Technical Support Document
for
Draft Air Emission Permit No. 17100085-103

This technical support document (TSD) is intended for all parties interested in the draft permit and to meet the requirements that have been set forth by the federal and state regulations (40 CFR § 70.7(a)(5) and Minn. R. 7007.0850, subp. 1). The purpose of this document is to provide the legal and factual justification for each applicable requirement or policy decision considered in the determination to issue the draft permit.

1. General information

1.1 Applicant and stationary source location

Table 1. Applicant and source address

Applicant/Address	**Stationary source/Address** (SIC Code: 3086 - Plastics Foam Products)
Kingspan Insulation LLC. PO Box 44 Rockford, MN 55373-0044	Kingspan Insulation LLC - West 6901 West Rd Rockford, MN 55373-5126
Contact: Christopher Davis Phone: 304-283-5958	

1.2 Facility description

Kingspan Insulation LLC - West is an existing facility that manufactures expanded polystyrene boardstock, primarily used in building materials and insulation. The boardstock is made with expanded polystyrene beads molded into the desired shapes. The first step in the process is the pre-expansion of the beads, which are similar in appearance to white sugar. Steam is mixed with the beads, releasing the blowing agent, pentane, which causes the beads to expand in size. Beads are typically stored in mesh bags for 8 to 48 hours after expansion, allowing time to stabilize. Beads are then transferred to the molding area, where blocks are formed, cured, and then conveyed to hot wire cutters where they are cut to size. Additionally, some final products are laminated with thin plastic sheeting.

The main pollutant of concern for this facility is pentane, a Volatile Organic Compound (VOC). Additionally, small amounts of free styrene (both a hazardous air pollutant and a VOC) are emitted from the raw beads throughout the process. Combustion products are also emitted from a natural gas fired boiler. The facility has activities that are considered insignificant under Minnesota Rules. A complete list of these insignificant activities is available in Appendix A.

1.3 Description of the activities allowed by this permit action

This permit action is Part 70 Reissuance.

1.4 Facility emissions

Table 2. Total facility potential to emit summary

	PM (tpy)	**PM_{10}** (tpy)	**$PM_{2.5}$** (tpy)	**SO_2** (tpy)	**NO_x** (tpy)	**CO** (tpy)	**CO_2e** (tpy)	**VOC** (tpy)	**Styrene** (tpy)	**All HAPs** (tpy)
Total facility limited potential emissions	0.277	0.277	0.277	0.0219	3.65	3.07	4360	225	2.85	2.92

	PM (tpy)	**PM_{10}** (tpy)	**$PM_{2.5}$** (tpy)	**SO_2** (tpy)	**NO_x** (tpy)	**CO** (tpy)	**CO_2e** (tpy)	**VOC** (tpy)	**Styrene** (tpy)	**All HAPs** (tpy)
Total facility actual emissions (2024)	0.004	0.004	0.003	0.005	0.751	0.630	*	104.375	*	0.0240

*Not reported in Minnesota emission inventory.

Table 3. Facility classification

Classification	**Major**	**Synthetic minor/area**	**Minor/Area**
New Source Review		X	
Part 70	X		
Part 63		X	

1.5 Changes to permit

The permit does not authorize any specific modifications. The following changes to the permit are made through this permit action:

- The permit has been updated to reflect current MPCA templates and standard citation formatting.
- Decommissioned equipment (EQUI 5 – Laminator) was removed from the permit.
- Allowable fuels for the boiler (EQUI 1) were changed from natural gas and propane to natural gas only.

2. Regulatory and/or statutory basis

2.1 New source review (NSR)

The permit carries forward limits on the facility such that it is a minor source under New Source Review regulations. No modifications are authorized by this permit.

2.2 Part 70 permit program

The facility is a major source under the Part 70 permit program.

2.3 New source performance standards (NSPS)

The Permittee has stated that no New Source Performance Standards apply to the operations at this facility.

2.4 National emission standards for hazardous air pollutants (NESHAP)

The facility has accepted limits on HAP emissions such that it is an area source under 40 CFR pt. 63. Thus, no major source NESHAPs apply. In addition, the Permittee has stated that no area source NESHAPs apply to the facility.

2.5 Regulatory Overview

Table 4. Regulatory overview of facility

Subject item*	Applicable regulations	Rationale
COMG 2 – Total Facility VOC Limit	Title I Condition: Avoid major modification under 40 CFR § 52.21(b)(2) and Minn. R. 7007.3000, Title I Condition: Avoid major source under 40 § CFR 52.21(b)(1)(i) and Minn. R. 7007.3000, Title I Condition: Avoid major source under 40 CFR § 63.2	Prevention of Significant Deterioration (PSD) and NESHAPS. Limits taken to avoid major source and modification classification under PSD for all noncombustion emissions of VOC. This VOC limit also results in the facility remaining an area source of HAPs. It is a rolling limit due to substantial and unpredictable variations in operation. This limit is carried forward from the previous permit.
COMG 2 – Total Facility VOC Limit	Minn. R. 7011.0715, subp. 1(A) and (B)	Standards of Performance for post-1969 Industrial Process Equipment. Equipment for which there is no other promulgated performance standard is subject to the opacity and PM limits in this rule. Construction of all units was on or after July 9, 1969.
EQUI 1 - Boiler	Minn. R. 7011.0515, subp. 1 and 2	Standards of Performance for New Indirect Heating Equipment. • construction of the boiler was on or after January 31, 1977; • the unit burns gaseous fuels; • the facility is located outside the cities in Table II of the rule; • the boiler capacity is less than or equal to 250 MMBtu/hr; and • the facility has less than or equal to 250 MMBtu/hr of indirect heating equipment.

*Location of the requirement in the permit (e.g., EQUI 1, STRU 2, etc.).

3. Technical information

3.1 Calculations of potential to emit (PTE)

Attachment 1 to this TSD contains a summary of the PTE of the Facility as well as detailed spreadsheets and supporting information prepared by the MPCA and the Permittee.

EPS Bead Processes

The facility bases their VOC emissions on EPA 450/3-90-020, Control of VOC Emissions from Polystyrene Foam Manufacturing. According to this document, the majority (85%) of the VOC emissions from the beads take place during the pre-expansion and molding. It is unknown how long it takes the remaining 15% of VOC to be released during storage. As there is no time limit on how long the Permittee can store the finished product, it is assumed that all the remaining VOC is released within the facility.

The facility also assumes conservatively that 50% of the VOC content of the EPS beads is released during pre-expansion and the remaining 50% is released during molding. The facility also uses the 7% maximum pentane content (SDS in Attachment 3).

Additionally, there is free styrene present in small amounts in the EPS beads (maximum 0.09%). It is assumed that 100% of the styrene is emitted within the facility.

Boiler
The PTE calculations are based on emission factors in AP-42 1.4, Natural Gas Combustion, and the boiler capacity.
The permit has been modified to remove propane as an alternative fuel for the boiler. Although the boiler is designed to burn natural gas or propane, there is no physical connection to a propane source at the facility.

3.2 Monitoring

In accordance with the Clean Air Act, it is the responsibility of the owner or operator of a facility to have sufficient knowledge of the facility to certify that the facility is in compliance with all applicable requirements.

In evaluating the monitoring included in the permit, the MPCA considered the following:

- the likelihood of the facility violating the applicable requirements;
- whether add-on controls are necessary to meet the emission limits;
- the variability of emissions over time;
- the type of monitoring, process, maintenance, or control equipment data already available for the emission unit;
- the technical and economic feasibility of possible periodic monitoring methods; and
- the kind of monitoring found on similar units elsewhere.

