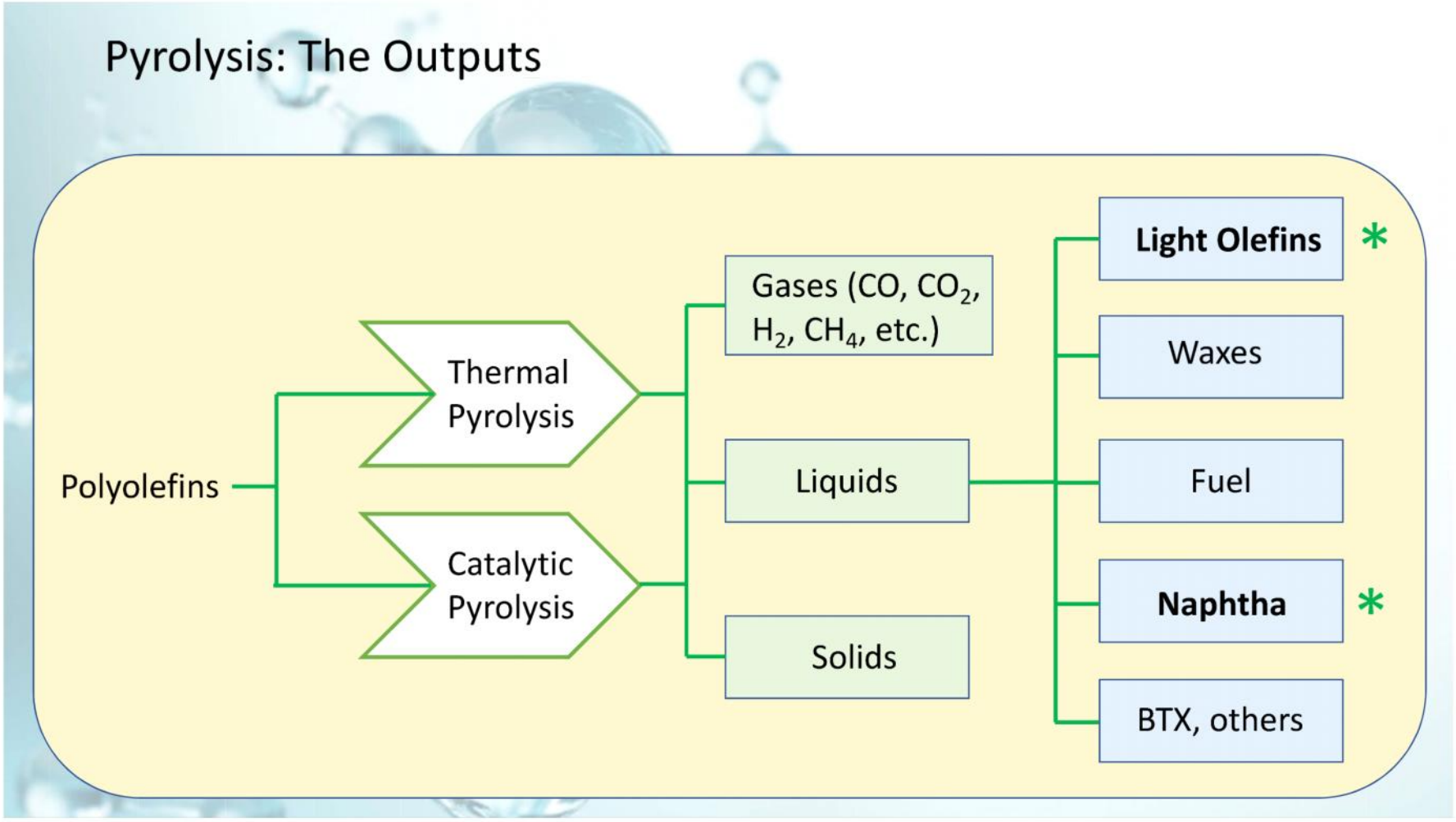


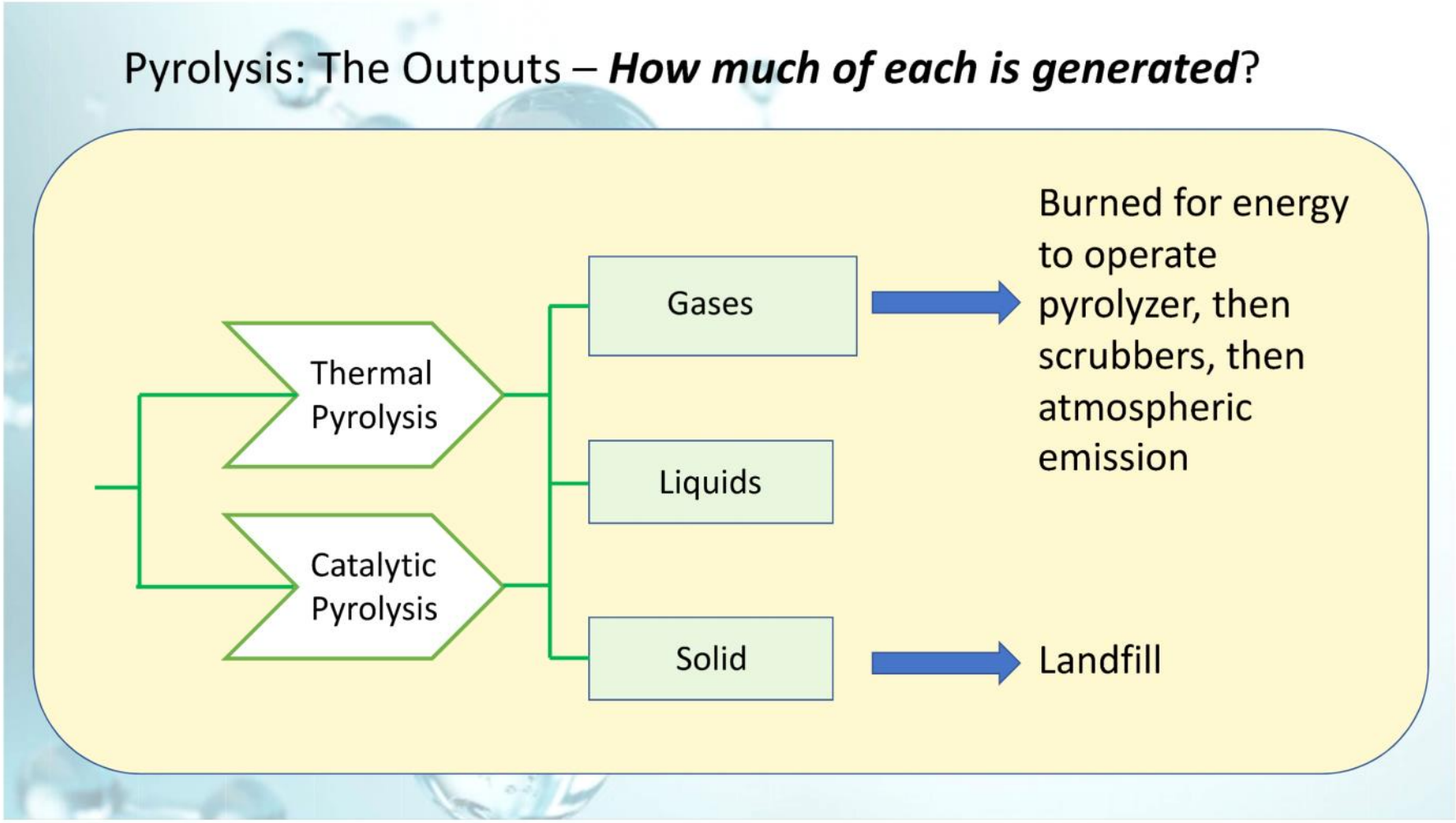
You can't successfully pyrolyze every polymer type



So, one typically removes three categories from the overall stream, or close to 40% -- ***where will that material go***?

Also, ***any pretreatment & associated waste***?


Pyrolysis: The Outputs
Polyolefins
Thermal Pyrolysis
Catalytic Pyrolysis
Gases (CO, CO_2, H_2, CH_4, etc.)
Liquids
Solids
Light Olefins *
Waxes
Fuel
Naphtha *
BTX, others



Summary

- PVC, PET, "Other" – all of these are not candidates for pyrolysis, ***so when and where are they removed from the waste stream***? Sometimes plastics are "washed" before pyrolysis – ***how much waste occurs from this step and where does it go?***
- Polyolefins are key target for chemical recycling; significant research progress still needed to generate mostly valuable products.
- ***Solid stream from the pyrolyzer is landfilled***
- Gaseous stream from the pyrolyzer is burned to generate process energy; ***emissions must be scrubbed before entering atmosphere***

US Briefing on Chemical Recycling

Plastic Alchemy:
The Deception of the "Chemical Recycling" Industry

EMBARGOED UNTIL JULY 28, 2020

ACKNOWLEDGMENTS

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Chandra conducted facility-level research. Other contributors to this report include Claire Arkin, Ivy Schlegel, Janek Vahk, Kate Bailey, and Kate Davenport.

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Available online at: www.no-burn.org/XXXXXXXXXXXXXXX

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GAIA is a global network of more than 800 grassroots groups, NGOs, and individuals. We envision a just, Zero Waste world built on respect for ecological limits and community rights, where people are free from the burden of toxic pollution, and resources are sustainably conserved, not burned or dumped. We work to catalyze a global shift towards environmental justice by strengthening grassroots social movements that advance solutions to waste and pollution.

Design/layout: Doun Moon
Image sources: ©Freepik

EXECUTIVE SUMMARY

The United States has a plastics problem. Of all of the plastics produced since 1950, 91% have never been recycled.[1] After being tossed into trash cans or wishfully into recycling bins, most plastics end up in landfills or incinerators, here and overseas.[2] The reality is that the amount of plastic produced in the United States cannot be reasonably recycled. In addition, many of the types of plastics that are produced cannot be recycled into useful new products.

As a result, the plastics and fossil fuel industries are facing increasing market constraints and widespread consumer backlash from plastic pollution. The industry has faced increased pushback from consumers who are choosing reusable alternatives, China and other Asian countries rejecting plastic waste exports, and governments instituting bans on single-use plastic. Rather than taking responsibility for its plastic waste, industry is pushing forward plans to produce additional billions of tons of plastic that reach beyond the planet's ecological capacity and put the health of communities and workers at risk.

While industry has flooded the world with even more plastic, it has also maintained that the answer to the plastic pollution problem is not making less of it, but rather downstream techno-fixes. One in particular that has risen to buzzword status in industry circles is "chemical recycling," a term often used by the petrochemical industry that conflates plastic-to-plastic and plastic-to-fuel technologies as a form of recycling. In this report, we use the term "chemical recycling" to refer to both plastic-to-plastic and plastic-to-fuel operations, although only the former truly qualify as recycling operations. We do so because of the similarity in technologies and because industry uses "chemical recycling" to include both.

A recent review of scientific and technological evidence called "Chemical Recycling: Status, Sustainability, and Environmental Impacts" shows the chemical recycling industry is riddled with technical, economic, and environmental problems.[3] The key findings are:

- **"Chemical recycling" releases toxic chemicals into the environment.**
- **"Chemical recycling" has a large carbon footprint.**
- **"Chemical recycling" has not yet been proven to work at scale.**
- **"Chemical recycling" cannot compete in the market.**
- **"Chemical recycling" does not fit in a circular economy.**

In May 2020, GAIA released "Chemical Recycling: Distraction, Not Solution." This report serves as an important and timely assessment of the prospects of "chemical recycling" in light of its promotion by the plastics and fossil

fuel industry as the silver bullet to solve the plastics crisis. This report takes a look at the state of the industry in the U.S. and concurs with the conclusion of the May 2020 briefing paper:

> **"In a society that urgently needs to transition from an extractive, fossil fuel economy to a circular one, chemical recycling is a distraction at best. Far more mature and viable solutions are to be found in upstream, zero waste strategies which focus on reducing the production and consumption of plastic."**

This report provides an assessment of failed, proposed, and existing projects in the United States and demonstrates that the industry is once again proposing to build a new network of waste and burn facilities. Under the guise of "chemical" or "advanced" recycling, **the industry is lobbying for and advancing development of plastic-to-fuel (PTF) facilities** that will only make the plastics crisis worse while diverting public and private investments dollars away from real solutions.

KEY FINDINGS:

1. Of the 37 plastics "chemical recycling" facilities proposed since the early 2000's, only 3 are currently operational. Based on publicly available information, none are successfully recovering plastic to produce new plastics. Our report finds that the industry continues to advance plastic-to-fuel technologies while mislabelling them "chemical recycling" and the solution to the global plastics crisis.
2. Plastic-to-fuel (PTF) facilities place a heavy toxic burden on communities and workers at plastic waste processing sites, in the end use of the products they produce, and at the facilities where the waste created by the process is dumped, destroyed, or treated.
3. PTF carries a large carbon footprint that is not compatible with a climate safe future. It only adds to global carbon emissions created by the fossil fuel industry.
4. With increased instability in the fossil fuel market, public demand for plastic alternatives, and more stringent climate policies, "chemical recycling" and PTF technologies are risky and not environmentally friendly. Yet, industry continues to wield its political power to advance policies that enable development of the technology and markets.
5. Fast-moving consumer goods companies can play a critical role in the development of "chemical recycling" and should act quickly to implement real solutions to the plastics problem.

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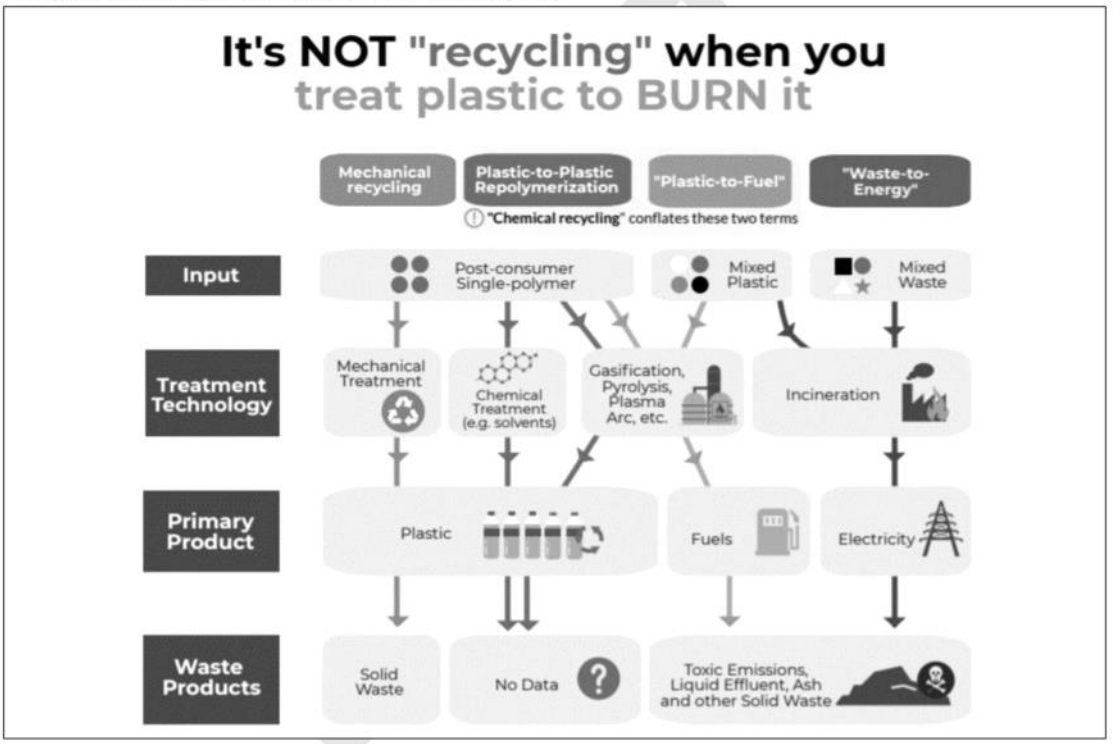
“Chemical Recycling” in the U.S.

