ACRONYM LIST

CBI	Confidential Business Information	NO_x	Oxides of Nitrogen
Cd	Cadmium	O_2	Oxygen
CEMS	Continuous Emissions Monitoring System	OTS	Other Sulfur Compounds
CO	Carbon Monoxide	PAH	Polycyclic Aromatic Hydrocarbon
ESP	Electrostatic Precipitator	Pb	Lead
FF	Fabric Filter	PM	Particulate Matter
HAP	Hazardous Air Pollutant	PM10	PM with diameters 10 micrometers and smaller
HCl	Hydrogen Chloride	PM2.5	PM with diameters 2.5 micrometers and smaller
Hg	Mercury	RATA	Relative Accuracy Test Audit
ICR	Information Collection Request	SCR	Selective Catalytic Reduction
NAICS	North American Industry Classification System	SNCR	Selective Non-catalytic Reduction
NESHAP	National Emission Standards for Hazardous Air Pollutants	SO_2	Sulfur Dioxide
NMHC	Non-methane Hydrocarbon	TOC	Total Organic Carbon
NSPS	New Source Performance Standards	VOC	Volatile Organic Compounds

DEFINITIONS: For the purposes of this ICR only, the following terms have been defined:

- **Batch** means, for the purposes of this survey, a pyrolysis or gasification unit designed so it can only process a discrete quantity of feedstock at a time because the design does not allow feedstock to be fed to the unit and/or char to be removed during the process. After each batch, the equipment is generally emptied before a fresh batch is started.
- **Commercial/industrial/institutional use** means, for the purposes of this subpart, a gasification or pyrolysis process that operates to provide a valuable material processing service and/or produces syngas, char and other hydrocarbon streams as part of a facility's normal operations and is not being used solely for research and development purposes.
- **Continuous** means, for the purposes of this survey, a pyrolysis or gasification unit designed so that it can process material without interruption, with feedstock entering and products leaving the process equipment continually during operation. For monitoring, continuous means that process parameter data are automatically measured continuously while the process is operating (usually for a short interval of time, such as every 10 seconds) and stored for future evaluation.

- **Emission release point** means the vent or stack to the atmosphere for the entire process associated with the gasification, pyrolysis and/or combustion unit (e.g., thermal oxidizer, flare, etc.).
- **Gasification unit** means, for the purposes of this survey, equipment that converts feed materials (primarily carbonaceous) into syngas (carbon monoxide and hydrogen) and carbon dioxide. The materials are gasified when they react with controlled amounts of oxygen or steam at high temperatures.
- **Halogenated compounds** are defined as organic Hazardous Air Pollutant (HAP) compounds that contain halogen atoms (atoms of chlorine, fluorine or bromine)**.**
- **Heat recovery** means the process of recovering heat from the combustion flue gases outside of the combustion firebox by convective heat transfer only.
- **Heavy Metals** are defined as metallic elements with high atomic weights; (e.g., mercury, chromium, cadmium, arsenic, and lead); can damage living things at low concentrations and tend to accumulate in the food chain.
- **Hospital waste** means discards generated at a hospital, except unused items returned to the manufacturer. The definition of hospital waste does not include human corpses, remains, and anatomical parts that are intended for interment or cremation.
- **Institutional facility** means a land-based facility owned and/or operated by an organization having a governmental, educational, civic, or religious purpose such as a school, hospital, prison, military installation, government facility, church or other similar establishment or facility.
- **Municipal solid waste** means refuse (and refuse-derived fuel) collected from the general public and from residential, commercial, institutional, and industrial sources consisting of paper, wood, yard wastes, food wastes, plastics, leather, rubber, and other combustible materials and non-combustible materials such as metal, glass and rock, provided that the term does not include industrial process wastes or medical wastes that are segregated from such other wastes.
- **Pyrolysis unit** means for the purposes of this survey, equipment that thermally decomposes or rearranges materials under process conditions where extremely little to no oxygen is present.
- **Refuse-derived fuel** means a type of municipal solid waste produced by processing municipal solid waste through shredding and size classification. This includes all classes of refuse-derived fuel including two fuels:

  (1) Low-density fluff refuse-derived fuel through densified refuse-derived fuel.

  (2) Pelletized refuse-derived fuel
- **Semi-continuous** means a process where that is neither batch or continuous. An example could be a process where feedstock may be fed into the gasification or pyrolysis unit in a series of batches, but the products leave the process continuously.
- **Small entity means**:

  (1) A small business that is an ultimate parent entity in the regulated industry that has annual receipts as identified in Table 1 below.

  (2) A small governmental jurisdiction that is a government of a city, county, town, school district or special district with a population of less than 50,000; or

  (3) A small organization that is any not-for-profit enterprise that is independently owned and operated and is not dominant in its field.