The Table below summarizes the monitoring requirements.

Table 5. Monitoring

Subject Item*	Requirement (basis)	What is the monitoring?	Why is this monitoring adequate?
COMG 2 – Total Facility VOC Limit	Volatile Organic Compounds <= 37,500 pounds per month 12-month rolling average. (Limit to avoid NSR and pt. 63 NESHAPs)	Recordkeeping: Daily records of coating usage; On-going records of coating contents; Monthly calculations of emissions.	Records can be generated on a daily basis for EPS beads using written production records and meter readings. Material content for each material must be determined as required by the Material Content requirement at COMG 2.
	Particulate Matter: Variable, depending on airflow. Opacity <= 20% (Minn. R. 7011.0715, subp. 1(A) and 1(B))	None	None of these processes is reasonably expected to generate any particulate matter. It is highly unlikely that they could violate the applicable requirement.

Subject Item*	Requirement (basis)	What is the monitoring?	Why is this monitoring adequate?
EQUI 1 – Boiler	Filterable Particulate Matter <= 0.40 lb/MMBtu Opacity <= 20% except for one six-minute period per hour of not more than 60% (Minn. R. 7011.0515, subp. 1 and 2)	Recordkeeping: fuel records	The boiler only burns natural gas; therefore, the likelihood of violating either of the emission limits is very small. The Permittee can demonstrate that the boiler will continue to operate such that emissions are well below the emission limits by only burning natural gas. The PTE for the boiler, using AP-42 1.4, Natural Gas Combustion, is 0.0075 lb/MMBtu of PM compared to the rule limit of 0.40 lb/MMBtu of PM.

*Location of the requirement in the permit (e.g., EQUI 1, STRU 2, etc.).

3.3 Insignificant activities

Kingspan Insulation LLC - West has several operations which are classified as insignificant activities under the MPCA's permitting rules. These are listed in Appendix A to the permit.

The permit is required to include periodic monitoring for all emissions units, including insignificant activities, per EPA guidance. The insignificant activities at this Facility are only subject to general applicable requirements. Using the criteria outlined earlier in this TSD, the following table documents the justification why no additional periodic monitoring is necessary for the current insignificant activities. See Attachment 1 of this TSD for PTE information for the insignificant activities.

Table 6. Insignificant activities

Insignificant activity	General applicable emission limit	Discussion
Individual units with potential emissions less than 2000 lb/year of certain pollutants	*Hot wire cutting operations and EPS grinding, milling, and cutting operations:* PM, variable depending on airflow Opacity <= 20% (Minn. R. 7011.0715)	Based on calculations in Attachment 1, none of these activities are expected to exceed the allowable limits by rule. The highest comparison is for the EPS cutting/grinding and that is at roughly 8% of the allowable rate.
	22 space heaters at 0.3 MMBtu/hr each and one make-up air unit at 1.469 MMBtu/hr: PM <= 0.4 lb/MMBtu Opacity <= 20%, with exceptions (Minn. R. 7011.0515)	The space heaters and make-up air unit burn only natural gas which has an AP-42 1.4, Natural Gas Combustion, PM emission factor of 0.0075 lb/MMBtu, well below the 0.4 lb/MMBtu limit.

3.4 Permit organization and standard language

This permit meets the MPCA Tempo Guidance for ordering and grouping of requirements as well as the use of permit appendices.

When amending or reissuing an air permit, MPCA staff evaluate standard permit language in the permit. If the standard language has been changed in the Tempo database since the last permit was issued, staff need to decide how to proceed for each revised condition. For this permit action, all standard language was updated in the permit.

3.5 Comments received

This section will be completed after the referenced review periods.

Public Notice Period: [start date] – [end date]
EPA Review Period: [start date] – [end date]

4. Permit fee assessment

This permit action is the reissuance of an individual Part 70; therefore, no application fees apply under Minn. R. 7002.0016, subp. 1.

5. Conclusion

Based on the information provided by Kingspan Insulation LLC - West the MPCA has reasonable assurance that the proposed operation of the emission facility, as described in the Air Emission Permit No. 17100085-103 and this TSD, will not cause or contribute to a violation of applicable federal regulations and Minnesota Rules.

Staff members on permit team: Erin Bosman (permit engineer)
Peggy Bartz (peer reviewer)
Patrick Hecht (enforcement)
Leah Waller (data coordinator)
Beckie Olson (permit writing assistant)
Laurie O'Brien (administrative support)

Tempo Activities: Part 70 Reissuance (IND20250001)

Attachments:
1. PTE summary calculation spreadsheets
2. Subject item inventory and facility requirements
3. Safety Data Sheets

Attachment 1: Potential to Emit Calculations

MINNESOTA POLLUTION CONTROL AGENCY
520 Lafayette Road North
St. Paul, MN 55155-4194

GI-07 Spreadsheet

Facility Emissions Summary

Air Quality Permit Program

Doc Type: Permit Application

1a) AQ Facility ID number: 17100085

1b) Agency Interest ID number: 4229

2) Facility name: Kingspan Insulation LLC - West

Follow the instructions to complete this spreadsheet. This spreadsheet can be copied into a tab for your emissions spreadsheet and must be submitted on a CD with your application. If you need to provide emissions information for more emissions units, add more sets of columns (3a through 3f) to the right as needed in the Emissions by Source table. If you need to provide information for more pollutants, add rows as needed.