“Chemical recycling” encompasses a number of processes that involve breaking plastic down into its component parts using pressure and/or heat in a low-oxygen environment; some also use catalysts or chemical solvents. Although the term “recycling” should only apply to processes that turn plastic back into plastic,[4] the petrochemical industry has popularized terms such as “chemical recycling” or “advanced recycling,” that conflate both plastic-to-plastic and plastic-to-fuel conversion as a recycling solution. In reality, most pyrolysis and gasification processes that are referred to as “chemical recycling” produce fuels, as the process of turning plastic into plastic is complex and expensive.

[Image X] Technologies conflated as “chemical recycling”



In addition to gasification and pyrolysis, some projects aim to purify or depolymerize plastic feedstock using solvent and/or catalysts. Among the 37 projects in the U.S. that were selected for our assessment, 12 facilities use solvent/catalyst-based processes or a combination of heat and solvents/catalysts; all but one of which remain in an early stage (announcement only or at a pilot phase). Therefore, this briefing primarily focuses on gasification and pyrolysis, specifically the 20 plastic-to-fuel projects that are announced, planned, or operating in the U.S.

This assessment also finds that there are many unknowns regarding the potential impacts of the commercialization of the plastic-to-fuel technologies. However, if the industry is allowed to develop, available evidence indicates that it will have significant impacts on existing mechanical recycling markets, the climate, human health, and the environment.

Plastic-to-Fuel is an Industry Shell Game

For decades, pyrolysis and gasification companies have promoted themselves as an alternative solution to waste disposal, securing massive funds from investors and governments with no concrete evidence to support their viability claims. Pyrolysis and gasification technologies have been around since the 1950s, and attempts to use these thermal treatments to recover plastic waste streams began in the 1970s.[5]

These empty promises resulted in a track record of high-profile failures across the globe, along with reports of fires, explosions, and financial losses. Since the early 2000s, at least 37 projects have been announced in the United States (see Appendix 1). Of these 37 projects, twelve projects claim to have developed a plastic-to-plastic (PTP) process, achieving varying levels of maturity, with none at commercial stage. Twenty are PTF projects, and thus do not qualify as recycling. The majority of existing projects are under development, 14 of which are either announcements or projects with no progress for the last several years. Only three projects – Agilyx, Brightmark, and New Hope Energy– are currently commercially operational. Brightmark and New Hope Energy are PTF projects; they do not produce plastic or feedstocks for plastic. Agilyx is frequently upheld as a model of plastic-to-plastic recycling, but our investigation indicates that the vast majority of its output is sent for combustion in cement kilns (see case study). Eastman claims to recycle used carpet back into new carpet, but no evidence has been found to support that claim.[6] Also the operation feeds its outputs into the facility's own process, rather than selling commercial products to outside markets.[7] Not one of the 37 "chemical recycling" projects announced in the U.S. in the last 20 years has been proven based on public information to successfully recycle plastic at a commercial scale. One facility, Renewlogy, is idling less than a year after it opened to upgrade equipment. Meanwhile, bags of waste are shipped to cement kilns or sit outside the facility in the hopes that it will reopen.[8] As of 2017, the technologies have wasted at least $2 billion of investments with canceled or failed projects across the globe.[9] Many cases identified fragile revenue models, complications around obtaining permits, and high operating costs as the main cause of such failures.[10]

- Technical challenges remain unsolved at each stage of the process: sorting and cleaning highly contaminated plastic waste feedstock (pre-treatment), optimizing the temperature during the conversion processes by large energy inputs, removing impurities from the products in order to meet the standards necessary for use (post-processing), and managing toxins present in solid and liquid residues.
- Heavy investments are required for the construction of a facility in addition to the technological challenges directly contributing to a large financial toll.
- The immaturity of the technology increases waste management costs and compliance risks associated with regulation of toxic emissions and byproduct disposal.

- Securing appropriate plastic feedstocks is a growing concern for "chemical recycling" companies.[11] Despite the claimed capability of treating low-grade mixed plastic waste being the main selling point of pyrolysis technologies, the process requires additional treatment beyond traditional sorting and washing, increasing the costs.[12]

[Table 1] Projects Proposed as "Chemical Recycling" in the U.S.

	PTP*	PTF	Other**	Total
Number of facilities	12	20	5	37
Percent of total facilities	32%	54%	14%	100%

Source: See Appendix 1.

* Includes proposals of 8 solvent or catalyst-based processes and 4 pyrolysis projects. Of the 12 projects, 11 have not reached operational status and Eastman's PTP operation lacks publicly available evidence to substantiate its status.

** Other: Projects that appeared in industry/research reports as a chemical recycling project, but do not represent an independently operating chemical recycling facility. These projects are either waste-to-energy facilities or a partner or buyer of a CR company.

[Table 2] Status of Proposed PTF Projects in the U.S.

	Announcement only, or lab-testing	Pilot or under construction	Currently operating	Operation on hold	Total
Number	9	6	3	2	20
Percent of total facilities	45%	30%	15%	5%	100%

[Table 3] Status of Proposed PTP projects in the U.S.

	Announcement only, or lab-testing	Pilot or under construction	Currently operating	Other*	Total
Number	5	5	0	2	12
Percent of total facilities	42%	42%	0%	17%	100%

* Eastman claims to have a PTP operation, but no evidence is publicly available; Geo-Tech Polymers is not a chemical recycling facility but only provides consulting services.

1 Plastic to Fuel facilities and their products endanger human health

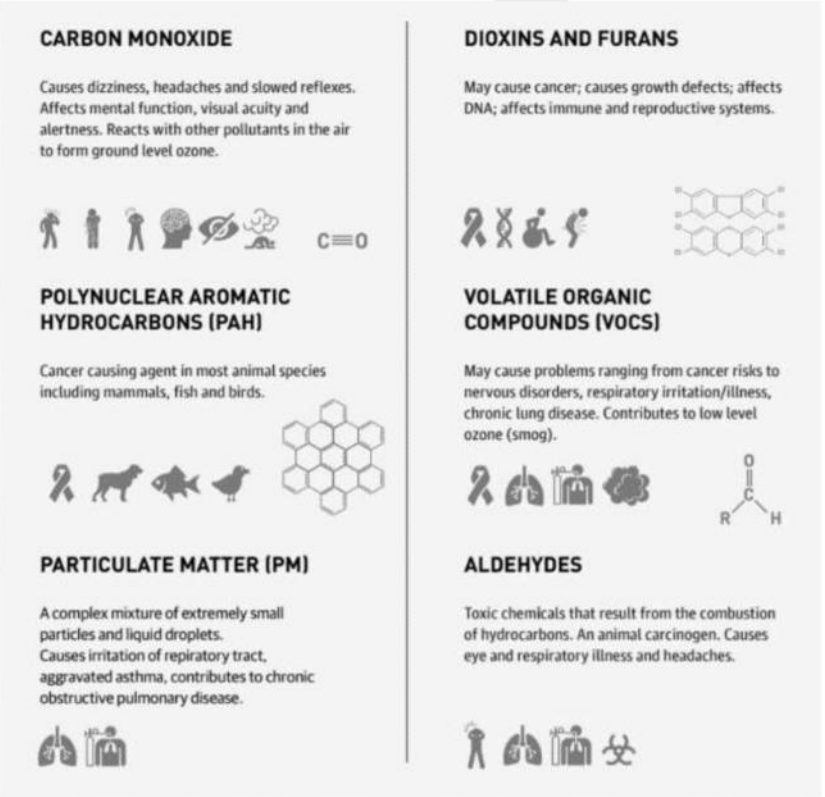
Plastics are used in a range of products from bottles to toys to medical equipment and car parts. To make these products pliable or rigid, flame retardant and durable, or non-reactive to certain oils and chemicals, the plastic is combined with other elements such as oxygen, nitrogen, chlorine, fluorine, or silicon that can be harmful to human health. Plastics contain a wide range of toxic chemicals and the PTF production process creates more.[13] These additives produce chemical waste that requires disposal during the PTF manufacturing process. Much like oil refineries, some PTF facilities produce a number of chemical products that are sold to other chemical manufacturing facilities. Contaminants can remain in those final products and may be released when burned or converted into yet another chemical product. While the environmental impacts of PTF processing and its end products are not well-documented, enough is known to cause concern for workers, communities, and the environment. For example, Brightmark Energy's facility in Ashley, Indiana, plans to convert plastic waste into fuel, naphtha, and waxes for candles and other consumer products. We have been unable to find results of any tests on these fuels and products for toxicity. The Agilyx facility in Tigard, Oregon, sent over 49,000 tons of waste styrene to burn in cement kilns located in low-income and people of color communities across the country in 2018.

Regulatory requirements for chemical manufacturing and preventing toxic exposures have historically had a "build first, sell now, protect health later" approach that has resulted in polluted communities and recalled consumer products. PTF facilities operate similarly to other industrial facilities that release toxic emissions, produce toxic effluents, and in some operations, pose a danger to the community from explosion or catastrophic toxic chemical releases. After years of BPA-laden baby bottles and toys dominating their respective markets, plastic producers and consumer goods companies faced a significant backlash when it was discovered that they could cause developmental and reproductive problems later in life. Plastic pellets, also known as nurdles, are often used as feedstock for PTF processes. Some companies, such as Brightmark, will use mixed plastic waste sourced from regional commercial and municipal waste programs and turn them into pellets before feeding them into the chemical processing system. Similar to mechanical recycling, this process typically involves sorting, shredding, cleaning and washing the plastic which can release microplastics and wastewater laden with potentially toxic dyes and chemicals that require proper disposal. The presence of microplastics in the environment has become so ubiquitous that it is now found in the most remote glaciers and in the air we breathe.[14] Considering these factors, exposures to toxic chemicals that are formed and released during the PTF process and the toxic chemicals that remain in the final product or process waste should be prevented.

Of the three operating PTF facilities in the US, environmental review documents are only available for two - Agilyx facility in Tigard, Oregon, and a recently constructed Brightmark facility in Ashley, Indiana, just south of the Indiana-Michigan border. A review of publicly available emissions reports from these facilities from local environmental agencies and the EPA provides little information about emissions and relies heavily on self-

reporting by the industry. Brightmark's permit request documents filed with the Indiana Department of Environmental Quality claim that the level of air emissions from their process would be negligible or below reporting thresholds. If the plant expands or larger facilities are built at a scale comparable to the massive amounts of plastic waste already plaguing the world, it will be too late to prevent or manage these risks. Furthermore, a fire at New Hope Energy's Trinity Oaks PTF plant in Tyler, TX raises flags about the safety of PTF facilities.[15] Only in operation since July 2019, the $150 million facility processes 960 tons of post-consumer plastic per day to produce 4,500 barrels/day of fuels and chemical feedstocks and is one of the three currently operating PTF facilities in the country.[16]

[Image X] Pollutants generated from burning of plastics



Source:

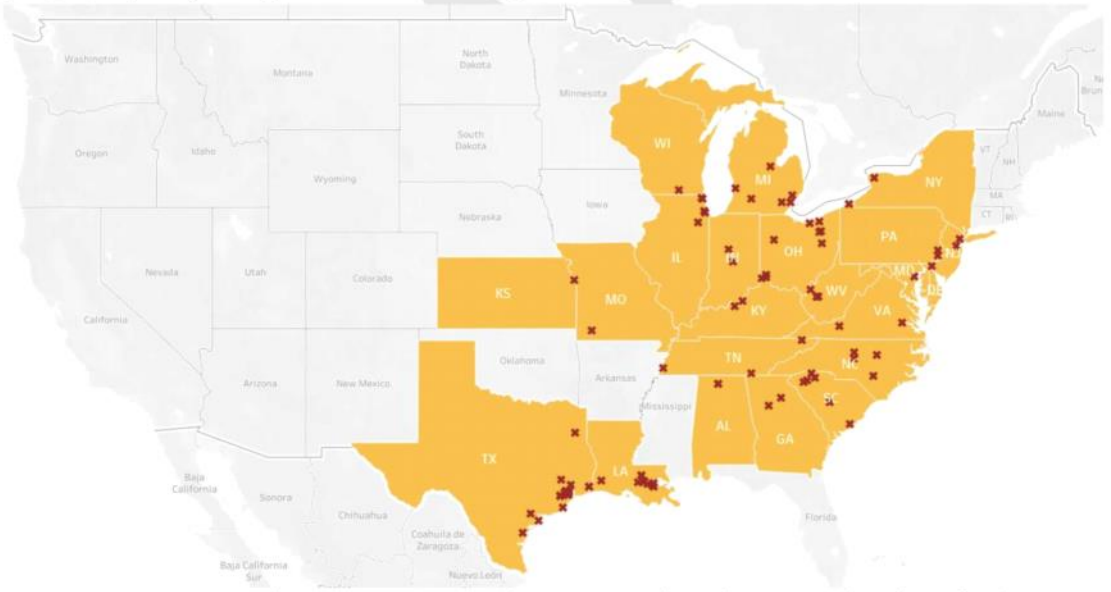
Plastic to Fuel Increases Toxic Pollution in Environmental Justice Communities

The building of PTF facilities in existing petrochemical corridors is particularly concerning and threatens to add to the cumulative burden of toxic exposures on environmental justice communities. Brightmark has already

begun searching for possible locations to expand its business in Florida, Georgia, New Jersey, New York, Pennsylvania, Louisiana, and Texas.[17] Locations considered "ideal" by Brightmark are already overburdened by pollution and industry. Petrochemical hubs, such as Monroe County, Pennsylvania, where one Agilyx facility is planned, are most accessible by rail, highways, natural gas inputs, and electrical utilities and are already occupied by other highly hazardous petrochemical facilities. Agilyx's Tigard facility delivers styrene products to its partner, American Styrenics, in St. James Parish, Louisiana, to be converted into polystyrene. St. James Parish is a majority people of color and low-income community located in Louisiana's Cancer Alley.[18]

In a survey by the Environmental Integrity Project, researchers reviewing data from the EPA's 2018 Toxic Release Inventory found emissions from all industrial facilities reporting to the EPA amounted to 4.7 billion tons.[19] The top 100 most polluting facilities, representing less than 1% of all facilities reporting to TRI, released 1.8 billion tons of toxic chemicals, or 38% of all releases.[20] Many of these same facilities include chemical plants and oil refineries located such that they put 134 million Americans at risk from harm in the event of a toxic chemical disaster.[21] These communities are also disproportionately Black or Latino and have higher rates of poverty, lower income, and lower property values compared to the overall U.S. population.[22]

[Image X] Top 100 polluting chemical manufacturing facilities in the U.S.



Source: U.S. EPA. Toxic Release Inventory 2018 data. Mapping based on national ranking of Risk-Screening Environmental Indicators score of the facilities in the chemical manufacturing sector.

Although industry includes PTF operations under the term "chemical recycling," recycling properly only refers to processes that result in similar products. PTF is not a form of recycling because it does not replace virgin plastic, does not contribute to a circular economy in plastic, and does not avoid the environmental harms of plastic production. On the contrary, plastic-derived fuels are fossil fuels that spend a very small portion of their lifecycle as plastic. Since many of these fuels are then burned in operations that routinely dispose of hazardous waste (see the Agilyx case study), PTF might be better described as a plastic-to-hazardous waste operation. The only thing PTF recycles is toxic chemicals.