Table 1. Small Business Classification for Small Businesses for this Survey

NAICS Codes[1,2]	NAICS Industry Description	Size Standards in millions of dollars	Size standards in number of employees
114	Fishing, Hunting and Trapping	6-22[3]	Not Applicable
211	Oil and Gas Extraction	Not Applicable	1,250
212	Mining except oil and gas	Not Applicable	250-1,500 [3]
221	Utilities	16.5-30[4]	250-1,000 [3]
321	Wood Product Manufacturing	Not Applicable	250-1,250 [3]
322	Paper Manufacturing	Not Applicable	500-1,250 [3]
325	Chemical Manufacturing	Not Applicable	500-1,250 [3]
326	Plastics and Rubber Products Manufacturing	Not Applicable	500-1,500 [3]
327	Nonmetallic Mineral Product Manufacturing	Not Applicable	500-1,500 [3]
337	Furniture and Related Product Manufacturing	Not Applicable	500-1,000 [3]
486	Pipeline Transportation	30-40.5 [5]	1,500[6]
541710	Research and Development	Not Applicable	Not Applicable
562213	Solid Waste Combustors and Incinerators	41.5	Not Applicable
6111	Elementary and Secondary Schools	12	Not Applicable
6112	Junior Colleges	22	Not Applicable
6113	Colleges, Universities, and Professional Schools	30	Not Applicable
622110	General Medical and Surgical Hospitals	41.5	Not Applicable
622310	Specialty Hospitals	41.5	Not Applicable
7121	Museums, Historical Sites and Similar Institutions	8-30 [3]	Not Applicable

[1] North American Industry Classification System.
[2] Small business size standards are not established for NAICS codes starting with 92 (Public administration). Establishments in the Public Administration Sector are Federal, state, and local government agencies that administer and oversee government programs and activities that are not performed by private establishments.
[3] Range represents the range of size standards for the more specific NAICS codes beyond the 3- or 4-digit codes shown, e.g., 221117 (for biomass electric power generation) small business size standard is 250 employees, while 221310 (for natural gas distribution) small business size standard is 1,000 employees.
[4] Size standard in millions of dollars applies only to NAICS codes 221310, 221320, and 221330.
[5] Size standard in millions of dollars applies only to NAICS codes 486210 and 486990.
[6] Size standard in number of employees applies to NAICS codes 486110 and 486910.

- **Solid waste** means any garbage, or refuse, sludge from a wastewater treatment plant, water supply treatment plant, or air pollution control facility and **other discarded material**, including solid, liquid, semi-solid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations, and **from community activities**, but does not include solid or dissolved materials in domestic sewage, or solid or dissolved materials in irrigation return flows or industrial discharges that are point sources subject to permit under 33 U.S.C. 1342, or source, special nuclear, or by-product material as defined by the Atomic Energy Act of 1954, as amended (68 Stat. 923).

- **Supplemental firing** means that a burner combusts auxiliary fuel within the duct prior to the waste heat recovery unit for additional heat input.

- **Usage Types** (Used in Part III, Section C, question 18)

  (1) Primary — fuel, waste, or other material that provides the largest fraction of heat input on an annual basis.
  (2) Startup — material used for unit startup.

  (3) Auxiliary — material used to augment the primary fuel when heat input demand exceeds the supply of primary fuel, accounts for ≤15% of the instantaneous heat input.

PART I. OWNER/FACILITY INFORMATION

1. Pyrolysis/Gasification Unit

We believe that your company owns or operates at least one pyrolysis or gasification unit that is used to process solid or semi-solid feedstocks, including solid waste (*e.g.,* municipal solid waste, commercial and industrial waste, hospital and medical waste, sewage sludge, and other solid waste), biomass, plastics, tires, and organic contaminants in soils and oily sludges. **If you believe that this survey does not pertain to you, please indicate your reason below:**

☐ Pyrolysis/gasification unit is permanently shut down. Please identify the date the unit was shut down.

_____

☐ No pyrolysis/gasification unit located at this facility.

If your company owns or operates at least one pyrolysis or gasification unit then provide the following information:

2. Name of Owner: Brightmark

a. Physical Address: 1725 Montgomery St.

b. City: San Francisco

c. State (if in U.S.): CA

d. Zip: 94111

e. County (if in U.S.): San Francisco

f. Country (if not in U.S.): _____

3. Is the mailing address of the Owner different than the physical address?

☐ Y ☑ N

If Yes, then provide the following:

a. Mailing Address: _____

b. City: _____

c. State (if in U.S.): _____

d. Zip: _____

e. County (if in U.S.): _____

f. Country (if not in U.S.): _____

4. Complete street address of facility owned (physical location) where the unit is located:

a. Physical Address: 3240 West 800 South

b. City: Ashley

c. State: Indiana

d. Zip: 46705

e. County: Steuben

5. Is the mailing address of the facility different than the physical address where the unit is located?:

☐ Y ☒ N

If Yes, then provide the following:

a. Mailing Address: _____

b. City: _____

c. State: _____

d. Zip: _____

e. County: _____

6. Is the operator of the facility different than the owner?

☐ Y ☑ N

If Yes, then provide the following for the operator:

a. Mailing Address: _____

b. City: _____

c. State: _____

d. Zip: _____

e. County: _____

7. Facility/ Facilities Contact (Contact is a person who is able to answer questions about responses in the survey):

a. Name (First Name, Last Name): Bob Powell

b. Title: Founder and CEO

c. Telephone Number: ( ) _____ Ext _____

d. Fax Number: ( ) _____

e. E-mail: info@brightmark.com

8. Facility Description

Check all boxes that apply to the nature or purpose of the facility where the Pyrolysis/Gasification Unit is located:

- ☐ Electric power generation facility
- ☐ Medical center, hospital, or medical research laboratory
- ☐ Federal/state/local government service or branch other than wastewater treatment plant or municipal waste combustion facility (e.g., state correctional facility, state park, etc.)
- ☐ Commercial or government municipal waste combustion facility
- ☐ Chemical manufacturing facility
- ☐ Research and development facility
- ☐ Wastewater treatment plant
- ☐ Recycling facility
- ☐ Stand-alone waste treatment facility using pyrolysis or gasification
- ☐ Chemical or hazardous waste management facility with thermal desorption units using pyrolysis
- ☐ Manufacturing liquid petroleum products from recycling and deconstruction of end-of-life
- ☒ Other. Specify the purpose of the facility Plastics through pyrolysis

9. What is the NAICS code for the facility? 324199 - All other petroleum and coal products manufacturing

A complete list of NAICS codes is available through the NAICS Association (http://www.naics.com/search.htm). The following are examples and not an exhaustive list:

541700	**Research and Development Services**	**611310**	**Colleges, Universities, and Professional Schools**
562213	**Solid Waste Combustion Incinerators**	**622110**	**General Medical and Surgical Hospitals**

PART II. FACILITY/BUSINESS INFORMATION

Please complete the following questions for each facility or business that has a pyrolysis/gasification unit as defined in the definitions section that is used to process solid or semi-solid feedstocks, including solid waste (*e.g.,* municipal solid waste, commercial and industrial waste, hospital and medical waste, sewage sludge, other solid waste), biomass, plastics, tires, and organic contaminants in soils and oily sludges.

Please identify clearly any response(s) that you consider to be confidential business information (CBI). Any responses not so identified will be included in a publicly available database. Refer to Enclosures 3, 4, 5, and 6 for more information on the treatment of CBI and a list of information you may be asked to submit later to substantiate a claim of confidentiality.

1. For facilities that process municipal solid waste, plastics or sewage sludge, the population (number of people) served by facility where the unit(s) is located. Check one

❑ <500 ❑ 500-1,000 ❑ 1,000-10,000 ❑ 10,000-50,000 ❑ 50,000-100,000
❑ 100,000-500,000 ❑ >500,000 ❑ Unknown

2. Are you (check one):

☑ privately owned ❑ part of a larger private corporate entity
❑ part of a joint venture ❑ publicly owned

a. If the facility is privately owned or part of a larger corporate entity, provide the following:

i. Name of Global Parent Company: Please refer to Part I, Question 2

ii. Total number of employees at the facility: _____

iii. Total number of employees at the parent company: _____

b. If the facility is operated under a joint partnership, provide the following for each partner:

Partner name	Percent Ownership	Number of employees
Not applicable		

c. If the facility is publicly owned, what is the population of the local government entity (city, county, town, school district) that owns the facility? _____

3. Is the owner a small entity as defined in the definitions section?

❑ Y ❑ N ☒ Unknown

4. What is the annual revenue for the owner of the facility operating the pyrolysis/gasification unit? n/a

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Pyrolysis/Gasification Unit ID PCU-1

PART III. PYROLYSIS/GASIFICATION UNIT SPECIFIC INFORMATION

Please complete the following questions for each pyrolysis/gasification unit as defined in the definitions section that is used to process solid or semi-solid feedstocks, including solid waste (*e.g.,* municipal solid waste, commercial and industrial waste, hospital and medical waste, sewage sludge, other solid waste), biomass, plastics, tires, and organic contaminants in soils and oily sludges.

- Make additional copies of Part II for each pyrolysis/gasification unit.
- Please complete every question. If you do not know an answer, please enter "unknown". If the question is not applicable to your pyrolysis/gasification unit, please enter "NA".

Please identify clearly any response(s) that you consider to be confidential business information (CBI). Any responses not so identified will be included in a publicly available database. Refer to Enclosures 3, 4, 5, and 6 for more information on the treatment of CBI and a list of information you may be asked to submit later to substantiate a claim of confidentiality.