Emissions by Source Table

3a) Tempo SI ID number:		EQUI 1				**3a)** Tempo SI ID number:		EQUI2				**3a)** Tempo SI ID number:		EQUI4			
3b) Delta ID No.:		EU001				**3b)** Delta ID No.:		EU002				**3b)** Delta ID No.:		EU004			
3c)	**3d)**	**3e)** Potential			**3f)**	**3c)**	**3d)**	**3e)** Potential			**3f)**	**3c)**	**3d)**	**3e)** Potential			**3f)**
Pollutant Name	CAS #	Pounds (lbs) per hour	tons per year un-restricted	tons per year limited	Actual tons per year	Pollutant Name	CAS #	Pounds (lbs) per hour	tons per year un-restricted	tons per year limited	Actual tons per year	Pollutant Name	CAS #	Pounds (lbs) per hour	tons per year un-restricted	tons per year limited	Actual tons per year
PM	-	0.0633	0.277	0.277	-	**PM**	-					**PM**	-				
PM10	-	0.0633	0.277	0.277	-	**PM10**	-					**PM10**	-				
PM2.5	-	0.0633	0.277	0.277	-	**PM2.5**	-					**PM2.5**	-				
SO2	-	5.00E-03	2.19E-02	2.19E-02	-	**SO2**	-					**SO2**	-				
NOx	-	0.833	3.65	3.65	-	**NOx**	-					**NOx**	-				
VOC	-	4.58E-02	0.201	0.201	-	**VOC**	-	385.0	843.2	See COMG2		**VOC**	-	385.0	843.2	See COMG2	
CO	-	0.700	3.07	3.07	-	**CO**	-					**CO**	-				
Pb	-	4.17E-06	1.83E-05	1.83E-05	-	**Pb**	-					**Pb**	-				
CO2	-	994	4,355	4,355	-	**CO2**	-					**CO2**	-				
CH4	-	1.87E-02	8.21E-02	8.21E-02	0.00E+00	**CH4**	-					**CH4**	-				
N2O	-	1.87E-03	8.21E-03	8.21E-03	0.00E+00	**N2O**	-					**N2O**	-				
CO2e	-	995	4,360	4,360	-	**CO2e**	-					**CO2e**	-				
Total HAPs	-	1.57E-02	6.89E-02	6.89E-02	-	**Total HAPs**	-	4.95	10.8	See COMG2		**Total HAPs**	-	4.95	10.8	See COMG2	
Arsenic	7440-38-2	1.67E-06	7.30E-06	7.30E-06	-	**Arsenic**	7440-38-2					**Arsenic**	7440-38-2				
Benzene	71-43-2	1.75E-05	7.67E-05	7.67E-05	-	**Benzene**	71-43-2					**Benzene**	71-43-2				
Beryllium	7440-41-7	1.00E-07	4.38E-07	4.38E-07	-	**Beryllium**	7440-41-7					**Beryllium**	7440-41-7				
Cadmium	7440-43-9	9.17E-06	4.02E-05	4.02E-05	-	**Cadmium**	7440-43-9					**Cadmium**	7440-43-9				
Chromium	7440-47-3	1.17E-05	5.11E-05	5.11E-05	-	**Chromium**	7440-47-3					**Chromium**	7440-47-3				
Cobalt	744-48-4	7.00E-07	3.07E-06	3.07E-06	-	**Cobalt**	744-48-4					**Cobalt**	744-48-4				
Dichlorobenzene	25321-22-6	1.00E-05	4.38E-05	4.38E-05	-	**Dichlorobenzene**	25321-22-6					**Dichlorobenzene**	25321-22-6				
Formaldehyde	50-00-0	6.25E-04	2.74E-03	2.74E-03	-	**Formaldehyde**	50-00-0					**Formaldehyde**	50-00-0				
Hexane	110-54-3	1.50E-02	6.57E-02	6.57E-02	-	**Hexane**	110-54-3					**Hexane**	110-54-3				
Manganese	7439-96-5	3.17E-06	1.39E-05	1.39E-05	-	**Manganese**	7439-96-5					**Manganese**	7439-96-5				
Mercury	7439-97-6	2.17E-06	9.49E-06	9.49E-06	-	**Mercury**	7439-97-6					**Mercury**	7439-97-6				
Naphthalene	91-20-3	5.08E-06	2.23E-05	2.23E-05	-	**Naphthalene**	91-20-3					**Naphthalene**	91-20-3				
Nickel	7440-02-0	1.75E-05	7.67E-05	7.67E-05	-	**Nickel**	7440-02-0					**Nickel**	7440-02-0				
POM	-	5.82E-06	2.55E-05	2.55E-05	-	**POM**	-					**POM**	-				
Selenium	7782-49-2	2.00E-07	8.76E-07	8.76E-07	-	**Selenium**	7782-49-2					**Selenium**	7782-49-2				
Toluene	108-88-3	2.83E-05	1.24E-04	1.24E-04	-	**Toluene**	108-88-3					**Toluene**	108-88-3				
Styrene	100-42-5				-	**Styrene**	100-42-5	4.95	10.8	See COMG2		**Styrene**	100-42-5	4.95E+00	1.08E+01	See COMG2	

MINNESOTA POLLUTION CONTROL AGENCY
520 Lafayette Road North
St. Paul, MN 55155-4194

GI-07 Spreadsheet

MINNESOTA POLLUTION CONTROL AGENCY
520 Lafayette Road North
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Facility Emissions Summary

Air Quality Permit Program

Doc Type: Permit Application

1b) Agency Interest ID number: 2273B

1a) AQ Facility ID number: 17100085

2) Facility name: Kingspan Insulation LLC - West

3a) Tempo SI ID number:	EQUI6					**3a)** Tempo SI ID number:	EQUI7					**3a)** Tempo SI ID number:	COMG2				
3b) Delta ID No.:	EU007					**3b)** Delta ID No.:	EU008					**3b)** Delta ID No.:	GP001				
3c)	**3d)**	**3e)** Potential			**3f)**	**3c)**	**3d)**	**3e)** Potential			**3f)**	**3c)**	**3d)**	**3e)** Potential			**3f)**
Pollutant Name	CAS #	Pounds (lbs) per hour	tons per year un-restricted	tons per year limited	Actual tons per year	Pollutant Name	CAS #	Pounds (lbs) per hour	tons per year un-restricted	tons per year limited	Actual tons per year	Pollutant Name	CAS #	Pounds (lbs) per hour	tons per year un-restricted	tons per year limited	Actual tons per year
PM	-					**PM**	-				-	**PM**	-				
PM10	-					**PM10**	-				-	**PM10**	-				
PM2.5	-					**PM2.5**	-				-	**PM2.5**	-				
SO2	-					**SO2**	-				-	**SO2**	-				
NOx	-					**NOx**	-				-	**NOx**	-				
VOC	-	17.64	38.6	See COMG2		**VOC**	-	24.5	53.7	See COMG2	-	**VOC**	-	-	-	225.0	
CO	-					**CO**	-				-	**CO**	-				
Pb	-					**Pb**	-				-	**Pb**	-				
CO2	-					**CO2**	-				-	**CO2**	-				
CH4	-					**CH4**	-				0.00E+00	**CH4**	-				
N2O	-					**N2O**	-				0.00E+00	**N2O**	-				
CO2e	-					**CO2e**	-				-	**CO2e**	-				
Total HAPs	-	0.227	0.497	See COMG2		**Total HAPs**	-	0.315	0.690	See COMG2	-	**Total HAPs**	-	-	-	2.85	
Arsenic	7440-38-2					**Arsenic**	7440-38-2				-	**Arsenic**	7440-38-2				
Benzene	71-43-2					**Benzene**	71-43-2				-	**Benzene**	71-43-2				
Beryllium	7440-41-7					**Beryllium**	7440-41-7				-	**Beryllium**	7440-41-7				
Cadmium	7440-43-9					**Cadmium**	7440-43-9				-	**Cadmium**	7440-43-9				
Chromium	7440-47-3					**Chromium**	7440-47-3				-	**Chromium**	7440-47-3				
Cobalt	744-48-4					**Cobalt**	744-48-4				-	**Cobalt**	744-48-4				
Dichlorobenzene	25321-22-6					**Dichlorobenzene**	25321-22-6				-	**Dichlorobenzene**	25321-22-6				
Formaldehyde	50-00-0					**Formaldehyde**	50-00-0				-	**Formaldehyde**	50-00-0				
Hexane	110-54-3					**Hexane**	110-54-3				-	**Hexane**	110-54-3				
Manganese	7439-96-5					**Manganese**	7439-96-5				-	**Manganese**	7439-96-5				
Mercury	7439-97-6					**Mercury**	7439-97-6				-	**Mercury**	7439-97-6				
Naphthalene	91-20-3					**Naphthalene**	91-20-3				-	**Naphthalene**	91-20-3				
Nickel	7440-02-0					**Nickel**	7440-02-0				-	**Nickel**	7440-02-0				
POM	-					**POM**	-				-	**POM**	-				
Selenium	7782-49-2					**Selenium**	7782-49-2				-	**Selenium**	7782-49-2				
Toluene	108-88-3					**Toluene**	108-88-3				-	**Toluene**	108-88-3				
Styrene	100-42-5	2.27E-01	4.97E-01	See COMG2		**Styrene**	100-42-5	0.315	0.690	See COMG2	-	**Styrene**	100-42-5			2.85	

GI-07 Spreadsheet

MINNESOTA POLLUTION CONTROL AGENCY
520 Lafayette Road North
St. Paul, MN 55155-4194