- Plastics often contain toxic additives and contaminants that are known to be harmful to human health and are not effectively filtered out from the chemical recycling process or may form during the process, risking exposure to workers, communities near facilities, consumers, and the environment. For example, hormone disruptors and carcinogens such as bisphenol-A (BPA), phthalates, benzene, brominated compounds, and volatile organic compounds (VOCs) are found in plastic and not effectively filtered out from end products.[23] Depending on the type of plastics being processed, other chemicals may form and end up in the final product, such as benzene, toluene, formaldehyde, vinyl chloride, hydrogen cyanide, PBDEs, PAHs, and high-temperature tars, among many others.[24]
- Heavy metals, such as cadmium and lead, cannot be destroyed during chemical processing and therefore, are recombined into the final product or released in the waste byproducts. Heavy metal exposure is of greatest risk to workers in a facility; however, small amounts of lead exposure to children, directly or prenatally from exposed mothers can cause neurological damage leading to cognitive dysfunction, lower IQ, and behavioral issues.[25] Excess exposure to cadmium can damage kidney function and bones if ingested or cause pneumonia and emphysema if inhaled.[26]
- Waste produced from "chemical recycling" requires appropriate disposal of ash, liquid effluent, and containment of air emissions; it nevertheless threatens communities living near dump sites, incinerators, and cement kilns.[27]
- In particular, diesel and waxes produced from the process are more contaminated with solid residues, dioxins, and PAHs than regular diesel or an equivalent.[28] The diesel requires substantial refinement to be used as a fuel, as it produces greater quantities of NO_x, soot, CO and CO_2 emissions compared to conventional diesel when burned.[29] Cleaning the toxins from end products is extremely difficult, expensive, and creates additional toxic waste streams.[30]
- Burning waste produced in the PTF process in cement kilns and hazardous waste incinerators ships toxic pollution from communities where the PTF plant is built to other communities. Persistent organic pollutants such as dioxins, heavy metals, and particulate matter are common pollutants emitted from cement kilns.[31] Cement kilns have lower reporting requirements for emissions than other burn facilities, such as coal plants and incinerators, and are not required to notify nearby communities when emissions occur. Many of these facilities do not monitor for dioxins created by burning plastics like PVC. Dioxins are highly toxic and can cause reproductive and developmental problems, damage the immune system, interfere with hormones, and cause cancer.[32]

2 Plastic to Fuel's Goliath-sized Carbon Footprint

The process of converting plastic waste to fuel demands considerable energy, which is supplied by burning fossil fuels. Burning the resulting fuel releases additional greenhouse gas emissions. Instead of conserving the material in a circular process, burning plastic-derived fuel adds to the carbon footprint of the plastic lifecycle and stimulates further virgin plastic production to replace the plastic lost as fuel. In 2019 alone, the global production and incineration of plastic accounted for more than 850 million metric tons of greenhouse gases released to the atmosphere, approximately equal to the emissions from 189 five-hundred-megawatt coal power plants,[33] and incineration was the primary source of GHG emissions in the management of plastic waste.[34] PTF increases the climate impact of plastic disposal, as it releases carbon stored in the plastic into the atmosphere and requires external energy inputs throughout the processes.

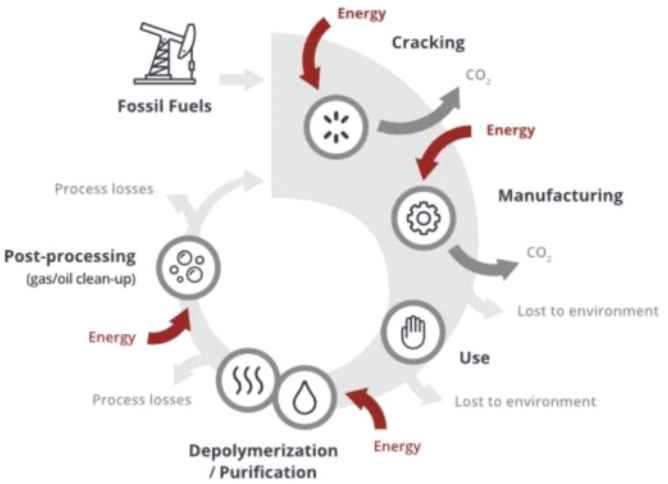
The actual climate impact of gasification or pyrolysis has not been well quantified, in part because PTF companies do not make their data public. There are claims PTF has a much lower carbon footprint compared to conventional fossil fuels. Quantafuel, a plastic-to-fuel company based in Norway, claims that its fuel product can reduce greenhouse gas emissions by 90% compared to conventional fossil fuels.[35] Another plastic-to-fuel company Renewlogy, in Salt Lake City, Utah, presented a 75% lower carbon footprint of the plastic fuel compared to traditional fossil fuels.[36] Neither claim has been independently verified. In contrast, the one set of publicly-accessible data from a US-based company indicates an order of magnitude higher emissions than from conventional fuel. In 2019, more than one-third of the carbon in the polystyrene processed at Agilyx was lost during processing. For each kilogram of styrene Agilyx produced, it emitted 3.23 kilograms of carbon dioxide, not counting the emissions from burning the styrene itself. This means that Agilyx's operation largely turns plastic into greenhouse gas emissions, while producing a relatively small quantity of styrene, which might or might not be recycled. The plant accepts feedstock from suppliers across the nation, including one in Florida, further contributing to its overall carbon footprint.[37]

PTF results in a wide range of direct and indirect GHG emissions from pre-processing (hauling, sorting, washing, and shredding of plastic feedstock), thermal processing through gasification or pyrolysis, and post-processing treatment (cleaning and upgrading the fuel). While industry claims that PTF has a lower carbon footprint compared to conventional fossil fuels, such claims either lack independent verification or are based on incomplete, partial life-cycle assessment (LCA) models.[38] The life cycle assessments designed in favor of plastic fuel producers can misrepresent the climate impact of gasification and pyrolysis processes, often influencing relevant policy-shaping decisions that can

further exacerbate the excessive production and consumption of plastic. Life-cycle assessments (LCA) designed to measure the carbon footprint of plastic routinely neglect emissions associated with the raw materials and/or the use of products which would be avoided by shifting from plastic packaging to refillable and reusable systems for the delivery of consumer goods. GHG emissions from the extraction, refining, and manufacturing of plastic feedstock are rarely taken into account in the partial LCAs. The life-cycle assessment of the carbon footprint varies with a number of additional factors that could be skewed in industry data: the discretion of researchers in selecting the baselines and parameters; the types of selected cases; scale and the efficiency of the selected process; and regional electricity grid generation mix.

In addition, gasification and pyrolysis are energy intensive processes. PTF facilities require continuous energy inputs to ensure and maintain thermodynamic stability during the high-temperature operation, plus additional energy inputs to ensure products meet industrial standards. According to one study, half of the carbon in the plastic waste is emitted as carbon dioxide in a single step -- upgrading the plastic-derived fuel to industrial standards (53% in pyrolysis and 48% in gasification).[39] No successful self-sufficient systems have been reported and the energy recovery capacity is unlikely to be improved in the next few decades.[40] Burning low-quality products as a fuel results in GHG emissions, despite its minimal contribution as an energy source. Even if the PTF process can be made more energy-efficient, it still results in the production of an additional fossil fuel at a time when the world is desperate to wean itself off fossil fuels and demand for them is crashing. When viewed from a climate perspective, PTF is incompatible with reaching global and national greenhouse gas emissions goals.

[Image X] GHG emissions from PTF processes



Source: CRTA

3 The Industry is Grasping at Straws to Save Itself

As the future of the fossil fuel industry becomes more and more precarious, companies are looking to plastics as a lifeline. Public pressure has pushed international institutions and national governments to tighten climate policies that restrict or end financial support for fossil fuel extraction.[41] Oil and gas prices have been in a freefall for over a decade.[42] In recent years, low gas prices have fueled increased production of plastic and the industry has been planning 264 new or expanded US plastic facilities at a cost of $164 billion.[43] However, a recent report by Center for International Environmental Law shows that "dovetailing trends of lowered plastic resin prices, increased plastic regulation, and decreased capital spending threaten the fundamentals of the petrochemical industry" and argues that plastic will not be the salvation of oil and gas companies.[44]

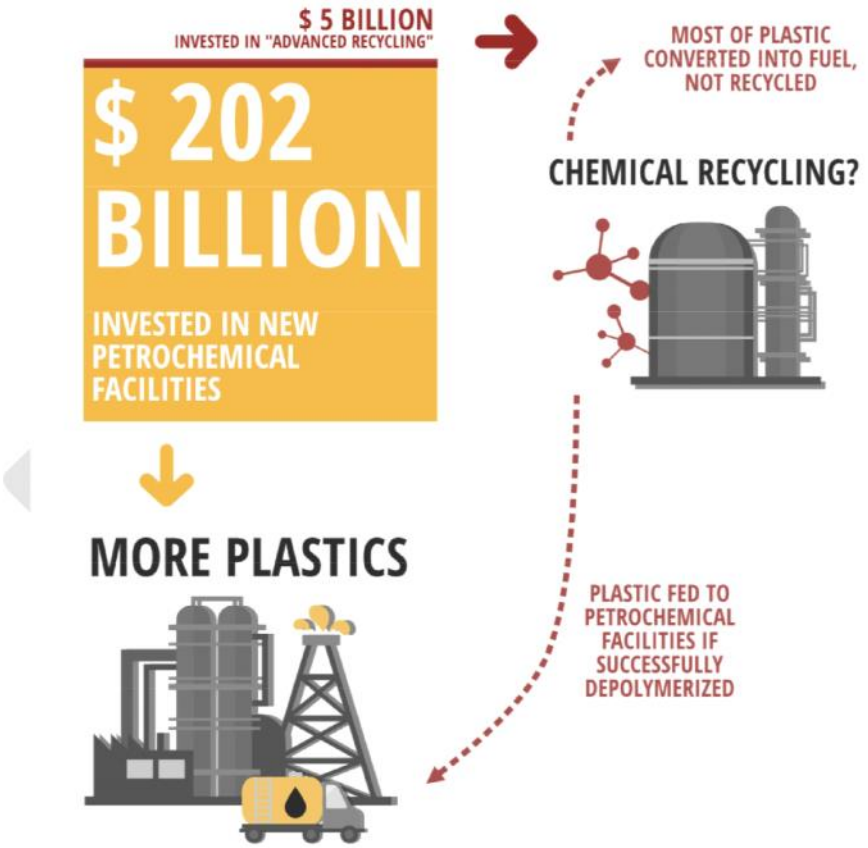
Meanwhile, cheap virgin plastic continues to flood the marketplace in the U.S. and around the world. Much of this material is difficult or impossible to recycle, and the low price of virgin plastic undercuts plastic recycling markets, exacerbating the problem of plastic waste and pollution. The momentum to prevent plastic pollution is growing through government bans on plastic bags and other single use items and advocates, and even some industries, increasingly demanding strategies to address plastic production.

The petrochemical industry has pushed back on plastic bans and other policies to curb plastic use,[45] even exploited the COVID-19 pandemic to tout single-use plastics as safer and more hygienic than plastic alternatives.[46] Meanwhile, many petrochemical companies point to PTF and "chemical recycling" as key solutions to the plastic waste crisis and the American Chemistry Council (ACC), Dow, Shell, and others give financial backing to projects like Hefty® EnergyBag®.[47] ACC also recommends PTF and "chemical recycling," which it calls "advanced recycling," over other plastic pollution interventions, as seen in the association's response to the Consumer Brands Association May 2020 proposal for a new virgin plastic resin fee. [48]

According to petrochemical industry associations, the industry may spend up to $5 billion on plastics recycling in the U.S., about 80 percent of the announced investments going toward chemical recycling.[49] The ACC affiliate America's Plastic Makers® gives a figure of $4.6 billion spent in the past three years.[50] The ACC is also connected to the international "Alliance to End Plastic Waste", which includes oil, gas, petrochemical, and waste companies (BASF, Braskem, DSM, ExxonMobil, Henkel, Procter & Gamble, Suez, Veolia, among others). AEPW touts commitments by its member companies to spend $1.5 billion on projects that include chemical recycling.[51] A much smaller amount of US government funding is available: the U.S. Department of Energy is providing $4 million in grants for chemical recycling, and chemical recycling is eligible for a $25 million plastic recycling grant program.[52] Considering how many operations called "chemical recycling" are in fact PTF operations, it is likely that most of these funds will be spent on plastic-to-fuel efforts. The investment in the expansion of new plastic production dwarfs that invested in "chemical recycling" reveals where the priorities of the industry truly lie.

In addition, the petrochemical industry is using its significant financial and political influence to shift public policy in their favor. Through an effort led by the American Chemistry Council, industry is lobbying for legislation to create new markets that have failed to attract, and in some cases led to losses for, investors. For example, legislation introduced in 15 states would no longer define post-consumer plastics as solid waste and reclassify chemical or advanced recycling facilities to be regulated as chemical manufacturing facilities rather than solid waste management. The net effect of these regulations is to undermine traditional mechanical recycling markets by creating a supply chain that leads more plastic waste to PTF facilities.

[Image X] Industry Investments in Plastic Recycling Compared to Petrochemical Infrastructure



Source: American Chemistry Council (September, 2018). U.S. Chemical Investment Linked to Shale Gas: $202 Billion and Counting [press release].

Consumer Goods Companies Need to Act Fast

As noted earlier in the report, most so-called "chemical recycling" operations burn their outputs as fuel, and even in the few that attempt plastic-to-plastic recycling, very little of the waste plastic actually becomes new plastic. Fast moving consumer goods companies (FMCGCs) are responsible for millions of tons of plastic packaging[53] and billions of individual, non-recyclable, single-use, and multi-layered plastic packaging waste annually.[54] Growing pressure from the public has pushed many large corporations to pledge to make packaging 100% recyclable by 2030.[55] For example, Coca-Cola and Unilever, both among the top ten polluters according to Break Free From Plastic's 2019 Brand Audit, are partnering with chemical recycling companies.[56]

While the technological and economic viability of these chemical recycling projects has never been proven, the tendency of relying on new techno-fixes has been growing among many FMCG companies. When not coupled with commitments for source reduction, the focus on downstream approaches only perpetuates the over-production and consumption of plastic packaging. As of July 2020, no FMCGC has yet committed to phasing out single-use plastic packaging through a systemic shift toward reusable and refillable delivery options.[57] In the meantime, the FMCGC packaging industry is planning to grow by 3.2% each year over the next five years.[58]

Brand audits?

Conclusion

The chemical industry has promoted the idea of recycling plastics into plastics for decades.[59] However, the evidence is lacking. As of today, after decades of development, there are no operational facilities that successfully recover waste plastic to produce new plastics.

In addition, the economic outlook of the chemical recycling industry is highly uncertain and is subject to downside risks. Even before the impact of the Covid-19 pandemic, low oil and gas prices reflected the systemic weakness of the fossil fuel industry in the era of decarbonization. Low fossil fuel prices will continue to keep the production costs of new polymers low, damaging the market value of recycled plastic. While this is a challenge faced by both mechanical recycling and chemical recycling industries, chemical recycling is exposed to greater risks as the technology is much less established compared to mechanical recycling, requiring costly investments for infrastructure and market development. Plastic-to-fuel operations are especially fragile in the competition with low oil prices, as seen in the case of the shutdown of Agilyx's Tigard plant in 2016.[60] The trend of divestments from the fossil fuel and plastic industries will likely continue as more investment firms and banks recognize the long-term social and financial risks, further lowering oil and gas prices and undermining secondary plastic manufacturing markets.

Public involvement in siting decisions and rigorous regulatory oversight along the entire chain of the industry is needed to protect communities and workers and prevent further harm to overburdened communities. If left unchecked, the industry will continue to build a network of polluting waste and burn facilities that exacerbate the climate and plastic waste crisis. As society pushes the industry to move away from fossil fuels and plastic, the future of the plastic-to-fuel industry is at best questionable and at most a distraction from addressing the root cause of the world's plastic waste crisis. The industry has struggled with decades of technological difficulties and poses an unnecessary risk to the environment and health and a financially risky future that is incompatible with a climate safe future and circular economy.