A. UNIT INFORMATION

1. **Supply a unique identification code for each pyrolysis/gasification unit (e.g., PYU1, PYU2, GU1, GU2etc). The ID should be included at the top of every page associated with the pyrolysis/gasification unit:**

   PCU-1

2. **Is the pyrolysis/gasification unit for commercial/industrial/institutional use or used solely for research and development?**

   ☑ Commercial/Industrial/Institutional use ❑ Research and Development

3. **Provide the following information for each pyrolysis/gasification unit, if known:**

   a. Manufacturer : Brightmark

   b. Model number: NA - Custom manufactured

   [ATTACH a copy of the manufacturer's brochure/specifications, if available.]

   c. Primary purpose for the unit (e.g., to convert municipal solid waste into syngas): Manufacturing of petroleum compou nds from pyrolysis of end-of-life plastics

   d. Year unit was fabricated: 2020

   e. Year unit was installed/constructed at facility: 2020/2021

   f. Year unit started normal operation: Not yet commissioned

   g. Original capital cost of the unit:

   h. Remaining useful life of the unit (years): 20

   i. Is the unit stationary (in one place), or portable (able to be moved around)?

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Pyrolysis/Gasification Unit ID PCU-1

☐ Stationary ☐ Portable

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Pyrolysis/Gasification Unit ID PCU-1

4. Briefly describe the primary purpose and design characteristics of the pyrolysis/gasification unit (e.g., indirect heated gasifier or pyrolysis chamber in combination with a thermal oxidizer):

Pyrolysis unit converting end-of-life plastics to petroleum products

5. If unit is a pyrolysis unit, identify the type of process:

☒ Thermal pyrolysis/cracking ☐ Catalytic pyrolysis/cracking ☐ Hydrocracking

☐ Other, specify _____

☐ Not applicable, unit is a gasification unit.

6. If unit is a gasification unit, identify the design type from:

☐ Updraft fixed bed gasifier ☐ Downdraft fixed bed gasifier ☐ Bubbling fluidized bed gasifier

☐ Circulating fluidized bed gasifier ☐ Other, specify _____

☑ Not applicable, unit is a pyrolysis unit.

7. Is the pyrolysis/gasification unit operated continuously, semi-continuously, or as a batch process? Refer to definitions.

☑ Continuously ☐ Semi-continuous ☐ Batch

a. If batch, typical charge weight per batch: _____

Unit of measure: _____

b. If batch, typical batch time: _____

Unit of measure: _____

c. If not batch, typical feed rate: 6000 pounds

Unit of measure: plastics per hour

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[If no box is checked, EPA will assume that the page does NOT contain CBI]

Pyrolysis/Gasification Unit ID PCU-1

8. **Provide the pyrolysis/gasification unit design capacity and unit of measure (e.g., dry pounds of materials per hour or per day) for the design capacity. Design capacity is the maximum amount of material that can be entered into the pyrolysis/gasification unit per batch, or hourly or daily.**

   Unit design capacity: 6000 pounds per hour

   Unit of measure: _____

9. **Typical number of hours the unit is operated:**

   a. Hours per day: 24

   b. Hours per month: _____

10. **Total number of hours the unit operated the previous 5 years:** Not applicable

    2020: _____ 2019: _____ 2018: _____

    2017: _____ 2016: _____

11. **Provide information about external heat applied to the pyrolysis or gasification unit:**

    a. Describe how external heat is applied to the pyrolysis or gasification unit to achieve pyrolysis or gasification in the pyrolysis or gasification zone of the unit. (e.g., electric kiln, natural gas, syngas combustion): Natural gas or syn gas combustion burners

    b. Is there a flame? X Y ❑ N

    c. If yes, is the flame directly applied to the feed? ❑ Y X N ❑Not applicable

12. **Provide the unit/reactor's maximum heat input and the unit of measure for the heat capacity. Maximum heat input is the maximum amount of thermal or electrical energy input or fuel a unit is able to combust or process in a given period, as stated by the manufacturer.**

    a. Maximum heat input of unit 6.0

    b. Unit of measure (e.g., BTU's/hour): MMBTU/Hr

13. **Provide information about unit operating conditions:**

    a. Gasifier/pyrolysis reactor chamber operating temperature, °F: 600-950

    b. Feedstock material residence time at or above temperature in 13.a, minutes: Variable

    c. Is unit temperature continuously recorded? ☒ Y ❑ N

    d. Air-to-fuel ratio within gasifier/pyrolysis reactor: Air is excluded

    e. Partial pressure of oxygen within gasifier/pyrolysis reactor: Trace amounts

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[If no box is checked, EPA will assume that the page does NOT contain CBI]

Pyrolysis/Gasification Unit ID _____

f. Is oxygen level within gasifier/pyrolysis reactor continuously recorded? ❑ Y ☒ N

g. Does the process use a catalyst? ❑ Y X N

h. Is the pyrolysis process conducted in a vacuum? ❑ Y X N

14. Provide information on the process parameters monitored to ensure proper operation of the pyrolysis or gasification unit:

a. What process parameters for the pyrolysis or gasifier chamber are monitored to ensure proper operation (e.g., temperature, oxygen to feed material ratio, partial pressure of oxygen):____Temperature, feed rate_____

b. Which process parameters are automatically controlled? __T, feed rate_____

c. What type of automatic controls are used? (e.g., Programmable Logic Controller): ____PLC_____

d. Which process parameters are manually controlled? _None during normal operation____

e. What type of manual controls are used? (e.g., manually control gate valves)_____None during normal operation_____

f. Which process parameters are controlled through another method?____None_____

g. For any parameters listed in 14.f., what type of controls are used?