Facility Emissions Summary

Air Quality Permit Program

Doc Type: Permit Application

1b) Agency Interest ID number: 2273B

1a) AQ Facility ID number: 17100085

2) Facility name: Kingspan Insulation LLC - West

two IAs listed that are not in current permit

3a) Tempo SI ID number:	IA Hot Wire Cutters					**3a)** Tempo SI ID number:	IA Space Heaters (Total for 22)					**3a)** Tempo SI ID number:	Makeup Air Unit				
3b) Delta ID No.:	IA Hot Wire Cutters					**3b)** Delta ID No.:	IA Space Heaters (Total for 22)					**3b)** Delta ID No.:	Makeup Air Unit				
3c)	**3d)**	**3e)** Potential			**3f)**	**3c)**	**3d)**	**3e)** Potential			**3f)**	**3c)**	**3d)**	**3e)** Potential			**3f)**
Pollutant Name	CAS #	Pounds (lbs) per hour	tons per year un-restricted	tons per year limited	Actual tons per year	Pollutant Name	CAS #	Pounds (lbs) per hour	tons per year un-restricted	tons per year limited	Actual tons per year	Pollutant Name	CAS #	Pounds (lbs) per hour	tons per year un-restricted	tons per year limited	Actual tons per year
PM	-	1.11E-02	4.86E-02	4.86E-02		**PM**	-	4.92E-02	2.15E-01	2.15E-01		**PM**	-	1.09E-02	4.79E-02	4.79E-02	
PM10	-	1.11E-02	4.86E-02	4.86E-02		**PM10**	-	4.92E-02	2.15E-01	2.15E-01		**PM10**	-	1.09E-02	4.79E-02	4.79E-02	
PM2.5	-	1.11E-02	4.86E-02	4.86E-02		**PM2.5**	-	4.92E-02	2.15E-01	2.15E-01		**PM2.5**	-	1.09E-02	4.79E-02	4.79E-02	
SO2	-	-	-	-		**SO2**	-	6.47E-01	2.83E+00	2.83E+00		**SO2**	-	1.44E-01	6.31E-01	6.31E-01	
NOx	-	1.30E-01	0.569	0.569		**NOx**	-	5.44E-01	2.38E+00	2.38E+00		**NOx**	-	1.21E-01	5.30E-01	5.30E-01	
VOC	-	2.67E-03	1.17E-02	1.17E-02		**VOC**	-	3.88E-03	1.70E-02	1.70E-02		**VOC**	-	8.64E-04	3.78E-03	3.78E-03	
CO	-	1.18E-02	5.17E-02	5.17E-02		**CO**	-	3.56E-02	1.56E-01	1.56E-01		**CO**	-	7.92E-03	3.47E-02	3.47E-02	
Pb	-	-	-	-		**Pb**	-	3.24E-06	1.42E-05	1.42E-05		**Pb**	-	7.20E-07	3.15E-06	3.15E-06	
CO2	-	58.6	256.8	256.8		**CO2**	-	1.22E-02	5.35E-02	5.35E-02		**CO2**	-	171.8	752.6	752.6	
CH4	-	2.34E-03	1.03E-02	1.03E-02		**CH4**	-	7.72E+02	3.38E+03	3.38E+03		**CH4**	-	3.24E-03	1.42E-02	1.42E-02	
N2O	-	4.68E-04	2.05E-03	2.05E-03		**N2O**	-	1.46E-02	6.37E-02	6.37E-02		**N2O**	-	3.24E-04	1.42E-03	1.42E-03	
CO2e	-	58.8	257.6	257.6		**CO2e**	-	772.8	3,385.0	3,385.0		**CO2e**	-	172.0	753.4	753.4	
Total HAPs	-					**Total HAPs**	-	1.22E-02	5.35E-02	5.35E-02		**Total HAPs**	-	2.72E-03	1.19E-02	1.19E-02	
Arsenic	7440-38-2					**Arsenic**	7440-38-2	1.29E-06	5.67E-06	5.67E-06		**Arsenic**	7440-38-2	2.88E-07	1.26E-06	1.26E-06	
Benzene	71-43-2					**Benzene**	71-43-2	1.36E-05	5.95E-05	5.95E-05		**Benzene**	71-43-2	3.02E-06	1.32E-05	1.32E-05	
Beryllium	7440-41-7					**Beryllium**	7440-41-7	7.76E-08	3.40E-07	3.40E-07		**Beryllium**	7440-41-7	1.73E-08	7.57E-08	7.57E-08	
Cadmium	7440-43-9					**Cadmium**	7440-43-9	7.12E-06	3.12E-05	3.12E-05		**Cadmium**	7440-43-9	1.58E-06	6.94E-06	6.94E-06	
Chromium	7440-47-3					**Chromium**	7440-47-3	9.06E-06	3.97E-05	3.97E-05		**Chromium**	7440-47-3	2.02E-06	8.83E-06	8.83E-06	
Cobalt	744-48-4					**Cobalt**	744-48-4	5.44E-07	2.38E-06	2.38E-06		**Cobalt**	744-48-4	1.21E-07	5.30E-07	5.30E-07	
Dichlorobenzene	25321-22-6					**Dichlorobenzene**	25321-22-6	7.76E-06	3.40E-05	3.40E-05		**Dichlorobenzene**	25321-22-6	1.73E-06	7.57E-06	7.57E-06	
Formaldehyde	50-00-0					**Formaldehyde**	50-00-0	4.85E-04	2.13E-03	2.13E-03		**Formaldehyde**	50-00-0	1.08E-04	4.73E-04	4.73E-04	
Hexane	110-54-3					**Hexane**	110-54-3	1.16E-02	5.10E-02	5.10E-02		**Hexane**	110-54-3	2.59E-03	1.14E-02	1.14E-02	
Manganese	7439-96-5					**Manganese**	7439-96-5	2.46E-06	1.08E-05	1.08E-05		**Manganese**	7439-96-5	5.47E-07	2.40E-06	2.40E-06	
Mercury	7439-97-6					**Mercury**	7439-97-6	1.68E-06	7.37E-06	7.37E-06		**Mercury**	7439-97-6	3.74E-07	1.64E-06	1.64E-06	
Naphthalene	91-20-3					**Naphthalene**	91-20-3	3.95E-06	1.73E-05	1.73E-05		**Naphthalene**	91-20-3	8.79E-07	3.85E-06	3.85E-06	
Nickel	7440-02-0					**Nickel**	7440-02-0	1.36E-05	5.95E-05	5.95E-05		**Nickel**	7440-02-0	3.02E-06	1.32E-05	1.32E-05	
POM	-					**POM**	-	4.52E-06	1.98E-05	1.98E-05		**POM**	-	1.01E-06	4.40E-06	4.40E-06	
Selenium	7782-49-2					**Selenium**	7782-49-2	1.55E-07	6.80E-07	6.80E-07		**Selenium**	7782-49-2	3.46E-08	1.51E-07	1.51E-07	
Toluene	108-88-3					**Toluene**	108-88-3	2.20E-05	9.64E-05	9.64E-05		**Toluene**	108-88-3	4.90E-06	2.14E-05	2.14E-05	
Styrene	100-42-5					**Styrene**	100-42-5					**Styrene**	100-42-5				