1 Agylix & American Styrenics – Tigard, Oregon to St. James, Louisiana

Agilyx claims to be the world's first chemical recycling company that would "fully recycle post-consumer polystyrene materials back to new polystyrene products"[61], but in reality their primary business is PTF. The company currently has one facility in operation in Tigard, Oregon, which converts polystyrene into styrene, and a planned facility in partnership with Monroe Energy in Trainer, Pennsylvania, which would produce jet fuel for Delta Airlines. The company also has a partnership with Ineos styrolution to build a PTF facility in Channahon, Illinois, with operation scheduled for 2022.[62]

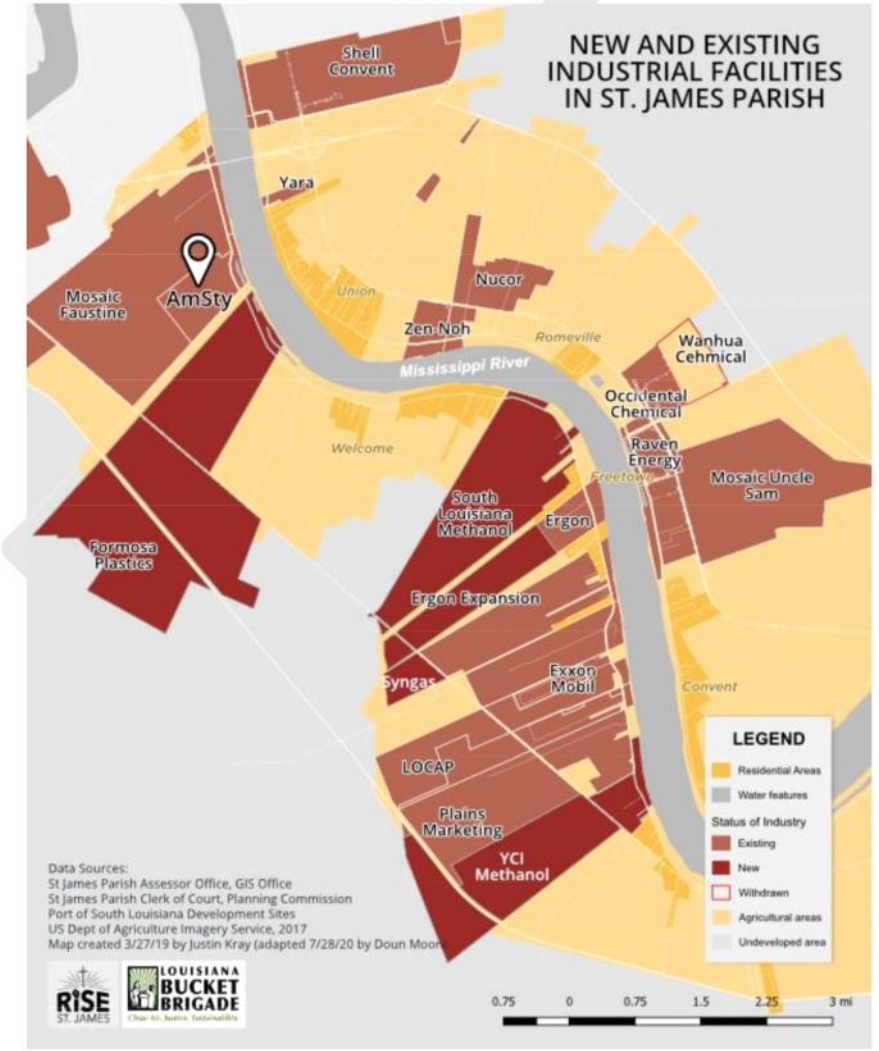
An investigation into the company's project in Oregon reveals a long history of technological false starts that cost investors millions of dollars[63] and did more environmental harm than good. Its first demonstration pyrolysis plant in Tigard, Oregon, was built in 2010 and received at least $25 million in private investment by 2011. Some of these investments went down the drain in 2016 when the company was forced to temporarily shut the plant down after its product failed to compete with the low price of oil.[64] [65] In addition, Agilyx received over half a million dollars in tax credits from the Oregon Department of Energy through the Business Energy Tax Credit (BETC) program in 2013 to build a facility in Portland, which was owned and operated by Waste Management.[66] Waste Management, also an investor in Agilyx, abandoned the Portland facility after the plant was unable to overcome technical difficulties with its "6th generation" technology.[67]

Agilyx has since retrofitted the Tigard plant to convert polystyrene (PS) into styrene and reopened. The company has championed itself as the only company in the U.S. that turns post-consumer polystyrene back into virgin-quality plastic and is widely acclaimed by industry groups for this pioneering work using a chemical recycling technology, in this case, pyrolysis. However, Agilyx's own regulatory reporting does not back up this claim. In 2018, the last year for which complete data is available, Agilyx processed 216.82 tons of polystyrene waste to produce 24.23 tons of styrene. In the same year, a similar amount of styrene (24.86 tons) was sent to be burned in cement kilns (see table below).[68] Cement kilns are commonly used to burn hazardous waste, implying that the styrene Agilyx produced was either too contaminated or of too low quality to be turned back into plastic.

In 2019, Agilyx reported its first truckload of styrene sent to its partner American Styrenics, a chemical plant in St. James Parish, Louisiana, to be converted into polystyrene. However, it is not known if that shipment was in fact turned into plastic or also burned. Despite repeated requests, Agilyx has not disclosed how much of its styrene output was recycled into polystyrene and how much was combusted in 2019. Based on the regulatory

reporting, virtually all of the styrene produced at the Agilyx plant in 2018 was burned rather than converted into plastic, and our assessment is that the facility is effectively a plastic-to-fuel plant. To the extent that any of its output is recycled into polystyrene, Agilyx's business is still contributing to environmental burdens on the community where its partner firm is located. St. James Parish, Louisiana, is home to a petrochemical industrial zone in Louisiana's Cancer Alley, with a population that is 41.6% people of color.[69] According to EPA's Environmental Justice Screening tool, there are 13 facilities in the industrial zone with a combined output of over 300 stationary sources of air pollution, water dischargers, hazardous waste treatment, storage, and disposal facilities, and toxic release sites.[70]

[Image X] New and Existing Industrial Facilities in St. James Parish



Without greater transparency from Agilyx, it is impossible to verify the company's claim that some of its styrene is in fact being recycled into polystyrene. In addition, the available data reveal several other startling failures. Most shockingly, it has a huge carbon footprint. In 2018, the vast majority (approximately 89%) of the carbon in the plastic feedstock was lost in the process, presumably as CO_2. The remainder was emitted as CO_2 when the styrene product was burned in cement kilns. In 2019, more than a third of the carbon in the polystyrene was lost during processing. For each kilogram of styrene Agilyx produced, it emitted 3.23 kilograms of carbon dioxide, not counting the emissions from burning the styrene itself. This means that Agilyx's operation largely turns plastic into greenhouse gas emissions, while producing a relatively small quantity of styrene, which might or might not be recycled. The plant's overall poor performance is attested to by the fact that in 2019, it operated at only 26% of its claimed capacity.[71] The plant accepts feedstock from suppliers across the nation, including one in Florida, which adds to the carbon footprint.[72] In 2019, Agilyx processed 641 tons of polystyrene. At this pace, the U.S. would need 875 such facilities to process the 560,000 tons of container/packaging waste generated in the U.S. each year.[73]

While often praised by industry as a company that is successfully developing plastic to plastic technology, after several false starts, Agilyx's technology, business model, and impacts on health and climate come nowhere close to a proven solution to mitigate the industry's plastic waste problem.

[Table X] List of facilities that received styrene from Agilyx's Tigard plant for "energy recovery" in 2018

Facility Receiving Styrene from Agilyx - Tigard	Quantity (pounds)	In an EJ community?*	Violation records**
Green America Recycling (owned by Continental Cement Co LLC) Hannibal, MO - 6% minority, 33% below poverty level	44,452	Yes	Multiple Resource Conservation and Recovery Act violations since 2018; Significant Non-Compliance under Clean Water Act in 2019[74]
Tradebe Treatment and Recycling, LLC., a company that provides services for chemical reuse(including styrene) and energy recovery/fuel blending in cement kilns East Chicago, IN - 80% minority, 57% below poverty level	320	Yes	High Priority Violations under Clean Air Act in 2017; Significant Non-Compliance under Resource Conservation and Recovery Act in 2018 and 2019[75]
Burlington Environmental LLC Tacoma (now registered as Stericycle Environmental	1036	Yes	Significant Non-Compliance under

Solutions) Tacoma, WA - 42% minority, 31% below poverty level			Resource Conservation and Recovery Act since 2017[76]
Systech Environmental; The company co-processes by-products and waste materials at 22 cement kilns across North America, in partnership with its sister company Geocycle. Both are affiliates of LafargeHolcim Fredonia, KS - 7% minority, 45% below poverty level	3904	Yes	No records available for Clean Air Act; two resolved Clean Water Act non -compliance cases were reported in 2019[77]
Total	49,712		

Source: U.S. EPA. Toxic Release Inventory.[78]

* Two factors were used to determine whether the facility is located in an EJ community: (a) the percentage of people living below the federal poverty rate is above 25 percent OR (b) the percentage of people who identify as "minority" is above 25 percent, based on the demographics of the population within a 3-mile radius of the facility.[79]

** According to the U.S. EPA, Significant Non-Compliance is the designation for the most serious level of violations and noncompliance events which pose risks to the environment or program integrity."[80]

Note: According to the company, its 2019 Toxic Release Inventory data was submitted to the EPA before the deadline of July 1, 2020. However, the EPA has not yet made it publicly available and as of our publication deadline, Agilyx had not responded to our request for updated information.

2 RES Polyflow/Brightmark Energy – Ashley, Indiana

In April 2019, Brightmark Energy, a waste management company based in San Francisco, took majority ownership in RES Polyflow and closed a $260 million financing package to finalize the construction of a plant in Ashley, Indiana that will convert plastic waste into fuel, naphtha, and waxes for candles and other consumer products.[81] While initially stating that the company would rely on rejected plastics collected from recycling and trash haulers in Chicago, parts of Ohio and southern Indiana for the Indiana facility,[82] the company now says it will take all plastics #1-7 for future sites, diverting even plastics that could otherwise be mechanically recycled.[83]

The now operational Brightmark facility began with significant delays and public investments to get off the ground.[84] The Indiana project initially began as an effort by Renewable Energy Solutions by Polyflow (RES Polyflow, LLC) to commercialize its plastic-to-fuel conversion technology in 2011 and received significant public funding in 2012 to support its efforts.[85] RES Polyflow is a joint venture between Polyflow, LLC, an Ohio-based plastic-to-fuel company, and Indiana-based private equity firm Ambassador Enterprises. The venture was supported through a State of Ohio Third Frontier Advanced Energy Program grant.[86] Since its formation, the company received at least two loans - in 2011 and 2018 - from Steuben County, Indiana.[87] In 2016, Indiana State's lead economic development agency, the Indiana Economic Development Corporation (IEDC) also offered up to $1 million for a project in Ashley, Indiana, including $900,000 in conditional tax credits and $100,000 in training grants for 136 employees to be hired by 2021.[88] The financing package for the project included $185 million of Exempt Facility Revenue Bonds (Green Bonds) issued by the Indiana Finance Authority and underwritten by Goldman Sachs & Co.[89] Brightmark projects 136 full-time jobs will be created at this facility though the agreement with IEDC made no commitments for employee retention over time.[90] In 2018, the company entered an agreement with the British oil and gas company BP to sell fuels to be produced in the Ashley plant.[91]

The plant finally began operations in May 2020 and plans to reach its goal of processing 100,000 tons of plastic by 2021 from across the region.[92] While it is yet unclear if the company can produce what is claimed, especially given the challenges in treating mixed low-grade plastic waste, Brightmark has announced a call for community partnerships in 2019, looking to build more facilities in the U.S. and globally. In the U.S, the company's targeted states include Florida, Georgia, New Jersey, New York, Pennsylvania, Louisiana, and Texas.[93]

[Table X] List of investments provided to Brightmark

Year	Grantor	Program	Amount
2011, 2018	Steuben County	Tax abatement	$1.5 million
2016	Indiana Economic Development Cooperation	Economic Development for a Growing Economy (EDGE) - Payroll Tax Credit and Skills Enhancement Fund (SEF) - Workforce Training Grant	$1 million ($900,000 in EDGE, $100,000 in SEF)
2019	Indiana Finance Authority	Exempt Facility Revenue Bonds (Green Bonds)	$185 million
2019	Brightmark	Capital from Brightmark Energy and prior development contributions by the Company	$75 million
Financial support from taxpayer funds (72%)			$187.5 million
Financial support from private sector (28%)			$75 million
Total			$262.5 million

Source:

3 Renewlogy – Salt Lake City, Utah

Renewlogy is a plastic-to-fuel company in Salt Lake City, Utah. Since 2018, the company has been working in partnership with Dow Chemical to support its HeftyBag Campaign, a curbside collection program which collects "hard-to-recycle" plastic waste in orange bags to burn or convert into fuels. The program launched in Boise, Idaho, in April 2018, with an agreement to send collected plastic waste to Renewlogy's Salt Lake plant. However, in the first quarter of 2019, the plant stopped accepting the collected waste due to equipment upgrades, which the company said would be finished in the beginning of 2020[94]. While the plant idles, the city continued to collect the orange bags so as not to confuse residents, stockpiling the plastic waste. In May 2020, the city of Boise announced that it will send the stockpiled plastic waste to a cement kiln in Utah to be burned as fuel until the Renewlogy plant reopens in September.[95] According to a representative of Dow's Hefty Energy Bag program, the material efficiency of Renewlogy's processes was 50-75% before the plant stopped operation.[96] This means that between 25-50% of the collected waste could not be converted into fuels and remained as waste. The City of Boise says they have shipped 400,000 bags of plastic waste 340 miles to Renewlogy,[97] which in total means that 100,000-200,000 of those bags of waste have become waste in Utah.

GLOSSARY

- Catalyst: A substance that increases the rate of a chemical reaction without itself undergoing any permanent chemical change.
- Depolymerization: One of several technologies that breaks plastic down into its constituent building blocks.
- Effluent: Liquid waste, generally requiring wastewater treatment.
- Fast Moving Consumer Goods Companies (FMCGCs): company that produces products that are sold quickly and at a relatively low cost.
- Feedstock: Raw material to supply or fuel a machine or industrial process.
- Gasification: Similar to pyrolysis, heating waste in a low-oxygen environment.
- Repolymerization: The process of turning plastic waste back into plastic by breaking it down into its constituents and reconstructing the plastic polymers.
- Naphtha: A flammable oil containing various hydrocarbons, obtained by the dry distillation of organic substances such as coal, shale, or petroleum.
- Plastic-to-fuel: A process for turning plastic into a liquid or gas that is then burned for energy.
- Polymer: One of several distinct types of plastic, each with its own chemical structure. Different polymers generally cannot be recycled together.
- Polystyrene: a hard, stiff, brilliantly transparent synthetic resin made from styrene. It is primarily used for packaging and insulating materials.
- Pyrolysis: The process of heating waste in the absence of oxygen to produce a liquid or gas fuel.
- Solvent: A substance that dissolves a material into a solution. A solvent is usually a liquid but can also be in a solid or gas form.
- Styrene: primarily a synthetic chemical that is used extensively in the manufacture of plastics, rubber, and resins

ABBREVIATIONS

- EPA: Environmental Protection Agency
- FMCGCs: Fast-Moving Consumer Goods Companies
- PTF: Plastic-to-Fuel
- PTP: Plastic-to-Plastic
- TRI: Toxic Release Inventory

APPENDICES

[Appendix 1] List of Projects Proposed as "Chemical Recycling" in the U.S.