_____

15. Provide a flow diagram of the major equipment associated with the pyrolysis/gasification unit and overall process, including but not limited to, equipment used to store material or fuel fed to the pyrolysis/combustion unit, equipment used for fuel or material preparation, equipment use to feed/transport fuel or material to the pyrolysis/gasification unit, equipment used to recover heat from the pyrolysis/combustion unit, equipment used to handle/transport end products (including recycled byproducts and ash), equipment used to combust syngas or material outputs from the pyrolysis/gasification unit (such as boilers, process heaters, gas turbines or engines, if process includes these units), syngas processing equipment, and air pollution control equipment (including flares and thermal oxidizers).

16. Provide information on heat/energy recovery for the pyrolysis/gasification unit

a. Does the process have heat/energy recovery? ☒ Y ❑ N

b. If no, describe what the syngas is being used for instead?_____

If yes, please complete questions c through h:

c. The type of heat/energy recovery used (e.g., heat exchanger, boiler, turbine, etc.)

_____

Please check one: This page includes CBI X This page does NOT include CBI ☐

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Pyrolysis/Gasification Unit ID PCU-1

d. How is the recovered heat/energy used (e.g., feedstock drying, combustion air for an incinerator, combustion air for a boiler, plume suppression, steam production for, processes heat, or building comfort heating, space heat, electricity production, etc.): Drying feedstock, process heat and preheating, steam production

e. Is any of the recovered heat or energy used for drying incoming feed materials or heating the pyrolysis or gasification unit? ❑ Y ❑ N

1. If yes, specify how much heat or energy is used for drying or heating the pyrolysis or heating the pyrolysis or gasification unit: _____

f. Is any of the recovered heat or energy sold to other entities? ❑ Y ☒ N

1. If yes, specify how much heat or energy produced is sold to other entities: (%) _____

2. Does the unit have heat or energy production agreements with other entities? ❑ Y ❑ N

g. Does the heat recovery unit have supplemental firing? ❑ Y ☒ N

h. Type of auxiliary fuel used? (if you answered "yes" to 16.f)

❑ Natural Gas ❑ Fuel Oil ❑ Other (please specify)

_____

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[If no box is checked, EPA will assume that the page does NOT contain CBI]

Pyrolysis/Gasification Unit ID PCU-1

B. REGULATIONS AND PERMIT INFORMATION

17. Provide information on regulations and permits that apply to the pyrolysis/gasification unit:

a. Is the unit or overall process currently subject to Federal regulations (an NSPS or NESHAP under 40 CFR part 60, 61, or 63)?

❑ Y X N ❑ Unknown

If Yes, then indicate the regulation _____

b. Is the pyrolysis/gasification unit subject to any non-federal emission limits? ☒ Y ❑ N

If Yes, provide the following information (example provided):

Pollutant[1]	Emission limit[2]	Emission limit units[3]	Averaging times[4]	Fuel/material burned the limit is based on[5]	Basis of limits[6]	Rule citation
PM	**0.05**	**lb/hr**	**Daily**	**Unknown**	**State rules**	
VOC	76.3	ton/yr	annually	syn gas re-used as fuel	State rules (FESOP)	

[1] Select the pollutant that is being controlled:

- Particulate Matter (PM)
- PM_{10}
- $PM_{2.5}$
- Cadmium (Cd)
- Mercury (Hg)
- Lead (Pb)
- Sulfur Dioxide (SO_2)
- Oxides of Nitrogen (NO_x)
- Carbon Monoxide (CO)
- Hydrogen Chloride (HCl)
- Dioxins/Furans
- Volatile Organic Compounds (VOC)
- Total Organic Carbon (TOC)
- Polycyclic Aromatic Hydrocarbons (PAH's)
- Other Sulfur compounds (OTS)
- Nonmethane hydrocarbon (NMHC)
- Other, specify _____

[2] Provide the numerical value of the emission limit.
[3] Provide the units of the emission limits, e.g., lb/hr, lb/year.
[4] Indicate the averaging times associated with the emission limit, e.g., 30 days, annually, daily.
[5] Provide information on the type of fuel or material burned the limit is based on, e.g., #1-7 resins, etc.
[6] Indicated why the limits are required, e.g., state rules, local rules, federal rules.

c. Are there permit limitations on the type or amount of material that can be fed into the unit?