Emissions Summary Table

3a) Tempo SI ID number:		EPS Milling, Planing, Cutting, and Grinding Eq				**With Insignificant Activities**					**Without Insignificant Activities (for Tableau)**				
3b) Delta ID No.:		EPS Milling, Planing, Cutting, and Grinding Eq													
3c)	**3d)**	**3e)** Potential			**3f)**	**4a)**	**4b)**	**4c)** Potential (tons/year)		**4d)** Actual	**4a)**	**4b)**	**4c)** Potential (tons/year)		**4d)** Actual
Pollutant Name	CAS #	Pounds (lbs) per hour	tons per year un-restricted	tons per year limited	Actual tons per year	Pollutant Name	Potential (lbs/hr)	Unrestricted	Limited	tons/year	Pollutant Name	Potential (lbs/hr)	Unrestricted	Limited	tons/year
PM	-	0.196	0.858	0.858		**PM**	0.330	1.45	1.45		**PM**	6.33E-02	0.277	0.277	
PM10	-	0.196	0.858	0.858		**PM10**	0.330	1.45	1.45		**PM10**	6.33E-02	0.277	0.277	
PM2.5	-	0.196	0.858	0.858		**PM2.5**	0.330	1.45	1.45		**PM2.5**	6.33E-02	0.277	0.277	
SO2	-					**SO2**	0.796	3.487	3.487		**SO2**	5.00E-03	2.19E-02	0.0219	
NOx	-					**NOx**	1.63	7.13	7.13		**NOx**	0.83	3.65	3.65	
VOC	-					**VOC**	812	1779	225		**VOC**	812	1779	225	
CO	-					**CO**	0.755	3.31	3.31		**CO**	0.700	3.07	3.07	
Pb	-					**Pb**	8.12E-06	3.56E-05	3.56E-05		**Pb**	4.17E-06	1.83E-05	1.83E-05	
CO2	-					**CO2**	1225	5364	5364		**CO2**	994	4355	4355	
CH4	-					**CH4**	7.72E+02	3.38E+03	3.38E+03		**CH4**	1.87E-02	8.21E-02	8.21E-02	
N2O	-					**N2O**	1.72E-02	7.54E-02	7.54E-02		**N2O**	1.87E-03	8.21E-03	8.21E-03	
CO2e	-					**CO2e**	1999	8756	8756		**CO2e**	995	4360	4360	
Total HAPs	-					**Total HAPs**	10.5	23.0	2.99		**Total HAPs**	10.5	22.9	2.92	
Arsenic	7440-38-2					**Arsenic**	3.25E-06	1.42E-05	1.42E-05		**Arsenic**	1.67E-06	7.30E-06	7.30E-06	
Benzene	71-43-2					**Benzene**	3.41E-05	1.49E-04	1.49E-04		**Benzene**	1.75E-05	7.67E-05	7.67E-05	
Beryllium	7440-41-7					**Beryllium**	1.95E-07	8.54E-07	8.54E-07		**Beryllium**	1.00E-07	4.38E-07	4.38E-07	
Cadmium	7440-43-9					**Cadmium**	1.79E-05	7.83E-05	7.83E-05		**Cadmium**	9.17E-06	4.02E-05	4.02E-05	
Chromium	7440-47-3					**Chromium**	2.27E-05	9.96E-05	9.96E-05		**Chromium**	1.17E-05	5.11E-05	5.11E-05	
Cobalt	744-48-4					**Cobalt**	1.36E-06	5.98E-06	5.98E-06		**Cobalt**	7.00E-07	3.07E-06	3.07E-06	
Dichlorobenzene	25321-22-6					**Dichlorobenzene**	1.95E-05	8.54E-05	8.54E-05		**Dichlorobenzene**	1.00E-05	4.38E-05	4.38E-05	
Formaldehyde	50-00-0					**Formaldehyde**	1.22E-03	5.34E-03	5.34E-03		**Formaldehyde**	6.25E-04	2.74E-03	2.74E-03	
Hexane	110-54-3					**Hexane**	2.92E-02	1.28E-01	1.28E-01		**Hexane**	1.50E-02	6.57E-02	6.57E-02	
Manganese	7439-96-5					**Manganese**	6.17E-06	2.70E-05	2.70E-05		**Manganese**	3.17E-06	1.39E-05	1.39E-05	
Mercury	7439-97-6					**Mercury**	4.22E-06	1.85E-05	1.85E-05		**Mercury**	2.17E-06	9.49E-06	9.49E-06	
Naphthalene	91-20-3					**Naphthalene**	9.91E-06	4.34E-05	4.34E-05		**Naphthalene**	5.08E-06	2.23E-05	2.23E-05	
Nickel	7440-02-0					**Nickel**	3.41E-05	1.49E-04	1.49E-04		**Nickel**	1.75E-05	7.67E-05	7.67E-05	
POM	-					**POM**	1.13E-05	4.97E-05	4.97E-05		**POM**	5.82E-06	2.55E-05	2.55E-05	
Selenium	7782-49-2					**Selenium**	3.90E-07	1.71E-06	1.71E-06		**Selenium**	2.00E-07	8.76E-07	8.76E-07	
Toluene	108-88-3					**Toluene**	5.52E-05	2.42E-04	2.42E-04		**Toluene**	2.83E-05	1.24E-04	1.24E-04	
Styrene	100-42-5					**Styrene**	10.4	22.9	2.85		**Styrene**	10.4	22.9	2.85	

Minnesota Pollution Control Agency
520 Lafayette Road North
St. Paul, MN 55155-4194

EC-01

General Emissions Calculation Form

Air Quality Permit Program

\\pca.state.mn.us\sdrive\Public\Bosman_Erin.EB\4229 Kingspan Insulation\[PCA PTE Calculations.xlsx]COMG 2

Use this form to calculate the actual emissions for processes or process units that cannot be accounted for in process/unit specific emission calculation forms. Duplicate this form as necessary to identify all emission units, or attach sheets with equivalent information.

1a) AQD Facility ID No.: **17100085** **1b) AQ File No.** 2273B

2) Facility Name: **Kingspan Insulation LLC - West**

3) Emission Unit Identification Number: **COMG 2 Main Process Steps (for VOC limit)**

4) Stack/Vent Designation Number: **STRU 1, STRU 4, STRU 5, STRU 6, STRU 8**

5) Pollution Control Equipment Identification Number:

6) Process Type: ☑ Batch Process ☐ Continuous Process

7) Operating Capacity: **2.75*** Units: **ton/hr**

***The operating capacity of COMG 2 is equal to 2.75 tons/hr, as that is the operating capacity of the pre-expander, which is the bottleneck for this process. All beads used at this facility must go through the pre-expander before being molded and cut into a final product.**

8) Source of Emission Factors used in table below: **Control of VOC (pentane) emissions from polystyrene foam manufacturer**

EPA-450/3-90-020

9) Calculations Summary

9a) Pollutant	9b) Emission Factor (lbs/ton)	9c) Emission Rate (lbs/hr)	9d) Maximum Uncontrolled Emissions (tons/yr)	9e) Actual Uncontrolled Emissions (tons/yr)	9f) Pollution Control Efficiency (%)	9g) Maximum Controlled Emissions (tons/yr)	9h) Actual Controlled Emissions (tons/yr)	9i) Limited Controlled Emissions (tons/yr)
PM								
PM_{10}								
PM2.5								
SO_2								
NO_x								
VOC	140	385.00	1686	NA	NA	1686.30	NA	225.00
CO								
Lead								

10) Check all of the following that are appropriate:

☐ This process/unit combusts fuel. Include fuel combustion emissions on Form EC-02 (Boilers), EC-03 (Internal Combustion Engines), or EC-08 (Ovens, Dryers, Furnaces), as appropriate.