Count	Company	Province/City (site of the facility)	Project Type	Current status
1	Agilyx	Tigard, Oregon	PTF in practice (according to available data)	5 - Operating plant
2	Agilyx and Monroe Energy	Trainer, Pennsylvania	PTF	0 - Project not started. No budget or schedule announced.
3	Ambercycle	Los Angeles	PTP (solvent/catalyst-based)	2- Pilot scale operation
4	Americas Styrenics (Amsty)	St. James	Not CR - Buyer/Partner	X- Not a chemical recycling facility. Accepts recycled plastic from Agilyx.
5	BioCellection Inc.	Menlo Park, California	PTP (solvent/catalyst-based)	2- Pilot scale operation
6	BP Infinia	Naperville, Illinois	PTP ?	4 - Project announced with site, budget, and schedule info
7	Braven	Cumberland County, Virginia	PTF	4 - Project announced with site, budget, and schedule info
8	Brightmark (former RES Polyflow (US)) (partners with BP)	Ashley, Indiana	PTF	5 - Operating plant
9	Climax Global Energy	Allendale, South Carolina	PTF	0 - Announcement only
10	Cogent Energy Systems		PTF	2 - Pilot project completed. No progress since 2018 found.
11	Eastman	Kingsport, Tennessee	PTP (thermal)	X – Data not available
12	Ecofuel technologies (partners with Save Our Oceans Foundation)	Livonia, Michigan	PTF	0 - Announcement only
13	Encina		PTP	0 - Announcement only

14	Fulcrum Bioenergy	Storey County, Nevada	Not CR - WTE	4 - Plant scheduled to start up in 2020
15	Geo-Tech Polymers (a division of Western Advantage Inc.)	Waverly, Ohio	PTP (water-based)	X - Not a chemical Recycling facility. Provides consulting services
16	Golden Renewable Energy	Yonkers, New York	PTF	4 - Project announced with site and budget info
17	Illinois Sustainable Technology Center		PTF with PTP (solvent-based purification and pyrolysis)	1 - Lab-scale
18	Ineos Styrolution	Channahon, Illinois	PTP (using Agilyx technology)	0 - Announcement only
19	Inline Plastics	Shelton	Not CR - Buyer	X - Not a chemical recycling facility. Buys recycled plastic from other companies to use in manufacturing.
20	Loop Industries	Spartanburg	PTP (solvent/catalyst-based)	3 - Site and schedule announced
21	METT USA	Virginia	PTF	0 - Announcement only
22	NatureWorks (jointly owned by PTT Global Chemicals and Cargill)	Omaha, Nebraska	Not CR - PLA production	X - Not a chemical recycling facility. A PLA production process.
23	New Hope Energy	Tyler, Texas	PTF	5 - Operating plant. Facility fire in May 2020.
24	Nexus Fuels (partners with Shell)	Atlanta, Georgia	PTF	2 - Pilot plant operational. No budget or schedule announced for commercial plant.
25	PennState	Pennsylvania	PTF	1 - Lab-scale. No project progress found since 2014
26	Plastic2Oil	Niagara Falls, New York	PTF	X - On hold. Company does not appear to be actively developing new projects.
27	Pure Cycle technologies (partners with P&G)	Hanging Rock, Ohio	PTP (solvent/catalyst-based)	4 - Project construction started. Schedule for commercial completion delayed to 2022.
28	Quad City Innovations LLC	Livonia, Michigan	PTF	3 - Site and schedule announced

29	Reclaimed EcoEnergy	Newport Beach, California	PTF	0 - Announcement only
30	Renewlogy	Boise, Idaho (Salt Lake City plant site)	PTF	X - Plant shutdown since early 2019. Process undergoing improvement.
31	Renewlogy (US)	Phoenix, Arizona	PTF	0 - Announcement only
32	Resinate Materials Group	Plymouth, Michigan	PTP (glycolysis - both)	0 - Announcement only
33	Resynergi	Santa Rosa, California	PTF	2 - Pilot
34	Sierra Energy	Monterey County, California	Not CR - WTE	X - Not a Chemical Recycling facility. Waste-to-Energy
35	University of Massachusetts Lowell	Massachusetts	PTP (solvent/catalyst-based)	1 - Lab-scale
36	US DOE National Renewable Energy Laboratory (NREL)	Golden, Colorado	PTP (solvent/catalyst-based)	1 - Lab-scale
37	VADXX (member of ACC and PTF and Petrochemical Alliance (PFPA)	Akron, Ohio	PTF	0 - Announcement only

Source: Closed Loop Partners. (2019). Accelerating Circular Supply Chains for Plastics: A Landscape of Transformational Technologies that Stop Plastic Waste, Keep Materials in Play and Grow Markets; 52 Advanced Recycling Projects List from American Chemistry Council; press releases and media reports

* Stages of project maturity: 0 (announcement only), 1 (Lab-scale), 2 (Pilot plant operational), 3 (Site and schedule announced), 4 (Construction started), 5 (Operating plant), X (Other)

[Appendix 2] Analysis of the performance of Agilyx's plant in Tigard, Oregon

INPUTS (2018)	AMOUNT	UNIT	NOTES
MASS (POLY)STYRENE INPUT	196,663.039	kg	Permit report p.20
CARBON IN POLYSTYRENE INPUT	181,407.304	kg	
NATURAL GAS USED	231,631.424	m3/yr	Permit report p.4
	Amount	**Unit**	**Notes**
OUTPUTS (2018)			
MASS STYRENE OUTPUT	21,974.839	kg	Permit report p.20
CARBON IN STYRENE OUTPUT	20,270.186	kg	
C OUT IN CO	0.506	kg	
C OUT IN VOC	undetermined	kg	negligible
C OUT IN SOLID WASTE	0.000	kg	negligible
CARBON BALANCE	161,136.612	kg C	process carbon lost
CARBON PROCESS LOSS	590,834.246	kg CO2	process carbon lost as CO2
NATURAL GAS EMISSIONS	455,399.935	kg CO2	CO2 emissions from natural gas combustion
FACILITY CO2 EMISSIONS	1,046,234.181	kg CO2	Does not include electricity, diesel use
CO2 FROM STYRENE BURNED	1,271,412.064	kg CO2	burned in cement kilns
TOTAL CO2 EMISSIONS	2,317,646.245	kg CO2	
EFFICIENCY (2018)			
PROCESS EFFICIENCY	11.174	%	
CARBON FOOTPRINT	47.611	kg/kg	CO2 emissions per kg of styrene produced

INPUTS (2019)	Amount	Unit	Notes
mass (poly)styrene input	581,157.370	kg	Permit report p.13
carbon in polystyrene input	536,075.270	kg	
natural gas used	265,045.248	m3/yr	Permit report p.4
OUTPUTS (2019)	Amount	Unit	Notes
mass styrene output	376,136.902	kg	Permit report p.13
carbon in styrene output	346,958.848	kg	
C out in CO	7.778	kg	
C out in VOC	undetermined	kg	negligible
C out in solid waste	0.000	kg	negligible
carbon balance	189,108.643	kg C	process carbon lost
carbon process loss	693,398.359	kg CO2	process carbon lost as CO2
natural gas emissions	521,093.325	kg CO2	CO2 emissions from natural gas combustion
facility CO2 emissions	1,214,491.684	kg CO2	Does not include electricity, diesel use
CO2 from styrene burned	unknown	kg CO2	burned in cement kilns
total CO2 emissions	undetermined	kg CO2	
EFFICIENCY (2019)			
process efficiency	64.722	%	
carbon footprint	3.229	kg/kg	CO2 emissions per kg of styrene produced

Source: Analysis provided by PhD Andrew Rollinson.
Data sources: U.S. Environmental Protection Agency (EPA). (2020). Toxic Release Inventory Form R Reports; Agilyx. (2019). Air Quality Permit Detail Report.

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Ravenswood draft air permit comments

June 26, 2023

TO: Ed Andrews

FROM: Lea Harper, Managing Director, FreshWater Accountability Project

Frank Rocchio, Director, Ohio Valley Environmental Advocates

SUBJ: Draft Permit Comments & Request for Extension for Comments

RE: Permit #R13-3563

Dear Mr. Andrews,

First, thank you very much for the information about the subject draft air permit and for accepting the few comments below we could assemble in the time frame allocated. We would like to make a formal request for the time period for comments to be extended at least 45 days because we need to find an air expert and grant funding to make better comments. We would also like to request a public hearing on the subject draft permit. In the meantime, please enter the following comments into the air permit record.

1) This facility is classified as a medical waste facility which is estimated to contain 20-25% plastic. The waste to be incinerated needs to be sorted correctly and fully characterized to know what contaminants will be emitted, including dioxins and furans. It is too late to wait for a stack test to know what the actual emissions will be. We have searched for actual emissions from similar facilities, but cannot find much on-line. That is why we need an experienced air toxics specialist to fully characterize the emissions from this facility.

2) According to USEPA guidance issued over 10 years ago, air emissions from hospital/medical/mixed medical waste facilities, we quote: "After the EG is implemented, either through the revised/new state plans or the amended federal plan, emissions from HMIWI units will drop significantly. Key emissions reductions will include: ♣ mercury by 89 percent ♣ hydrogen chloride by 85 percent ♣ lead by 74 percent, and ♣ dioxin/furans by 68 percent. These limits should be incorporated into any air permit given for such facilities: https://www.epa.gov/sites/default/files/2015-12/documents/hmiwi_fact_sheet_040413.pdf This draft permit needs to include ways to obtain compliance with future USEPA standards, which is readily available on-line for review.

3) Because dioxin and furan's are persistent and extremely toxic, cumulative pollution from this facility must be weighed over time; therefore, we assert that zero emissions are allowable for those toxics that will accumulate and travel by particulate matter, posing a public health threat. Reference: https://www.who.int/news-room/fact-sheets/detail/dioxins-and-their-effects-on-human-health#:~:text=Short%2Dterm%20exposure%20of%20humans,endocrine%20system%20and%20reproductive%20functions.

4) Should the word, "not," be inserted here?: b. The permittee shall cause to be discharged into the atmosphere visible emissions of combustion ash or char from an ash conveying system (including conveyor transfer points) in excess of 5 percent of the observation period (i.e., 9 minutes per 3-hour period), as determined by EPA Reference Method 22 of appendix A-1 of this part, except as provided in following paragraphs. [40CFR60.52c(c)]

5) Six what? "4.2.8. The permittee shall conduct a visible emission check during one loading event per calendar year to verify compliance with the emission limitation in Condition 4.1.10. using U.S. EPA Method 22. The duration of this observation shall be no less than six."

6) We don't have the app to open all the related documents for this facility that are on-line, so additional time is needed to try to find experts to open and review all files.

7) The modeling done is only for criteria pollutants as far as we can tell from the records reviewed. This is inadequate for facilities that will be manufacturing syngas using medical waste. The most toxic, persistent chemicals such as dioxins and furans must be modeled to know what is produced, what will be captured by bag houses, and what could be released and where the chemical-laden particulates will travel. More realistic and applicable modeling is required to compare to potential public health impacts as well as air inversion concentrations that are characteristic of valley topography.

8) A study of existing, cumulative pollutant load is needed for the region before another source of toxic air emissions is permitted to ensure public health protection. This study should examine the potential release of PFAS chemicals from the proposed incineration and other discharges.

9) The carbon footprint of this facility as well as the impact of burning the resultant syngas needs to be calculated to assess greenhouse gas emissions that this facility would create along with the emissions from the subsequent combustion of the syngas. The burning of this waste and creation of syngas is likely at odds with carbon neutrality: https://www.chemistryworld.com/news/burning-plastic-waste-for-energy-at-odds-with-carbon-neutrality/4017584.article

10) As pointed out in the attached US Briefing on Chemical Recycling, "Technical challenges remain unsolved at each stage of the process: sorting and cleaning highly contaminated plastic waste feedstock (pre-treatment), optimizing the temperature during the conversion processes by large energy inputs, removing impurities from the products in order to meet the standards necessary for use (post-processing), and managing toxins present in solid and liquid residues." No final air permit can be issued without a full characterization of actual emissions, perhaps by gathering actual information from the few similar facilities that have operating air emissions data.

11) The site location and description in the draft air permit does not include necessary Environmental Justice considerations for a region with a history of industrial pollution, resource extraction and with low-income and poor public health indicators. It is important to determine if the region is already overburdened before allowing additional toxic pollution to be permitted.

12) Conducting an analysis of the waste stream to determine if hazardous only once per year is inadequate for input material that can vary considerably along with processing parameters such as temperature. Reference "4.2.7. The permittee shall conduct a hazardous determination per 40 CFR 262.11 of the streams leaving the gasifier process (e.g., ash, char, wastewater), to include re-injected adsorbent, at least once every 12 months. Should a determination yield that any stream is hazardous, the permittee shall notify the Director within 10 days of the determination in accordance with Condition 3.5.3. of this permit. Records of each determination shall be maintained in accordance with Condition 3.4.1. of this permit."

13) Please enter into the record that Brightmark is a Plastic to Fuel (PTF) facility with failures that have affected the community's air quality due to a fire and uncontrolled flaring: "'There's just basically a jet fire coming out, so I run as fast as I can screaming for my operator up in the control room to shut the pump off, open everything to the (emergency) flare so we can release dangerous vapor safely and prevent the build-up of pressure....An earlier fire in July 2020 threatened the lives of at least three plant workers, according to Kistler and his former supervisor, Roy Bisnett. And an oil spill at the plant in August 2022 took weeks to clean up, public records show.'" https://insideclimatenews.org/news/16062023/indiana-advanced-plastics-recycling-vapors-spills-fires/. So many problems have occurred at the Indiana facility that the company has cancelled plans to build another facility in Macon-Bibb county, GA: https://wgxa.tv/news/local/it-draws-a-red-flag-mayor-millers-explains-his-reasoning-for-pulling-out-of-brightmark
Since this has already happened, it is important that the air permit contains provisions that will require the capture and measurement of actual toxic releases from flaring events.

14) Continuous particulate matter monitoring is required for these facilities, inside and at fenceline, for the production of microplastics and harmful dust: "Another former worker complaining of clouds of plastic dust has sued the company in federal court, claiming lung damage." https://insideclimatenews.org/news/16062023/indiana-advanced-plastics-recycling-vapors-spills-fires/

15) Please enter the attached powerpoint presentation by Eric Beckman, PhD and the presentation that he made about the complexities of safely burning waste that includes a significant amount of plastic, requiring detailed sorting to ensure complete combustion and public safety. Please also enter the link to Dr. Beckman's video presentation which begins at approximately 14 min 40 secs and runs through 49 min 40 secs. In addition, please note: "Gasifiers were designed to manage this trade-off, but only with strictly controlled types of homogeneous feedstock, and not with something 'non-standard' such as plastic waste (Rollinson, 2018)." https://www.no-burn.org/wp-content/uploads/CR-Technical-Assessment_June-2020.pdf

These are all the comments we have the time and expertise to file to meet today's deadline at 5 pm. A more thorough review is required of the entire process of issuing this permit because of the lack of actual data on air emissions and proven success using incineration of medical waste that includes plastics. More research and emission data is needed to develop additional permitting parameters for these facilities: "In addition to the inherent toxicants in plastic, toxic gases such as hydrogen cyanide (HCN) and CO are produced, along with new, longer-chain, toxic molecules synthesised during low-oxygen thermolysis, thus increasing product toxicity

with respect to the feedstock. Knowledge of these synthesis routes is well established and has been widely studied over the last 100 years (see Kiel et al., 2004; Vreugdenhil and Zwart, 2009). They produce what are collectively called tertiary or high-temperature tars, and these include nitrated PAH (N-PAH), oxygenated PAH (O-PAH), and N/S/O- heterocyclic PAHs, many of which are potent mutagens and carcinogens (Idowu et al., 2019). With plastics, Font et al. (2003) observed that the emission factors of mutagenic PAHs from pyrolysis of polyethylene increased markedly with temperatures above 700ºC. This relates to the trade-off between temperature, depolymerisation, and re-synthesis of unwanted molecules, as discussed in the previous section. The production of these synthesised toxicants is corroborated by other plastic pyrolysis studies (Garrido et al., 2016; Lopez, et al. 2017; Seo and Shin, 2002; Wong, et al., 2015)."

https://www.no-burn.org/wp-content/uploads/CR-Technical-Assessment_June-2020.pdf

Because of the lack of data on actual emissions, we believe there may be more toxic chemicals that could be produced that are not described in this permit, so without more actual data about these facilities, there is not enough information to determine adequate measurement, characterization, reporting and permitting parameters. There are serious considerations that must be addressed before finalizing the air permit for Thunder Mountain.

The two cited attachments are sent via email transmittal. We can assist with additional information if more time can be allocated for the necessary scientific and legal review. Thank you in advance for your consideration of our permit comments and request for extension of at least 45 days and a public hearing.