❑ Y ☒ N

If Yes, describe the limitations: _____

[ATTACH a copy of your State, tribal or local air pollution agency permit.]

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[If no box is checked, EPA will assume that the page does NOT contain CBI]

Pyrolysis/Gasification Unit ID PCU-1

C. MATERIALS INPUT TO PYROLYSIS/GASIFICATION UNIT

18. Provide the following information on each type of material fed into the pyrolysis/gasification unit over the last 5 years (example provided).

Material input category[1]	Detailed input material description[2]	% of annual input to pyrolysis/gasification unit[3]	Material usage[4]
Recycled Plastic Materials	**Nos. 2, and 4-7**	**70**	**P**
	No. 1	**10**	**P**
	No. 3	**10**	**P**
Fuel	**Natural Gas**	**10**	**A**
Recycled Plastic	Numbers 1-7	100%	P
Fuel	Natural Gas	20%	**S**
	Non-condensable gas as fuel	80%	**P**

[1] Indicate the category of materials from the following list:

Bio-based resin (poly lactic acid)	Non-plastic municipal solid waste	Tires
Engineering grade plastics	Recycled plastic materials	Manure/Litter
Fuel	Soil/oily sludges	Municipal Solid Waste
Medical/infectious	Woody biomass	Other (specify)

[2] In each row provide a specific description of any and all materials burned (e.g., No. 3 plastic, natural gas, paper, etc.)

[3] Indicate the percentage of each detailed material burned annually on a mass basis. The summation should add up to 100%.

[4] Indicate whether the material burned is the primary (P) reason for the pyrolysis/gasification unit, material is used to startup (S) the pyrolysis/gasification unit, or material is auxiliary (A) material used to augment the primary material. See definitions for more description and examples.

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Pyrolysis/Gasification Unit ID PCU-1

19. Provide the following information on the material fed into the pyrolysis/gasification unit per year (example provided).

Detailed input material description[1]	Amount of input material fed per year					Unit of measure (e.g., tons, cubic feet, gallons)
	2020	**2019**	**2018**	**2017**	**2016**	
Nos. 2, and 4-7	**1000**	**800**	**Unknown**	**Unknown**	**Unknown**	**Tons**
No. 1	**400**	**400**	**Unknown**	**Unknown**	**Unknown**	**Tons**
No. 3	**400**	**400**	**Unknown**	**Unknown**	**Unknown**	**Tons**
Natural gas	**15000**	**12000**	**Unknown**	**Unknown**	**Unknown**	**Cubic feet**
The PCUs were	not operation	al until 2021	.			

[1] Copy information from question 18.

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[If no box is checked, EPA will assume that the page does NOT contain CBI]

Pyrolysis/Gasification Unit ID PCU-1

D. MATERIAL OUTPUT FROM UNIT AND EMISSIONS INFORMATION

20. Provide the following information about the outputs (i.e., products, by-products, intermediates, waste) from the pyrolysis/gasification unit per year (example provided).

Output material category[1]	Detailed output material description[2]	% of annual output[3]	Material usage[4]
Syngas		**70**	**80% rerouted to system; 20% flared.**
Liquid fuel product	**gasoline-diesel fuel blend**	**20**	**Sent offsite for further refinement.**
Char	**powdery residue**	**10**	**Landfilled.**

[1] Indicate the category of output material from the following list:

- Syngas
- Liquid fuel product
- Char
- Tar
- Black Carbon
- Other (specify, could include metals for recycling, if applicable)

[2] In each row provide a specific description of the output material (e.g., gasoline-diesel fuel blend, powdery residue, sludge with a heavy oil component, etc.).

[3] Indicate the percentage of each detailed output material created annually on a mass basis. The summation should add up to 100%.

[4] Briefly describe how the output material is used or disposed (e.g., recycled, chemical feedstock, landfilled, further refined, used on-site for energy/heating, sent off-site for energy/heating).

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Pyrolysis/Gasification Unit ID PCU-1

21. Provide the following information for each emission release point (each vent or stack to the atmosphere after all air pollution control devices) related to each pyrolysis/gasification unit and overall process (example provided). Enter unknown if information is not available.

Emission release point ID[1]	Description of release point[2]	Combined with other sources? Y/N[3]	Longitude of release point[4]	Latitude of release point[4]	Height of release point (ft)[5]	How many test ports available on stack?	Is stack round or rectangular?	Is there safe access to test location?	Exit temperature of the flue gas from release point (°F)	Diameter of the release point (ft)	Flow rate of the vent gas from the release point (acfm)
S1PYU1	**Combustion chamber stack outlet**	**N**	**35.7806 N**	**78.6389 W**	**12**	**2**	**Round**	**Y**	**1250**	**2.6**	**Unknown**
S2PYU1	**Cyclone stack outlet**	**N**	**35.7826 N**	**78.6399 W**	**6**	**2**	**Round**	**Y**	**650**	**0.6**	**Unknown**
R12001	PCU-1	N				2	Round	Y			
DC-1	Dust collector for shredding	N				2	Round	Y	70		
X-311	TOX for loading rack	N				2		Y			

[1] Provide an ID for each emission release point. Incorporate the pyrolysis/gasification unit ID into the emission release point ID (e.g., S1PYU1). This includes emergency flares or bypass stacks.
[2] Provide a description of the release point (e.g., cyclone stack outlet).
[3] Indicate whether emissions from the pyrolysis/gasification unit combined with other emission sources and released through a common stack.
[4] Report to the 4th decimal point in decimal degrees. If pyrolysis/gasification unit is mobile and not stationary, enter mobile.
[5] Indicate the height at the top of the release point (e.g., top of the stack).