☐ This process/unit uses clean-up solvents in addition to the process described by the emissions above. Include clean-up solvent emissions on Form EC-12.

☑ This process/unit emits Hazardous Air Pollutants (HAPs). Include HAP emissions on Form EC-13A (VOC HAPs), EC-13B (Particulate HAPs), or EC-13C (Combustion HAPs), as appropriate

11) Operating Limitations, if applicable:

Based on bead with 7% pentane and 100% of pentane emitted. Limit of 225 tons per year of VOC to be a synthetic minor source for NSR.

Minnesota Pollution Control Agency
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EC-13A

Hazardous Air Pollutants Calculation Form (Volatile HAPS)

Air Quality Permit Program

Alternate Form

\\pca.state.mn.us\sdrive\Public\Bosman_Erin.EB\4229 Kingspan Insulation\[PCA PTE Calculations.xlsx]COMG 2 HAP

Duplicate this form as necessary to identify all emission units, or attach sheets with equivalent information.

1a) AQD Facility ID No.: **17100085** **1b) AQ File No.** 2273B

2) Facility Name: **Kingspan Insulation LLC - West**

3) Emission Unit Identification Number: **COMG 2 Main Process Steps (for VOC limit)**

4) Stack/Vent Designation Number: **STRU 1, STRU 4, STRU 5, STRU 6, STRU 8**

5) Pollution Control Equipment Identification Number:

6) Calculations Summary Using Material Content

The maximum material usage rate of COMG 2 is equal to 5500 lbs/hr, as that is the maximum capacity of the pre-expander, which is the bottleneck for this facility. All beads used at this facility must go through the pre-expander before being molded and cut into a final product.

6a) Volatile HAP Name	6b) Maximum HAP Content (ppmw)	6c) Maximum Material Usage Rate (lbs/hr)	6d) Maximum Uncontrolled HAP Emission Rate (lbs/hr)	6e) Maximum Uncontrolled Emissions (tons/yr)	6f) Pollution Control Efficiency (%)	6g) Maximum Controlled HAP Emissions (tons/yr)	6h) Limited Controlled Emissions (tons/yr)
Styrene	900	5,500	4.95	21.68	0.00%	21.68	2.85

7) Operating Limitations, if applicable:

Styrene is present in the EPS beads at a maximum concentration of 900 ppmw. Maximum quantity of EPS beads that can be processed while staying below the 225 tpy VOC limit is 3169.01 tons/yr (225 tpy VOC / 7.1% = 3169.01 tpy EPS Beads). The available site specific testing regarding the percentage of styrene emitted will not be used in the PTE calculations because the test is over ten years old and doesn't affect any applicability requirements due to the 225 tpy VOC limit.

Minnesota Pollution Control Agency
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EC-01

General Emissions Calculation Form

Air Quality Permit Program

\\pca.state.mn.us\sdrive\Public\Bosman_Erin.EB\4229 Kingspan Insulation\[PCA PTE Calculations.xlsx]EQUI 2 Pre Expander 1

Use this form to calculate the actual emissions for processes or process units that cannot be accounted for in process/unit specific emission calculation forms. Duplicate this form as necessary to identify all emission units, or attach sheets with equivalent information.

1a) AQD Facility ID No.: **17100085** **1b) AQ File No.** 2273B

2) Facility Name: **Kingspan Insulation LLC - West**

3) Emission Unit Identification Number: **EQUI 2 Pre Expander No.1**

4) Stack/Vent Designation Number: **STRU 5**

5) Pollution Control Equipment Identification Number:

6) Process Type: ☑ Batch Process ☐ Continuous Process

7) Operating Capacity: **2.75** Units: **ton/hr**

8) Source of Emission Factors used in table below: **Mass Balance Based on Engineering Data, must assume 100% of VOCs (pentane + styrene emitted. Assume 50% VOCs emitted at pre-expansion, 50% VOCs emitted at molding.**

9) Calculations Summary

9a) Pollutant	9b) Emission Factor (lbs/ton)	9c) Emission Rate (lbs/hr)	9d) Maximum Uncontrolled Emissions (tons/yr)	9e) Actual Uncontrolled Emissions (tons/yr)	9f) Pollution Control Efficiency (%)	9g) Maximum Controlled Emissions (tons/yr)	9h) Actual Controlled Emissions (tons/yr)	9i) Limited Controlled Emissions (tons/yr)
PM								
PM_{10}								
PM2.5								
SO_2								
NO_x								
VOC	140	385.00	843.15	NA	NA	843.15	NA	**225
CO								
Lead								
Styrene	1.80	4.95	10.84	NA	NA	10.84	NA	*2.85

10) Check all of the following that are appropriate:

☐ This process/unit combusts fuel. Include fuel combustion emissions on Form EC-02 (Boilers), EC-03 (Internal Combustion Engines), or EC-08 (Ovens, Dryers, Furnaces), as appropriate.

☐ This process/unit uses clean-up solvents in addition to the process described by the emissions above. Include clean-up solvent emissions on Form EC-12.

☑ This process/unit emits Hazardous Air Pollutants (HAPs). Include HAP emissions on Form EC-13A (VOC HAPs), EC-13B (Particulate HAPs), or EC-13C (Combustion HAPs), as appropriate

11) Operating Limitations, if applicable:

**** 225 tpy emission cap on all equipment in COMG 2**

***** PTE of styrene for COMG 2 = 2.85 tpy**

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St. Paul, MN 55155-4194

EC-01

General Emissions Calculation Form

Air Quality Permit Program

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Use this form to calculate the actual emissions for processes or process units that cannot be accounted for in process/unit specific emission calculation forms. Duplicate this form as necessary to identify all emission units, or attach sheets with equivalent information.

1a) AQD Facility ID No.: **17100085** **1b) AQ File No.** 2273B

2) Facility Name: **Kingspan Insulation LLC - West**

3) Emission Unit Identification Number: **EQUI 4 Molder**

4) Stack/Vent Designation Number: **STRU 6**

5) Pollution Control Equipment Identification Number:

6) Process Type: ☑ Batch Process ☐ Continuous Process

7) Operating Capacity: **2.75** Units: **ton/hr**

8) Source of Emission Factors used in table below: **Mass Balance Based on Engineering Data, must assume 100% of VOC (pentane + styrene) emitted. Assume 50% VOCs emitted at pre-expansion, 50% VOCs emitted at molding.**

9) Calculations Summary

All expanded beads go to either the block mold (EQUI 4) or one of the mold presses. Expanded beads can only molded once. Keep in mind that the sum of the the unit-by-unit PTEs is not really the facility PTE - this assumes EACH bead is expanded once and molded three times in each molder. This is not physically possible, but gives a rough conservative estimate of the total facility PTE.

9a) Pollutant	9b) Emission Factor (lbs/ton)	9c) Emission Rate (lbs/hr)	9d) Maximum Uncontrolled Emissions (tons/yr)	9e) Actual Uncontrolled Emissions (tons/yr)	9f) Pollution Control Efficiency (%)	9g) Maximum Controlled Emissions (tons/yr)	9h) Actual Controlled Emissions (tons/yr)	9i) Limited Controlled Emissions (tons/yr)
PM								
PM_{10}								
PM2.5								
SO_2								
NO_x								
VOC	140	385.00	843.15	NA	NA	843.15	NA	**225
CO								
Lead								
Styrene	1.80	4.95	10.84	NA	NA	10.84	NA	*2.85

10) Check all of the following that are appropriate:

☐ This process/unit combusts fuel. Include fuel combustion emissions on Form EC-02 (Boilers), EC-03 (Internal Combustion Engines), or EC-08 (Ovens, Dryers, Furnaces), as appropriate.