Status 7/5/2023

Wednesday, July 19, 2023 3:13 PM

Andrews, Edward S <edward.s.andrews@wv.gov>

RE: FW: WV Draft Permit R13-3563 for Thunder Mountain Environmental Services LLC; West Virginia Plant

1 message

bryanf@resllc.net <bryanf@resllc.net> Wed, Jul 5, 2023 at 4:04 PM
To: "\"Andrews, Edward S\" <edward.s.andrews@wv.gov>" <edward.s.andrews@wv.gov>
Cc: "npatel@iconconstructioninc.com" <npatel@iconconstructioninc.com>, "rhanshaw@bowlesrice.com" <rhanshaw@bowlesrice.com>

Thanks Ed.

From: Andrews, Edward S <edward.s.andrews@wv.gov>
Sent: Wednesday, July 5, 2023 3:31 PM
To: bryanf@resllc.net
Cc: Naren Patel <npatel@iconconstructioninc.com>; Roger Hanshaw <rhanshaw@bowlesrice.com>
Subject: Re: FW: WV Draft Permit R13-3563 for Thunder Mountain Environmental Services LLC; West Virginia Plant

Bryan,

I apologize for the delay in responding to your request.

Attached is a copy of the submitted comments and request. We are evaluating their comments. The DAQ is currently planning on conducting a public meeting at 6:00 PM on July 20, 2023 to satisfy this request in accordance with our permit rule (45CSR13). I will keep you posted/informed on the arrangements for the upcoming public meeting.

Ed

Ravenswood draft air permit c…

On Tue, Jun 27, 2023 at 9:24 AM bryanf@resllc.net <bryanf@resllc.net> wrote:

> Ed – Thank you for the update. Please let us know if you require any assistance in preparing the response. If you, could you please share the comment so we can better understand the nature of the issue? Thanks you.

Best

Bryan

From: Andrews, Edward S <edward.s.andrews@wv.gov>
Sent: Tuesday, June 27, 2023 7:32 AM
To: bryanf@resllc.net
Subject: Re: FW: WV Draft Permit R13-3563 for Thunder Mountain Environmental Services LLC; West Virginia Plant

Bryan,

We received only one comment within the public comment period. A response will have to be developed before the DAQ can take final action on your application.

Ed

On Mon, Jun 26, 2023 at 6:02 PM bryanf@resllc.net <bryanf@resllc.net> wrote:

> Ed –
>
> As the 30-day public comment period has now ended, can you please provide an update regarding the status of our application? Your assistance is greatly appreciated. Thank you.
>
> Best
>
> Bryan
>
> ---
>
> **From:** Mink, Stephanie R <stephanie.r.mink@wv.gov>
> **Sent:** Thursday, May 25, 2023 8:02 AM
> **To:** Supplee, Gwendolyn <supplee.gwendolyn@epa.gov>; Weinelt.Eva@epa.gov; leary.justin@epa.gov; bryanf@resllc.net; npatel@iconconstructioninc.com
> **Cc:** Crowder, Laura M <Laura.M.Crowder@wv.gov>; McKeone, Beverly D <Beverly.D.Mckeone@wv.gov>; McCumbers, Carrie <Carrie.McCumbers@wv.gov>; Nicole D Ernest <nicole.d.ernest@wv.gov>; Andrews, Edward S <Edward.S.Andrews@wv.gov>; Rebecca H Johnson <Rebecca.H.Johnson@wv.gov>; Joshua M Woody <joshua.m.woody@wv.gov>
> **Subject:** WV Draft Permit R13-3563 for Thunder Mountain Environmental Services LLC; West Virginia Plant
>
> Please find attached the Draft Permit R13-3563, Engineering Evaluation and Public Notice for Thunder Mountain Environmental Services LLC's West Virginia Plant located in Jackson County.

The public notice will be published in the *Jackson Star News* on Friday, May 26, 2023 and the thirty day comment period will end on Monday, June 26, 2023.

Should you have any questions or comments, please contact the permit writer, Ed Andrews, at 304-926-0499 ext. 41244 or Edward.S.Andrews@wv.gov.

--

Stephanie Mink

Environmental Resources Associate

West Virginia Department of Environmental Protection

Division of Air Quality, Title V Permitting

601 57th Street SE

Charleston, WV 25304

Phone: 304-926-0499 x41281

--

Edward Andrews, P.E.

Engineer

WVDEP/Division of Air Quality

304-926-0499 Ext 41244

601 57th Street, SE

Charleston, WV 25304

Ravenswood draft air permit comments

June 26, 2023

TO: Ed Andrews

FROM: Lea Harper, Managing Director, FreshWater Accountability Project

Frank Rocchio, Director, Ohio Valley Environmental Advocates

SUBJ: Draft Permit Comments & Request for Extension for Comments

RE: Permit #R13-3563

Dear Mr. Andrews,

First, thank you very much for the information about the subject draft air permit and for accepting the few comments below we could assemble in the time frame allocated. We would like to make a formal request for the time period for comments to be extended at least 45 days because we need to find an air expert and grant funding to make better comments. We would also like to request a public hearing on the subject draft permit. In the meantime, please enter the following comments into the air permit record.

1) This facility is classified as a medical waste facility which is estimated to contain 20-25% plastic. The waste to be incinerated needs to be sorted correctly and fully characterized to know what contaminants will be emitted, including dioxins and furans. It is too late to wait for a stack test to know what the actual emissions will be. We have searched for actual emissions from similar facilities, but cannot find much on-line. That is why we need an experienced air toxics specialist to fully characterize the emissions from this facility.

2) According to USEPA guidance issued over 10 years ago, air emissions from hospital/medical/mixed medical waste facilities, we quote: "After the EG is implemented, either through the revised/new state plans or the amended federal plan, emissions from HMIWI units will drop significantly. Key emissions reductions will include: ♣ mercury by 89 percent ♣ hydrogen chloride by 85 percent ♣ lead by 74 percent, and ♣ dioxin/furans by 68 percent. These limits should be incorporated into any air permit given for such facilities: https://www.epa.gov/sites/default/files/2015-12/documents/hmiwi_fact_sheet_040413.pdf This draft permit needs to include ways to obtain compliance with future USEPA standards, which is readily available on-line for review.

3) Because dioxin and furan's are persistent and extremely toxic, cumulative pollution from this facility must be weighed over time; therefore, we assert that zero emissions are allowable for those toxics that will accumulate and travel by particulate matter, posing a public health threat. Reference: https://www.who.int/news-room/fact-sheets/detail/dioxins-and-their-effects-on-human-health#:~:text=Short%2Dterm%20exposure%20of%20humans,endocrine%20system%20and%20reproductive%20functions.

4) Should the word, "not," be inserted here?: b. The permittee shall cause to be discharged into the atmosphere visible emissions of combustion ash or char from an ash conveying system (including conveyor transfer points) in excess of 5 percent of the observation period (i.e., 9 minutes per 3-hour period), as determined by EPA Reference Method 22 of appendix A-1 of this part, except as provided in following paragraphs. [40CFR60.52c(c)]

5) Six what? "4.2.8. The permittee shall conduct a visible emission check during one loading event per calendar year to verify compliance with the emission limitation in Condition 4.1.10. using U.S. EPA Method 22. The duration of this observation shall be no less than six."

6) We don't have the app to open all the related documents for this facility that are on-line, so additional time is needed to try to find experts to open and review all files.

7) The modeling done is only for criteria pollutants as far as we can tell from the records reviewed. This is inadequate for facilities that will be manufacturing syngas using medical waste. The most toxic, persistent chemicals such as dioxins and furans must be modeled to know what is produced, what will be captured by bag houses, and what could be released and where the chemical-laden particulates will travel. More realistic and applicable modeling is required to compare to potential public health impacts as well as air inversion concentrations that are characteristic of valley topography.

8) A study of existing, cumulative pollutant load is needed for the region before another source of toxic air emissions is permitted to ensure public health protection. This study should examine the potential release of PFAS chemicals from the proposed incineration and other discharges.

9) The carbon footprint of this facility as well as the impact of burning the resultant syngas needs to be calculated to assess greenhouse gas emissions that this facility would create along with the emissions from the subsequent combustion of the syngas. The burning of this waste and creation of syngas is likely at odds with carbon neutrality: https://www.chemistryworld.com/news/burning-plastic-waste-for-energy-at-odds-with-carbon-neutrality/4017584.article

10) As pointed out in the attached US Briefing on Chemical Recycling, "Technical challenges remain unsolved at each stage of the process: sorting and cleaning highly contaminated plastic waste feedstock (pre-treatment), optimizing the temperature during the conversion processes by large energy inputs, removing impurities from the products in order to meet the standards necessary for use (post-processing), and managing toxins present in solid and liquid residues." No final air permit can be issued without a full characterization of actual emissions, perhaps by gathering actual information from the few similar facilities that have operating air emissions data.

11) The site location and description in the draft air permit does not include necessary Environmental Justice considerations for a region with a history of industrial pollution, resource extraction and with low-income and poor public health indicators. It is important to determine if the region is already overburdened before allowing additional toxic pollution to be permitted.

12) Conducting an analysis of the waste stream to determine if hazardous only once per year is inadequate for input material that can vary considerably along with processing parameters such as temperature. Reference "4.2.7. The permittee shall conduct a hazardous determination per 40 CFR 262.11 of the streams leaving the gasifier process (e.g., ash, char, wastewater), to include re-injected adsorbent, at least once every 12 months. Should a determination yield that any stream is hazardous, the permittee shall notify the Director within 10 days of the determination in accordance with Condition 3.5.3. of this permit. Records of each determination shall be maintained in accordance with Condition 3.4.1. of this permit."

13) Please enter into the record that Brightmark is a Plastic to Fuel (PTF) facility with failures that have affected the community's air quality due to a fire and uncontrolled flaring: "'There's just basically a jet fire coming out, so I run as fast as I can screaming for my operator up in the control room to shut the pump off, open everything to the (emergency) flare so we can release dangerous vapor safely and prevent the build-up of pressure....An earlier fire in July 2020 threatened the lives of at least three plant workers, according to Kistler and his former supervisor, Roy Bisnett. And an oil spill at the plant in August 2022 took weeks to clean up, public records show.'" https://insideclimatenews.org/news/16062023/indiana-advanced-plastics-recycling-vapors-spills-fires/. So many problems have occurred at the Indiana facility that the company has cancelled plans to build another facility in Macon-Bibb county, GA: https://wgxa.tv/news/local/it-draws-a-red-flag-mayor-millers-explains-his-reasoning-for-pulling-out-of-brightmark
Since this has already happened, it is important that the air permit contains provisions that will require the capture and measurement of actual toxic releases from flaring events.

14) Continuous particulate matter monitoring is required for these facilities, inside and at fenceline, for the production of microplastics and harmful dust: "Another former worker complaining of clouds of plastic dust has sued the company in federal court, claiming lung damage." https://insideclimatenews.org/news/16062023/indiana-advanced-plastics-recycling-vapors-spills-fires/

15) Please enter the attached powerpoint presentation by Eric Beckman, PhD and the presentation that he made about the complexities of safely burning waste that includes a significant amount of plastic, requiring detailed sorting to ensure complete combustion and public safety. Please also enter the link to Dr. Beckman's video presentation which begins at approximately 14 min 40 secs and runs through 49 min 40 secs. In addition, please note: "Gasifiers were designed to manage this trade-off, but only with strictly controlled types of homogeneous feedstock, and not with something 'non-standard' such as plastic waste (Rollinson, 2018)." https://www.no-burn.org/wp-content/uploads/CR-Technical-Assessment_June-2020.pdf

These are all the comments we have the time and expertise to file to meet today's deadline at 5 pm. A more thorough review is required of the entire process of issuing this permit because of the lack of actual data on air emissions and proven success using incineration of medical waste that includes plastics. More research and emission data is needed to develop additional permitting parameters for these facilities: "In addition to the inherent toxicants in plastic, toxic gases such as hydrogen cyanide (HCN) and CO are produced, along with new, longer-chain, toxic molecules synthesised during low-oxygen thermolysis, thus increasing product toxicity

with respect to the feedstock. Knowledge of these synthesis routes is well established and has been widely studied over the last 100 years (see Kiel et al., 2004; Vreugdenhil and Zwart, 2009). They produce what are collectively called tertiary or high-temperature tars, and these include nitrated PAH (N-PAH), oxygenated PAH (O-PAH), and N/S/O- heterocyclic PAHs, many of which are potent mutagens and carcinogens (Idowu et al., 2019). With plastics, Font et al. (2003) observed that the emission factors of mutagenic PAHs from pyrolysis of polyethylene increased markedly with temperatures above 700ºC. This relates to the trade-off between temperature, depolymerisation, and re-synthesis of unwanted molecules, as discussed in the previous section. The production of these synthesised toxicants is corroborated by other plastic pyrolysis studies (Garrido et al., 2016; Lopez, et al. 2017; Seo and Shin, 2002; Wong, et al., 2015)."

https://www.no-burn.org/wp-content/uploads/CR-Technical-Assessment_June-2020.pdf

Because of the lack of data on actual emissions, we believe there may be more toxic chemicals that could be produced that are not described in this permit, so without more actual data about these facilities, there is not enough information to determine adequate measurement, characterization, reporting and permitting parameters. There are serious considerations that must be addressed before finalizing the air permit for Thunder Mountain.

The two cited attachments are sent via email transmittal. We can assist with additional information if more time can be allocated for the necessary scientific and legal review. Thank you in advance for your consideration of our permit comments and request for extension of at least 45 days and a public hearing.

Re: FWAP Comments 7/6/2023

Wednesday, July 19, 2023 3:07 PM

Andrews, Edward S <edward.s.andrews@wv.gov>

Re: Draft Permit Comments & Request for Extension for Comments RE: Permit #R13-3563

1 message

Leatra Harper <wewantcleanwater@gmail.com> Thu, Jul 6, 2023 at 12:20 PM
To: "Andrews, Edward S" <edward.s.andrews@wv.gov>
Cc: OVE Advocates <oveadvocates@gmail.com>, Frank Rocchio <frankrocchio30@gmail.com>

Thank you very much, Mr. Andrews!
Best,
Lea

On Thu, Jul 6, 2023 at 11:43 AM Andrews, Edward S <edward.s.andrews@wv.gov> wrote:

> Ms. Harper and Mr. Rocchio,
>
> Thank you for your timely response. The DAQ has elected to conduct a virtual public meeting regarding the Thunder Mountain Environmental Services' construction application on July 20, 2023 at 6:00 PM and the Director has elected to extend the public comment to 5:00 PM on July 27, 2023.
>
> I will forward you a copy of the meeting notice once it has been approved for public release by our office.
>
> Thanks,
> Ed
>
> On Thu, Jul 6, 2023 at 11:07 AM Leatra Harper <wewantcleanwater@gmail.com> wrote:
>
> > Thank you, Mr. Andrews. The task force has opted for a virtual meeting if we cannot have both. Is there any possibility to extend the meeting until 7/31? We are seeking experts and funding to support our concerns about this facility, which will be very helpful as a resource to the DEP as well in light of other proposed waste incinerators planned for West Virginia.
> > Thanks again,
> > Lea
> >
> > On Wed, Jul 5, 2023 at 3:15 PM Andrews, Edward S <edward.s.andrews@wv.gov> wrote:
> >
> > > Ms, Harper and Mr. Rocchio,
> > >
> > > These public meetings are resource interness events. The agency does not have the sufficient resources to hold hybrid public meetings. Your choice is either an in-person or virtual public meeting. Tentatively, the DAQ is considering holding this public meeting on Thursday, July 20, 2023.
> > >
> > > Your timely response is appreciated for the DAQ to make the necessary arrangements for this public meeting event.
> > >
> > > Please respond to this email by no later than 1:00 pm on Thursday, July 6, 2023.
> > >
> > > Thank you,
> > > Ed
> > >
> > > --
> > > Edward Andrews, P.E.
> > > Engineer
> > > WVDEP/Division of Air Quality
> > > 304-926-0499 Ext 41244
> > > 601 57th Street, SE

Charleston, WV 25304

On Tue, Jun 27, 2023 at 12:50 PM Leatra Harper <wewantcleanwater@gmail.com> wrote:
Thanks, Mr. Andrews - is it possible to do both at the same time? We would be able to cut down on travel costs if people had the opportunity to meet virtually, but we would not want to deny the opportunity to meet in person for those who are local. If not, then a virtual meeting would be the first choice.
Thanks again,
Lea

On Tue, Jun 27, 2023 at 11:16 AM Andrews, Edward S <edward.s.andrews@wv.gov> wrote:
Ms. Harper and Mr. Rocchio:

Before making any decision on your request for a public meeting, the DAQ would like to know which format for the meeting would you prefer in-person or virtual meeting?