[ATTACH a process flow diagram identifying all emission release points to the atmosphere for the facility.]

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Pyrolysis/Gasification Unit ID PCU-1

22. Estimate actual 2020 emissions (in tons per year) from each emission release point identified in question 21 and the source of the information. Enter unknown if information is not available.

Emission release point ID[1]		PM	PM_{10}	$PM_{2.5}$	Hg	Cd	Pb	SO_2	NO_x	CO	Dioxins/ Furans	HCl	VOC	PAHs	TOC	NHMC	OTS	Other HAP (specify)
S1PYU1	**Emissions (tpy)**																	
	Source of information[2]																	
S2PYU1	**Emissions (tpy)**																	
	Source of information[2]																	
	Emissions (tpy)	**Unknown**																
	Source of information[2]																	

[1] Copy information from question 21 and use list of pollutants in question 17b.
[2] Identify the source of the information:

a. Test data from unit
b. Test data from similar unit
c. Engineering analysis
d. Emission factor
e. Published data
f. Other (Please describe_____)

[ATTACH any data and/or calculations that support these emissions estimates.]

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Pyrolysis/Gasification Unit ID PCU-1

E. EMISSION TEST INFORMATION

23. Have emission tests been conducted on the pyrolysis/gasification unit or other vents or stacks associated with the overall process?

❑ Y ☒ N

If yes, what year(s) was (were) the test(s) done? _____

24. If you answered Yes to question 23, EPA requests information on each test conducted at each specific unit. Please copy this page and provide the following information for each test conducted.

a. Date of test: _____

b. Duration of test (number of days): _____

c. Test methods used to measure and analyze pollutants: _____

d. Which pollutants were tested? Check from list below.

❑ Particulate Matter (PM)	❑ PM_{10}	❑ $PM_{2.5}$	❑ Mercury
❑ Cadmium	❑ Lead	❑ Sulfur Dioxide	❑ Carbon Monoxide
❑ Oxides of Nitrogen	❑ Dioxins/Furans	❑ Hydrogen Chloride	❑ Volatile Organic Compounds (VOC)
❑ Polycyclic Aromatic Hydrocarbons (PAHs)	❑ Total Organic Carbon (TOC)	❑ Other Sulfur Compounds (OTS)	❑ Nonmethane hydrocarbons (NMHC)

❑ Other (specify) _____

e. Were any of the tests conducted using Continuous Emissions Monitoring Systems (CEMS)? ❑ Y ❑ N

If Yes, identify which pollutants were tested using CEMS: _____

[You are required to ATTACH a copy of the test reports. For pollutants measured with CEMS, ATTACH a copy of the most recent Relative Accuracy Test Audit (RATA) for the last 30 day period including those days where manual testing was conducted, along with the most recent 1 year of CEMS data.]

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Pyrolysis/Gasification Unit ID PCU-1

F. CONTROL MEASURES

25. For each pyrolysis/gasification unit, provide the following information regarding air pollution control devices.

Does the unit or overall process have a control device(s) that reduces air pollution? ☒ Y ☐ N

If Yes, identify the type of control device (check all that apply):

- ☐ Baghouse/FF
- ☐ ESP
- ☐ Condenser
- ☐ Dry scrubber
- ☐ Wet scrubber
- ☐ Venturi scrubber
- ☐ SCR
- ☐ SNCR
- ☐ Thermal Oxidizer
- ☐ Flare
- ☐ Cyclone

☒ Other. Provide a description Re-use of nc n-condensable gas as fuel

26. For each control device identified in question 25, provide the following information

Control Device	Pollutant[1]	Control Efficiency[2]	Basis[3]
Re-use NC gas	VOC	98%	Engineering estimate
Re-use NC gas	CO	98.7%	Engineering estimate

[1] Choose from:

- Particulate Matter (PM)
- PM10
- PM2.5
- Cadmium (Cd)
- Mercury (Hg)
- Lead (Pb)
- Sulfur Dioxide (SO_2)
- Oxides of Nitrogen (NO_x)
- Carbon Monoxide (CO)
- Hydrogen Chloride (HCl)
- Dioxins/Furans
- Volatile Organic Compounds (VOC)
- Total Organic Carbon (TOC)
- Polycyclic Aromatic Hydrocarbons (PAH's)
- Other Sulfur compounds (OTS)
- Nonmethane hydrocarbon (NMHC)
- Other, specify _____

[2] Provide control efficiency for each pollutant identified.