☐ This process/unit uses clean-up solvents in addition to the process described by the emissions above. Include clean-up solvent emissions on Form EC-12.

☑ This process/unit emits Hazardous Air Pollutants (HAPs). Include HAP emissions on Form EC-13A (VOC HAPs), EC-13B (Particulate HAPs), or EC-13C (Combustion HAPs), as appropriate

11) Operating Limitations, if applicable:

**** 225 tpy emission cap on all equipment in COMG 2**

***** PTE of styrene for COMG 2 = 2.85 tpy**

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EC-01

General Emissions Calculation Form

Air Quality Permit Program

\\pca.state.mn.us\sdrive\Public\Bosman_Erin.EB\4229 Kingspan Insulation\[PCA PTE Calculations.xlsx]EQUI 6 Mold Press 1

Use this form to calculate the actual emissions for processes or process units that cannot be accounted for in process/unit specific emission calculation forms. Duplicate this form as necessary to identify all emission units, or attach sheets with equivalent information.

1a) AQD Facility ID No.: **17100085** **1b) AQ File No.** 2273B

2) Facility Name: **Minnesota Diversified Products, Inc. - West**

3) Emission Unit Identification Number: **EQUI 6 - Mold Press -Pressing Equipment**

4) Stack/Vent Designation Number: **STRU 8**

5) Pollution Control Equipment Identification Number:

6) Process Type: ☑ Batch Process ☐ Continuous Process

7) Operating Capacity: **0.13** Units: **ton/hr**

8) Source of Emission Factors used in table below: **Mass Balance Based on Engineering Data, must assume 100% of VOC (pentane + styrene) emitted. Assume 50% VOCs emitted at pre-expansion, 50% VOCs emitted at molding.**

9) Calculations Summary

All expanded beads go to either the block mold (EQUI 4) or one of the mold presses. Expanded beads can only molded once. Keep in mind that the sum of the the unit-by-unit PTEs is not really the facility PTE - this assumes EACH bead is expanded once and molded three times in each molder. This is not physically possible, but gives a rough conservative estimate of the total facility PTE.

9a) Pollutant	9b) Emission Factor (lbs/ton)	9c) Emission Rate (lbs/hr)	9d) Maximum Uncontrolled Emissions (tons/yr)	9e) Actual Uncontrolled Emissions (tons/yr)	9f) Pollution Control Efficiency (%)	9g) Maximum Controlled Emissions (tons/yr)	9h) Actual Controlled Emissions (tons/yr)	9i) Limited Controlled Emissions (tons/yr)
PM								
PM_{10}								
PM2.5								
SO_2								
NO_x								
VOC	140.00	17.64	38.63	NA	NA	38.63	NA	**225
CO								
Lead								
Styrene	1.80	0.23	0.50	NA	NA	0.50	NA	*2.85

10) Check all of the following that are appropriate:

☐ This process/unit combusts fuel. Include fuel combustion emissions on Form EC-02 (Boilers), EC-03 (Internal Combustion Engines), or EC-08 (Ovens, Dryers, Furnaces), as appropriate.

☐ This process/unit uses clean-up solvents in addition to the process described by the emissions above. Include clean-up solvent emissions on Form EC-12.

☑ This process/unit emits Hazardous Air Pollutants (HAPs). Include HAP emissions on Form EC-13A (VOC HAPs), EC-13B (Particulate HAPs), or EC-13C (Combustion HAPs), as appropriate

11) Operating Limitations, if applicable:

**** 225 tpy emission cap on all equipment in COMG 2**

***** PTE of styrene for COMG 2 = 2.85 tpy**

Minnesota Pollution Control Agency
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EC-01

General Emissions Calculation Form

Air Quality Permit Program

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Use this form to calculate the actual emissions for processes or process units that cannot be accounted for in process/unit specific emission calculation forms. Duplicate this form as necessary to identify all emission units, or attach sheets with equivalent information.

1a) AQD Facility ID No.: **17100085** **1b) AQ File No.** 2273B

2) Facility Name: **Kingspan Insulation LLC - West**

3) Emission Unit Identification Number: **EQUI 7 Mold Press**

4) Stack/Vent Designation Number: **STRU 1**

5) Pollution Control Equipment Identification Number:

6) Process Type: ☑ Batch Process ☐ Continuous Process

7) Operating Capacity: **0.18** Units: **ton/hr**

8) Source of Emission Factors used in table below: **Mass Balance Based on Engineering Data, must assume 100% of VOC (pentane + styrene) emitted. Assume 50% VOCs emitted at pre-expansion, 50% VOCs emitted at molding.**

9) Calculations Summary

All expanded beads go to either the block mold (EQUI 4) or one of the mold presses. Expanded beads can only molded once. Keep in mind that the sum of the the unit-by-unit PTEs is not really the facility PTE - this assumes EACH bead is expanded once and molded three times in each molder. This is not physically possible, but gives a rough conservative estimate of the total facility PTE.

9a) Pollutant	9b) Emission Factor (lbs/ton)	9c) Emission Rate (lbs/hr)	9d) Maximum Uncontrolled Emissions (tons/yr)	9e) Actual Uncontrolled Emissions (tons/yr)	9f) Pollution Control Efficiency (%)	9g) Maximum Controlled Emissions (tons/yr)	9h) Actual Controlled Emissions (tons/yr)	9i) Limited Controlled Emissions (tons/yr)
PM								
PM_{10}								
PM2.5								
SO_2								
NO_x								
VOC	140.00	24.50	53.66	NA	NA	53.66	NA	**225
CO								
Lead								
Styrene	1.80	0.32	0.69	NA	NA	0.69	NA	*2.85

10) Check all of the following that are appropriate:

☐ This process/unit combusts fuel. Include fuel combustion emissions on Form EC-02 (Boilers), EC-03 (Internal Combustion Engines), or EC-08 (Ovens, Dryers, Furnaces), as appropriate.

☐ This process/unit uses clean-up solvents in addition to the process described by the emissions above. Include clean-up solvent emissions on Form EC-12.

☑ This process/unit emits Hazardous Air Pollutants (HAPs). Include HAP emissions on Form EC-13A (VOC HAPs), EC-13B (Particulate HAPs), or EC-13C (Combustion HAPs), as appropriate

11) Operating Limitations, if applicable:

**** 225 tpy emission cap on all equipment in COMG 2**

***** PTE of styrene for COMG 2 = 2.85 tpy**

Equipment subject to the Industrial Process Equipment (IPE) Rule
Minn. R. 7011.0730 (Table 1) and 7011.0735 (Table 2)

Under the rule, the allowable is the higher of Table 1 or Table 2.
There is no gas volume associated with the insignificant activities as they vent to the building, therefore, Table 1 only is used for these sources.

Using Table 1

Emission Unit	Process Weight Rate (lb/hr)	Table 1 (lb/hr)	PTE Comparison to Limit
IA Hot Wire	6800	7.7	0.14%
IA Grinding	1088	2.5	8.0%

Under the rule, the allowable is the higher of Table 1 or Table 2. For these activities there is no "process weight" that can be associated with generating particulate matter; therefore, Table 2 only is used for these sources.