Please respond to this request by replying to this email by Thursday, June 29, 2023.

Thanks,

--
Edward Andrews, P.E.
Engineer
WVDEP/Division of Air Quality
304-926-0499 Ext 41244
601 57th Street, SE
Charleston, WV 25304

On Mon, Jun 26, 2023 at 4:37 PM Leatra Harper <wewantcleanwater@gmail.com> wrote:
Dear Mr. Andrews,

Please see the attached draft air permit comments for the subject medical waste incineration facility proposed for Ravenswood, WV. A few additional comments to put our concerns into context are below:

Please enter into the record the attached PowerPoint presentation by Eric Beckman, PhD. Dr. Beckman, an expert in Polymer Science and Engineering, and Co-director of the Mascaro Center for Sustainable Innovation at the University of Pittsburgh, who presents a thorough exploration of the complexities tied to safely pyrolyzing waste with significant plastic content. His presentation not only highlights the need for detailed sorting to ensure complete combustion and protect public health, but also addresses the essential requirements for proper handling of wastewater from the pyrolysis process and the cleaning of associated equipment.

As you may already know, a comparable initiative to establish a pyrolysis-based medical waste treatment facility has been underway in Follansbee, WV. This project has given rise to numerous concerns within the community, necessitating an extensive investigation. Initially, the proposal revolved around the establishment of a medical waste treatment plant using pyrolysis, an idea that met with strong community resistance due to environmental and health apprehensions. However, following community research and the dissemination of transparent information, the proposal for medical waste feedstock has reportedly been rescinded. Consequently, the project's focus has shifted to plastics as the feedstock for the pyrolysis recycling facility. We are concerned the same tactic may be used in Ravenswood.

In light of the many unknown variables, including an analysis by DHHR, it is crucial that a timeline extension be granted for this project of at least 45 days. This will afford communities like Ravenswood and Follansbee the necessary time to conduct in-depth research, consult with industry experts such as Dr. Eric Beckman, and amass the resources needed to thoroughly understand the pyrolysis/incineration process. This understanding would include its potential environmental impact and the particulars of the planned plant. The earlier opposition to the medical waste plant proposal and the community's diligent engagement clearly demonstrate their investment in comprehending the possible ramifications of this project, including the massive amounts of trash that must be transported and stored.

Moreover, extending the timeline would provide these communities with an opportunity to voice detailed comments and articulate their position on the project. Such feedback could significantly influence the council's final decisions. The timeline extension could foster transparency, stimulate community

engagement, and assure residents that their concerns are heard and duly considered. In addition, it could pave the way for a thorough exploration of alternatives and the establishment of effective strategies to mitigate potential adverse impacts.

A timeline extension is indispensable for informed decision-making, fostering community involvement, and prioritizing environmental and public health within the context of the Follansbee Pyrolysis Project. In addition, a public hearing should be held so community members have the chance to learn the facts and ask questions.

Please see new articles pertaining to the ongoing efforts by the City of Follansbee in opposition to the pyrolysis facility being established.

- https://www.heraldstaronline.com/news/local-news/2023/01/follansbee-council-asked-to-block-medical-waste-treatment-plant/
- https://wtov9.com/news/local/medical-waste-plant-not-coming-to-follansbee
- https://www.weirtondailytimes.com/news/local-news/2023/06/council-advised-to-seek-information-on-recycling/

We are hopeful this additional background information about the proposed incineration facilities for the Ohio Valley region are reviewed in the larger context of the lack of adequate data and USEPA policies. Follansbee is not the only community that would not want a waste incinerator near their community that would bring in tons of trash and toxic materials, emitting harmful contaminants into air, water and soil. It appears West Virginia is being targeted for these facilities that will locate in disenfranchised communities and will not bring in many desirable jobs, only massive tons of waste to the state.

Thanks in advance for filing the attached comments along with the attachments here. Please advise if the permit comment period can be extended and if a public hearing will be held so we can assemble additional comments.

Best,

Lea Harper
Managing Director
FreshWater Accountability Project
www.fwap.org
419-450-7042

Frank Rocchio
Director
Ohio Valley Environmental Advocates
www.oveadvocates.org
724-579-4498

--

Edward Andrews, P.E.
Engineer
WVDEP/Division of Air Quality
304-926-0499 Ext 41244
601 57th Street, SE
Charleston, WV 25304

Meeting Notice 7/7/2023

Wednesday, July 19, 2023 3:09 PM

Andrews, Edward S <edward.s.andrews@wv.gov>

Thunder Mountain Public Meeting

1 message

Andrews, Edward S <edward.s.andrews@wv.gov> Fri, Jul 7, 2023 at 9:44 AM
To: Edward S Andrews <edward.s.andrews@wv.gov>
Bcc: OVE Advocates <oveadvocates@gmail.com>, Leatra Harper <wewantcleanwater@gmail.com>, Frank Rocchio <frankrocchio30@gmail.com>, "Crowder, Laura M" <a031313@wv.gov>, Beverly D Mckeone <beverly.d.mckeone@wv.gov>, Bill Heitfeld <bill.heitfeld@n-steel.com>, Naren Patel <npatel@iconconstructioninc.com>, Helena R Kubarycz <Helena.Kubarycz@ramboll.com>, Bryan Fennell <Bryanf@resllc.net>, Roger Hanshaw <rhanshaw@bowlesrice.com>, Christopher Sterner <christopher.sterner@ramboll.com>

To Whom it may concern,

In response to a request received within the public comment period for Permit Application R13-3563, the DAQ has scheduled a virtual public meeting at 6:00 pm on Thursday, July 20, 2023. Please see the attachment for details on how to register for this event.

The DAQ will continue to accept written comments regarding this application until 5:00 PM on Thursday, July 27, 2023.

Should you have any questions or concerns about this notice/public meeting, please let me know.

Thanks
Ed

--
Edward Andrews, P.E.
Engineer
WVDEP/Division of Air Quality
304-926-0499 Ext 41244
601 57th Street, SE
Charleston, WV 25304

Thunder_Mt_Public_Meeting_Notice.pdf
74K

Thunder_Mt_Public_Meeting_Notice

DEP to Hold Public Meeting and to Extend the Public Comment Period

The West Virginia Department of Environmental Protection's Division of Air Quality (DAQ) will hold a virtual public meeting on Thursday, July 20, 2023, to provide information and receive comments regarding Thunder Mountain Environmental Services LLC's air quality permit application. Thunder Mountain Environmental Services has proposed to construct a waste to energy facility, which will consist of converting medical waste to a synthetic gas by means of a gasifier, to be located at 5334B Point Pleasant Road, Ravenswood, Jackson County, West Virginia, at 39.923499 latitude and -81.795688 longitude.

The DAQ will hold the public meeting virtually at 6:00 p.m. on Thursday, July 20, 2023. Instructions for providing oral comments at the virtual public meeting are provided below. Representatives from the DAQ will conduct the meeting regarding the construction application submitted by Thunder Mountain Environmental Services on June 2, 2022.

To participate online or by telephone, registration is required by 5:00 p.m. on Thursday, July 20, 2023. To register, please complete the registration form at: https://forms.gle/u5KFk3Y3REATHgDE8. To register to provide oral comments, please indicate "yes" you want to provide oral comments on the record when you register. A confirmation email will be sent with information on how to join the public meeting. If you do not have internet access and want to register to participate via telephone, please contact Nicole Ernest at (304) 926-0499 x41256. Oral comments are limited to five (5) minutes. Video demonstrations and screen sharing by commenters is not permitted.

Written comments must be received by 5:00 p.m. on Thursday, July 27, 2023:

- Email written comments to Edward.S.Andrews@wv.gov with "Thunder Mountain Environmental Services Comments" in the subject line, or
- Mail hard copy comments to Edward Andrews, WV Department of Environmental Protection, Division of Air Quality, 601 57th Street, SE, Charleston, WV 25304.

Instructions for downloading additional information, including copies of the draft permit, application, and all other supporting materials relevant to the permit decision is available at: https://dep.wv.gov/daq/permitting/Pages/NSR-Permit-Applications.aspx.

Public Mtg Affidavit 7/12/23

Wednesday, July 12, 2023 8:21 AM

Andrews, Edward S <edward.s.andrews@wv.gov>

Thunder Mountain public meeting affidavit

1 message

Mink, Stephanie R <stephanie.r.mink@wv.gov> Wed, Jul 12, 2023 at 8:19 AM
To: Edward Andrews <edward.s.andrews@wv.gov>

Please see attached.

--

Stephanie Mink

Environmental Resources Associate

West Virginia Department of Environmental Protection

Division of Air Quality, Title V Permitting

601 57th Street SE

Charleston, WV 25304

Phone: 304-926-0499 x41281

Jackson Herald-Thunder pub meeting affidavit-Ed.pdf
1355K

Jackson Herald-Thunder pub meeting affidavit-Ed

The JACKSON Star&Herald

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PUBLISHER'S CERTIFICATE

I, Carolyn Sizemore, Classified Manager of THE JACKSON HERALD, a newspaper of general circulation published in the city of Ripley, County and state aforesaid, do hereby certify that the annexed:

Public Meeting

was published in THE JACKSON HERALD 1 time(s) commencing on 07/11/2023 and ending on 07/11/2023 at the request of

WV DEPT. ENVIR. PROTECTION/DIV..

Given under my hand this 07/11/2023.

The publisher's fee for said publication is: $28.67.

Carolyn Sizemore
Classified Manager of
THE JACKSON HERALD

Subscribed to and sworn to before me this 07/11/2023

Tina Kocher
Notary Public in and for Jackson County, WV

My commission expires on
The 7th day of January 20 25

OFFICIAL SEAL
NOTARY PUBLIC
STATE OF WEST VIRGINIA
Tina Kocher
PO Box 38
Ravenswood, WV 26164
My Commission Expires January 07, 2025

DEP to Hold Public Meeting and Extend Public Period

The West Virginia Department of Environmental Protection's Division of Air Quality (DAQ) will hold a virtual public meeting on Thursday, July 20, 2023, to provide information and receive comments regarding Thunder Mountain Environmental Services LLC's air quality permit application. Thunder Mountain Environmental Services has proposed to construct a waste to energy facility, which will consist of converting medical waste to a synthetic gas by means of a gasifier, to be located at 5334B Point Pleasant Road, Ravenswood, Jackson County, West Virginia, at 39.923499 latitude and -81.795688 longitude.

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To participate online or by telephone, registration is required by 5:00 p.m. on Thursday, July 20, 2023. To register, please complete the registration form at: https://forms.gle/u5KFk3Y3REATHgDE8. To register to provide oral comments, please indicate "yes" you want to provide oral comments on the record when you register. A confirmation email will be sent with information on how to join the public meeting. If you do not have internet access and want to register to participate via telephone, please contact Nicole Ernest at (304) 926-0499 x41256. Oral comments are limited to five (5) minutes. Video demonstrations and screen sharing by commenters is not permitted.

Written comments must be received by 5:00 p.m. on Thursday, July 27, 2023:

Email written comments to Edward.S.Andrews@wv.gov with "Thunder Mountain Environmental Services Comments" in the subject line, or

Mail hard copy comments to Edward Andrews, WV Department of Environmental Protection, Division of Air Quality, 601 57th Street, SE, Charleston, WV 25304.

Meeting Format 7/14/2023

Wednesday, July 19, 2023 3:14 PM

Andrews, Edward S <edward.s.andrews@wv.gov>

RE: Thunder Mountain Public Meeting

1 message

bryanf@resllc.net <bryanf@resllc.net> Fri, Jul 14, 2023 at 12:48 PM
To: "\"Andrews, Edward S\" <edward.s.andrews@wv.gov>" <edward.s.andrews@wv.gov>
Cc: "rhanshaw@bowlesrice.com" <rhanshaw@bowlesrice.com>, "a031313@wv.gov" <a031313@wv.gov>, "beverly.d.mckeone@wv.gov" <beverly.d.mckeone@wv.gov>, "terry.a.fletcher@wv.gov" <terry.a.fletcher@wv.gov>

Ed – Thank you. That is very helpful and gives me a full understanding of the process. Have a great weekend.

Best

Bryan

From: Andrews, Edward S <edward.s.andrews@wv.gov>
Sent: Friday, July 14, 2023 12:17 PM
To: bryanf@resllc.net
Cc: Roger Hanshaw <rhanshaw@bowlesrice.com> <rhanshaw@bowlesrice.com>; Crowder, Laura M <a031313@wv.gov>; Beverly D Mckeone <beverly.d.mckeone@wv.gov>; Terry A Fletcher <terry.a.fletcher@wv.gov>
Subject: Re: Thunder Mountain Public Meeting

Bryan,

The primary purpose of our public meetings is to allow the public an opportunity to make oral comments on the record in accordance with 45CSR13-9. Thus, any one (individual or individual representing on behalf of an organization) will be given the opportunity to make oral comments for up to five minutes. Remember this is the DEP public meeting with the purpose of satisfying the DAQ obligation with Rule 13 (45CSR13).

The DEP does not take or allow anyone (third party or applicant) electing to make comments on the record to request the specific order (e.g., first or last) in which their comments are to be made. The DEP calls on individuals/organizations to make oral comments based on the order that individuals or organizations register or sign-in (first come bases) at the events (public meetings).

Registered Individuals cannot defer their time to others in effort to extend the total time for one to increase the time loted to make comments.

Also, the DEP does not allow or require applicants to respond to any oral comments made on the record during the public meeting.

Before taking oral comments, the DAQ will allow an opportunity for individuals or organizations to ask questions regarding the application, permitting process, air quality issues, etc., which the DAQ may defer to an applicant's technical expert (if he/she is available) if the DAQ feels a question(s) should be addressed towards the applicant. The applicant does not have to provide an answer. If a question appears to be a comment, the DAQ will not answer it and will ask the individual to make a comment on the record.

The primary purpose of our public meetings is to allow the public (anyone who wishes to make oral comments) an opportunity to make oral comments on the record in accordance with 45CSR13-9.

Should you have any questions, please let me know.

Ed

On Fri, Jul 14, 2023 at 10:28 AM bryanf@resllc.net <bryanf@resllc.net> wrote:

> Ed – Good morning. Can you please let us know if you or someone else will be facilitating this meeting? Also, we have been in discussions with how we will participate. After some discussion, I would like to request that DAQ provide me the opportunity to be the last to speak at the meeting. Please let me know if you are agreeable to that. Thanks
>
> Bryan
>
> ---
>
> **From:** Andrews, Edward S <edward.s.andrews@wv.gov>
> **Sent:** Friday, July 7, 2023 9:46 AM
> **To:** Edward S Andrews <edward.s.andrews@wv.gov>
> **Subject:** Thunder Mountain Public Meeting
>
> To Whom it may concern,
>
> In response to a request received within the public comment period for Permit Application R13-3563, the DAQ has scheduled a virtual public meeting at 6:00 pm on Thursday, July 20, 2023. Please see the attachment for details on how to register for this event.
>
> The DAQ will continue to accept written comments regarding this application until 5:00 PM on Thursday, July 27, 2023.
>
> Should you have any questions or concerns about this notice/public meeting, please let me know.
>
> Thanks
>
> Ed
>
> --

Edward Andrews, P.E.

Engineer

WVDEP/Division of Air Quality

304-926-0499 Ext 41244

601 57th Street, SE

Charleston, WV 25304

--

Edward Andrews, P.E.