[3] Indicate the basis of the control efficiency entered (see footnote 2 to question 22 for a list)

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Pyrolysis/Gasification Unit ID PCU-1

27. For each control device identified in question 25, identify the control device parameters that are monitored to ensure proper operation (e.g., pressure drop, residence time, operating temperature)

Control Device	Parameter Monitored	Frequency of Monitoring
NC gas re-used	Burn temperature	Continuous

28. For each pyrolysis/gasification unit and overall process, are there measures other than add-on control devices (in question 25) used to minimize emissions (e.g., good combustion practices, pollution prevention measures, limits on the types of materials combusted, or any other emission control approaches that reduces HAP emissions)?

☐ Y ☒ N

If Yes, describe devices, measures, and practices for each unit:

29. Does your facility employ waste material segregation or feedstock preparation practices to prepare the materials fed into the pyrolysis/gasification unit?

☑ Y ☐ N

Type text here

If Yes, provide the following:

a. What types of materials are segregated from the waste stream before entering the pyrolysis/gasification unit (e.g., paper/cardboard, glass, plastics, batteries, fluorescent bulbs, metal-containing materials, chlorine containing materials, other)? Metals, PVC

b. What is done with the materials that are segregated from the waste stream? Recycle metals, dispose PVC

c. Describe the segregation methods used: Magnet for metals; manual sort for PVC

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Pyrolysis/Gasification Unit ID PCU-1

d. Summarize any practices that your facility utilizes to manage materials received (e.g., identifying dischargers that adversely impact the facility):____Pay for waste plastic and manage feedstock quality with suppliers. Pay is based on feedstock performance_____

e. Estimate the current cost of your waste segregation/recycling program (indicate whether cost estimate is on an annual basis, monthly basis, or other). _____

f. Do you have any emissions test data that would show the effects of segregating materials from the waste stream (e.g., test data before and after waste segregation practices began)?

☐ Y ☒ N

[If yes, ATTACH complete copies of the test reports and any analyses of the impact of waste segregation on emissions.]

30. Provide information on alternative disposal methods.

a. For materials received but not used in your pyrolysis/gasification unit(s), what would be the most likely alternative use or disposal method? *(check all that apply)*

- ☐ dispose on-site
- ☐ contract for special disposal service
- X send to a landfill off-site
- ☐ sell as a product
- ☒ Other: Recycle scrap metal
- ☐ sell as a fuel
- ☐ no other alternative currently available
- ☐ send to an off-site incinerator
- ☐ don't know

b. For the alternative disposal methods checked above, *estimate* the annual cost of each alternative:

i. Alternative method description:__Landfilling_____

ii. Annual cost ($/yr):____$6MM_____

31. If you have made any process or design changes to reduce emissions and/or improve the efficiency to the pyrolysis/gasification unit or overall process, describe the process/design change:

_____

[ATTACH a copy of any cost information you have for the process or design change.]

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Pyrolysis/Gasification Unit ID PCU-1

G. STARTUP AND SHUTDOWN

32. Please provide the following information for operations during start-up and shutdown for each period of operation from a cold start to cold stop:

a. How often does each unit start-up and shutdown (e.g., routine, never, etc.): Indicate number of times per year and the duration of time for start-up: –

___Anticipate quarterly maintenance of the PCU

b. List what procedures are followed or any activities that occur during start-up and shutdown (e.g., turn off unit, monitor pressure, etc.): –

____There are detailed startup/shutdown procedures, including warmup and cooldown ramp times and steps to avoid undue maintenance

c. Is a different fuel used during start-up and shutdown than during normal operating conditions? If yes, please explain:

__Natural gas is used during startup since we are not making our own fuel gas at that time

[ATTACH any emissions test data for testing conducted during any start-up or shutdown of the pyrolysis/gasification unit.]

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Pyrolysis/Gasification Unit ID _____

H. ECONOMIC AND MARKET INFORMATION

33. Complete the following table for each material or product from the unit:

Material or Product From the Unit[1]	Average Market Price[2]	Units[3]	Year Basis[4]	Identify how products get to the market[5]	Identify the average distance to the market
Naphtha				Truck	125 miles
Diesel					
Paraffin Wax					
Solid Inert Residue					

[1] Select material or products from the following:
- Syngas
- Liquid fuel product
- Char
- Tar
- Black carbon
- Energy (electricity, lbs steam, hot process water)
- Other (specify)

[2] Provide market prices for material or product.
[3] Provide units for the market price (e.g., $/ton, $/Btu).
[4] Provide the year the market price is based on.
[5]Identiy how products are sent to the market,
- Truck,
- Rail,
- Pipeline,
- Other (describe).

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