Engineer

WVDEP/Division of Air Quality

304-926-0499 Ext 41244

601 57th Street, SE

Charleston, WV 25304

DHHR Permit 7/19/2023

Wednesday, July 19, 2023 3:33 PM

Andrews, Edward S <edward.s.andrews@wv.gov>

Re: Thunder Mountain Environmental Services - App(s) with the DHHR

1 message

Gorbey-Michael, Donna R <donna.r.gorbey-michael@wv.gov> Wed, Jul 19, 2023 at 1:01 PM
To: "Andrews, Edward S" <edward.s.andrews@wv.gov>

They have filed an Alternative Treatment Application which I have requested more information on. I have not heard back from them yet. I believe that has been about a month ago. No permits have been approved from this office to date.

On Wed, Jul 19, 2023 at 12:47 PM Andrews, Edward S <edward.s.andrews@wv.gov> wrote:

> Donna,
>
> What applications/requests does Thunder Mountain have with your office?
>
> If so, what is the status regarding these applications?
>
> Has the DHHR issued an intent or final actions on any applications submitted by Thunder Mountain?
>
> My Director will most likely want to know before our public meeting.
>
> BTW: We are having a public meeting on Thunder Mountain's construction application with the DAQ tomorrow at 6 pm.
>
> Ed
> --
> Edward Andrews, P.E.
> Engineer
> WVDEP/Division of Air Quality
> 304-926-0499 Ext 41244
> 601 57th Street, SE
> Charleston, WV 25304

--
Donna Gorbey-Michael, R.S.
Infectious Medical Waste Program
Fairmont District Office
416 Adams Street, Suite 530
Fairmont, WV 26554
304.368.2530

DWWM 7/19/2023

Wednesday, July 19, 2023 3:38 PM

Andrews, Edward S <edward.s.andrews@wv.gov>

Fwd: Mail

1 message

Lockhart, John V <john.v.lockhart@wv.gov> Wed, Jul 19, 2023 at 1:11 PM
To: Edward S Andrews <edward.s.andrews@wv.gov>
Cc: Yogesh P Patel <yogesh.p.patel@wv.gov>, Michael P Hofe <michael.p.hofe@wv.gov>, "Flenner, Bill" <bflenner@psc.state.wv.us>, Richard A Boehm <richard.a.boehm@wv.gov>, Joseph McCarthy <joe.mccarthy@aecom.com>

This is the last thing I received...

John

---------- Forwarded message ---------
From: **Bandy, Jeremy W** <jeremy.w.bandy@wv.gov>
Date: Wed, Oct 19, 2022 at 10:10 AM
Subject: Fwd: Mail
To: Yogesh P Patel <yogesh.p.patel@wv.gov>, John V Lockhart <john.v.lockhart@wv.gov>, Brad M Wright <Brad.M.Wright@wv.gov>

FYI

---------- Forwarded message ---------
From: **Hudson, Marcy D** <marcy.d.hudson@wv.gov>
Date: Wed, Oct 19, 2022 at 10:06 AM
Subject: Mail
To: Jeremy W Bandy <jeremy.w.bandy@wv.gov>

Jeremy,

I received the attachment in the mail today.

Thanks,

Marcy Hudson

Executive Secretary

WV Dept. of Environmental Protection

601 57th Street, SE

Charleston, WV 25304

304-414-3733 (phone)

304-926-0447 (fax)

Bowles Rice - Thunder Mountain.pdf
652K

Bowles Rice - Thunder Mountain

Bowles Rice
Attorneys at Law

600 Quarrier Street, Charleston, WV 25301
P.O. Box 1386, Charleston, WV 25325-1386
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James V. Kelsh
jkelsh@bowlesrice.com
T 304.347.1135
F 304.343.3058

101 South Queen Street
Martinsburg, WV 25401

125 Granville Square, Suite 400
Morgantown, WV 26501

501 Avery Street
Parkersburg, WV 26101

Southpointe Town Center
1800 Main Street, Suite 200
Canonsburg, PA 15317

480 West Jubal Early Drive, Suite 130
Winchester, VA 22601

bowlesrice.com

October 14, 2022

CERTIFIED MAIL

Harold Ward
West Virginia Secretary of Environmental Protection
Department of Environmental Protection
601 57th Street SE
Charleston, West Virginia 25304

Re: Thunder Mountain Environmental Services, LLC

Dear Secretary Ward:

Enclosed please find a copy of the pre-siting notice regarding an October 13, 2022 Application for Commercial Infectious Medical Waste Processing Facility which was filed on behalf of Thunder Mountain Environmental Services, LLC, with the West Virginia Department of Health and Human Resources, pursuant to 64 WVCSR Series 56.

Should you have any questions regarding this notice or the Application, please contact me.

Very truly yours,

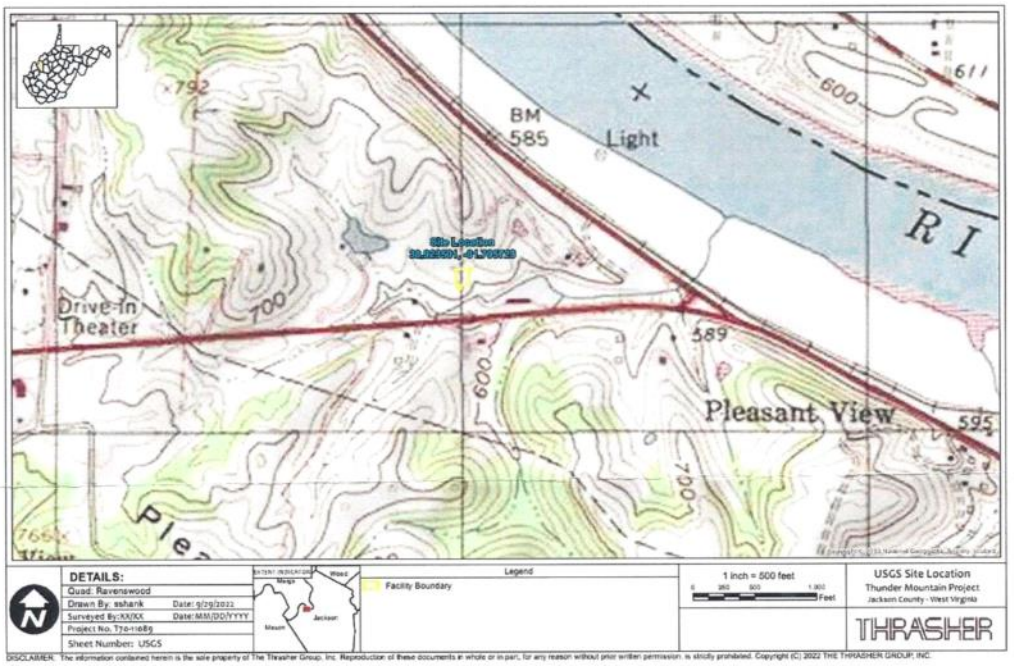
James V. Kelsh

JVK:tlp
Enclosure

15175259.1

64 WVCSR Series 56, §11.9 Pre-Siting Notice

On October 13, 2022, Thunder Mountain Environmental Services, LLC, filed an application with the West Virginia Department of Health and Human Resources, Bureau for Public Health, to install an infectious medical waste management facility approximately 0.36 acres in size at the Belt Center, Inc., 5334 Point Pleasant Road, Ravenswood, WV 26164



The proposed facility is expected to receive 7-20 tons daily of infectious medical waste from within West Virginia and from other states. Medical waste received at the facility will be treated by a gasification process.

When the Secretary of the Department of Health and Human Resources determines that Thunder Mountain Environmental Services, LLC's application is complete, the Department will require Thunder Mountain Environmental Services LLC to provide public notice of the date, time and place of a public hearing to be held in Jackson County, WV, the means by which citizens can file written comments with the Department, and the places where a copy of the application may be inspected.

Thunder Mountain Environmental Services, LLC
1800 Diagonal Rd., Ste. 600
Alexandria, VA 22314
(561) 310-2482
bryanf@resllc.net
15173500.1

Comments SC 7/19/2023

Wednesday, July 19, 2023 3:41 PM

Andrews, Edward S <edward.s.andrews@wv.gov>

Comments on R13-3563 permit for Thunder Mountain Environmental Services

1 message

James Kotcon <jkotcon@gmail.com> Wed, Jul 19, 2023 at 3:35 PM
To: "Andrews, Edward S" <edward.s.andrews@wv.gov>

See attached comment letter.

Jim Kotcon

SC comments on R13-3563-7-19-23.docx
89K

SC comments on R13-3563-7-19-23

Sierra Club
West Virginia Chapter
P.O. Box 4142
Morgantown, WV 26504

July 19, 2023

Ed Andrews
WV Department of Environmental Protection
Division of Air Quality
601 57th St. S.E.
Charleston, WV 25304

Via e-mail to: edward.s.andrews@wv.gov

Re: Comments on proposed air permit R13-3563 for Thunder Mountain Environmental Services, LLC, Ravenswood, WV

Dear Mr. Andrews:

Please accept the following comments on behalf of the West Virginia Chapter of Sierra Club.

The air pollution permit for the infectious medical waste facility proposed for Ravenswood, WV by Thunder Mountain Environmental Services LLC (TMES) should be denied. The draft permit allows TMES to process over 7,000 tons (1,666 lbs. per hour) of infectious medical waste per year. Disposal of infectious medical waste in West Virginia is strictly regulated by the WV Department of Health under 64-CSR-56, and section 11.2 of that rule clearly prohibits "incineration technology in any form, including the manufacture of refuse-derived fuel in any form" as a disposal method in commercial medical waste facilities. The Engineering Evaluation explicitly states that "some level of combustion will occur". It would be inappropriate for WV-DAQ to issue a permit for a commercial facility that is clearly illegal.

Should WV-DAQ choose to issue a permit in spite of this, the following terms and conditions should be addressed:

1) According to the air dispersion modeling report posted on the DEP website (Application page 603 on ApplicationXtender, submitted Dec. 14, 2022), the air modeling uses weather data from the Parkersburg, WV Airport. That site seems highly inappropriate as it is a hilltop location, whereas the TMES site is in a valley. The TMES smokestack is listed (Table 1) as 60 feet tall, but surrounding ridges are well over 100 feet above the facility. We disagree with the conclusion in the Engineering Evaluation (page 14) that the TMES evaluation of control technologies and dispersion modeling was "sufficient" with respect to siting requirements. **WV-DAQ must require at least one year of on-site meteorological data for dispersion modeling before considering a permit.**

2) West Virginia frequently experiences temperature inversions which trap pollutants close to the ground. That is especially true in valleys such as occur at the TMES site. Under those conditions, wind speed drops to zero for extended periods, and negligible pollutant dispersion occurs. **WV-DAQ must require air dispersion modeling protocols that account for extended periods of zero wind speed.**
3) The BACT Analysis refers to a "BACT Mythology" on the title page. While that appears to be a typo and apparently should refer to BACT Methodology, inadequate proofreading on the title page does not convey confidence that more substantive errors occur. Indeed, other examples of typographical errors occur throughout the BACT Analysis report, in some cases, to the point that the meaning is unintelligible. **Before issuing a permit, WV-DAQ should independently and carefully evaluate the BACT analysis and should not accept this analysis as valid without such an independent review.**
4) The BACT Analysis does not consider process changes, but no rationale is offered for rejecting process changes. Analyses of cost and pollution control efficacy may identify cost-effective alternatives to the proposed gasification process. That is especially true for Hazardous Air Pollutants such as heavy metals and dioxins. **Since gasification of medical waste is novel and therefore uncommon, and since medical waste is a highly heterogenous fuel, an evaluation of alternative processes must be required.**
5) The BACT Analysis concludes that Selective Non-Catalytic Reduction for NOx was technically feasible, but not cost-effective. However, the report identifies a cost of only $7,246 per ton, which seems to be in the range of cost-effectiveness for such a facility. Given that the gasification process is relatively novel and that the estimates of NOx emissions are highly uncertain, the use of "Good Combustion Practices" alone does not seem to be adequate. **WV-DAQ should require SNCR for NOx control in this permit.**
6) The BACT Analysis concludes that Co-oxidation Catalysis and a Thermal Oxidizer are not cost-effective for VOCs, however, no cost analysis was provided. **WV-DAQ should require a more complete BACT analysis before ruling out these technologies, particularly since they may provide additional control for dioxins and/or furans.**
7) The BACT Analysis concluded that the Dry FGD scrubber was BACT for this site, in part because "water is a precious commodity for this particular site". That makes little sense as the site is less than 0.3 mile from the Ohio River, and several other facilities operate nearby. While the CFB Dry FGD proposed by TMES projects a control efficiency of 98 %, **WV-DAQ should require a more complete BACT Analysis including a more detailed evaluation of wet scrubbing as a potential control option.**
8) The BACT Analysis for greenhouse gases rejects Carbon Capture and Sequestration, and concludes that energy efficiency measures are the only feasible option. We note that the application claims the energy produced is "renewable" however most comes from various plastics and other materials derived from fossil fuels, and is therefore not "renewable" energy. The potential for greenhouse gas offsets (tree planting and similar practices) or use of renewable energy sources was not discussed. The draft permit does not include any requirements for such efficiency measures, and merely requires monitoring for select greenhouse gases. **We recommend that GHG limits be included, and that requirements for energy efficiency practices be required. We also recommend that greenhouse gas offsets be required.**
9) Section 4.1.1.a. specifies wastes that shall not be accepted, however, there do not appear to be adequate monitoring protocols to enforce those provisions. How will WV-DAQ or TMES assure that radioactive waste or Prion infected wastes are not included? As written, these provisions are unenforceable. **The permit should include monitoring**

requirements prior to a shipment reaching the unloading dock, enforceable provisions to require that loads be rejected and returned to their source, and reporting requirements to document each instance where this occurs.

10) Dioxins. Section 4.1.3.a. viii establishes an emissions limit for dioxins of 9.3 ng/cubic meter. That limit appears to be based on levels allowed for waste incinerators, but a gasifier should have much lower emissions. The analysis submitted by the applicant (Report to Nathaniel Energy Corporation) showed levels of 0.0046 to 0.0123 ng/cubic meter. The European Union established limits for incineration of 0.1 ng/cubic meter (https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32019D2010&from=EN). It is not clear why such high dioxin levels are permitted for TMES. **We recommend that the permit be revised to lower the allowable dioxin levels to 0.1 ng/cubic meter and lower if lower limits are feasible.**
11) Visible emissions. Permit condition 4.1.3.b states that "The permittee shall cause to be discharged into the atmosphere visible emissions of combustion ash or char from an ash conveying system (including conveyor transfer points) **in excess of 5 percent** of the observation period …"(emphasis added). This does not appear to limit emissions, and appears to mandate excessive emissions. Is this a typographical error? It appears to contradict the preceding provision (4.1.3.a.xiv.) that visible emissions shall not exceed 6 % opacity. **The sentence must be clarified to require limits to emissions and that they be reduced to the maximum extent feasible.**
12) Section 4.2.4. Typographical. Should the word "in" be inserted after the words "free carbon is" in the first sentence?
13) The application indicates that bottom residuals (ash) would be washed out and solids sent to an approved disposal facility. It is not clear how that would work. **We recommend that language be added to make the air permit conditional on obtaining an NPDES permit, and approval of a Ground Water Protection Plan, as appropriate.**
14) **We also recommend that language be added to make the air permit conditional on approval of a permit from the WV Dept. of Health and Human Resources as a Commercial Infectious Medical Waste Facility**.
15) Finally, the disposal of the incineration/gasification solid waste has the potential to contain significant amounts of heavy metals, products of incomplete combustion (organic and inorganic) and other hazardous materials. While the TCLP test has been commonly used, it is insufficient. **We recommend adding language making the permit conditional on residuals meeting criteria for methods such as EPA Methods 1311, 1312, and 1320, and, if needed, the appropriate Hazardous Waste permitting.**

We appreciate the opportunity to provide these comments. Please feel free to contact us if we can offer clarification.

Sincerely,

James Kotcon

James Kotcon, Chair
West Virginia Chapter of Sierra Club
304-594-3322 (cell)
jkotcon@gmail.com