Using Table 2

Emission Unit	Stack	Airflow (acfm)	gas temp	DSCFM	Table 2 (gr/dscf)	Table 2 (lb/hr)
EQUI2	STRU5	500	160	426	0.1000	0.36
EQUI4	STRU6	500	160	426	0.1000	0.36
EQUI6	STRU7	500	160	426	0.1000	0.36
EQUI7	STRU1	500	160	426	0.1000	0.36

None of the above units are reasonably expected to generate particulate matter.

Natural Gas

EQUI ID	EQUI 1
Heat Input (MMBtu/hr)	8.5
Fuel Usage (MMSCF/hr)	0.008333333
Unlimited Operating Hours	8760
Limited Operating Hours	8760
Firing Type	Small, Uncontrolled

Pollutant	AP-42 Emission Factor (lb/MMSCF)	Other Emission Factor (lb/MMscf)	Control Efficiency (%)	Unrestriced Emission Rate (lb/hr)	Controlled Emission Rate (lb/hr)	Unrestricted Emissions (tpy)	Limited Emissions (tpy)
Particulate Matter	7.60E+00			6.33E-02	6.33E-02	2.77E-01	2.77E-01
PM < 10 micron	7.60E+00			6.33E-02	6.33E-02	2.77E-01	2.77E-01
PM < 2.5 micron	7.60E+00			6.33E-02	6.33E-02	2.77E-01	2.77E-01
Nitrogen Oxides	1.00E+02			8.33E-01	8.33E-01	3.65E+00	3.65E+00
Carbon Monoxide	8.40E+01			7.00E-01	7.00E-01	3.07E+00	3.07E+00
Sulfur Dioxide	6.00E-01			5.00E-03	5.00E-03	2.19E-02	2.19E-02
Volatile Organic Compounds	5.50E+00			4.58E-02	4.58E-02	2.01E-01	2.01E-01
Lead Compounds	5.00E-04			4.17E-06	4.17E-06	1.83E-05	1.83E-05
HAPs - Total	1.89E+00			1.57E-02	1.57E-02	6.89E-02	6.89E-02
Carbon Dioxide	1.17E+02			9.94E+02	9.94E+02	4.36E+03	4.36E+03
Methane	2.20E-03			1.87E-02	1.87E-02	8.21E-02	8.21E-02
Nitrous Oxide	2.20E-04			1.87E-03	1.87E-03	8.21E-03	8.21E-03
Carbon Dioxide Equivalent	1.17E+02			9.95E+02	9.95E+02	4.36E+03	4.36E+03
1,4-Dichlorobenzene (para-)	1.20E-03			1.00E-05	1.00E-05	4.38E-05	4.38E-05
Arsenic compounds	2.00E-04			1.67E-06	1.67E-06	7.30E-06	7.30E-06
Benzene	2.10E-03			1.75E-05	1.75E-05	7.67E-05	7.67E-05
Beryllium compounds	1.20E-05			1.00E-07	1.00E-07	4.38E-07	4.38E-07
Cadmium compounds	1.10E-03			9.17E-06	9.17E-06	4.02E-05	4.02E-05
Chromium compounds	1.40E-03			1.17E-05	1.17E-05	5.11E-05	5.11E-05
Cobalt compounds	8.40E-05			7.00E-07	7.00E-07	3.07E-06	3.07E-06
Formaldehyde	7.50E-02			6.25E-04	6.25E-04	2.74E-03	2.74E-03
Hexane	1.80E+00			1.50E-02	1.50E-02	6.57E-02	6.57E-02
Manganese compounds	3.80E-04			3.17E-06	3.17E-06	1.39E-05	1.39E-05
Mercury	2.60E-04			2.17E-06	2.17E-06	9.49E-06	9.49E-06
Naphthalene	6.10E-04			5.08E-06	5.08E-06	2.23E-05	2.23E-05
Nickel compounds	2.10E-03			1.75E-05	1.75E-05	7.67E-05	7.67E-05
Polycyclic organic matter (POM)	6.98E-04			5.82E-06	5.82E-06	2.55E-05	2.55E-05
Selenium compounds	2.40E-05			2.00E-07	2.00E-07	8.76E-07	8.76E-07
Toluene	3.40E-03			2.83E-05	2.83E-05	1.24E-04	1.24E-04

Other Emission Factor and/or Control Efficiency Factor Notes:

Notes for AP-42, Section 1.4 Calculations:

Emission factors for CO2, CH4, and N2O are from 40 CFR Part 98, Subpart C, Table C-1 and C-2 (November 29, 2013). CO2e emissions are based on global warming potentials from 40 CFR Part 98, Subpart A, Table A-1 (CO2 = 1, CH4 = 25, and N2O = 298) (November 29, 2013).

Firing Options

Large, Uncontrolled Pre-NSPS
Large, Uncontrolled Post-NSPS
Large, Controlled Low Nox
Large, Controlled, Flue Gas Recirculation
Small, Uncontrolled
Small, Controlled Low NOx burners
Small, Controlled, Flue Gas Recirculation
Tangential Fired, Uncontrolled
Tangential Fired, Controlled, Flue Gas Recirculation
Residential, Uncontrolled

Natural Gas

EQUI ID	IA - Heaters
Heat Input (MMBTU/hr)	0.3
Fuel Usage (MMSCF/hr)	0.000294118
Unlimited Operating Hours	8760
Limited Operating Hours	8760
Firing Type	Small, Uncontrolled

Pollutant	AP-42 Emission Factor (lb/MMSCF)	Other Emission Factor (lb/MMscf)	Control Efficiency (%)	Unrestriced Emission Rate (lb/hr)	Controlled Emission Rate (lb/hr)	Unrestricted Emissions (tpy)	Limited Emissions (tpy)
Particulate Matter	7.60E+00			2.24E-03	2.24E-03	9.79E-03	9.79E-03
PM < 10 micron	7.60E+00			2.24E-03	2.24E-03	9.79E-03	9.79E-03
PM < 2.5 micron	7.60E+00			2.24E-03	2.24E-03	9.79E-03	9.79E-03
Nitrogen Oxides	1.00E+02			2.94E-02	2.94E-02	1.29E-01	1.29E-01
Carbon Monoxide	8.40E+01			2.47E-02	2.47E-02	1.08E-01	1.08E-01
Sulfur Dioxide	6.00E-01			1.76E-04	1.76E-04	7.73E-04	7.73E-04
Volatile Organic Compounds	5.50E+00			1.62E-03	1.62E-03	7.09E-03	7.09E-03
Lead Compounds	5.00E-04			1.47E-07	1.47E-07	6.44E-07	6.44E-07
HAPs - Total	1.89E+00			5.55E-04	5.55E-04	2.43E-03	2.43E-03
Carbon Dioxide	1.17E+02			3.51E+01	3.51E+01	1.54E+02	1.54E+02
Methane	2.20E-03			6.61E-04	6.61E-04	2.90E-03	2.90E-03
Nitrous Oxide	2.20E-04			6.61E-05	6.61E-05	2.90E-04	2.90E-04
Carbon Dioxide Equivalent	1.17E+02			3.51E+01	3.51E+01	1.54E+02	1.54E+02
1,4-Dichlorobenzene (para-)	1.20E-03			3.53E-07	3.53E-07	1.55E-06	1.55E-06
Arsenic compounds	2.00E-04			5.88E-08	5.88E-08	2.58E-07	2.58E-07
Benzene	2.10E-03			6.18E-07	6.18E-07	2.71E-06	2.71E-06
Beryllium compounds	1.20E-05			3.53E-09	3.53E-09	1.55E-08	1.55E-08
Cadmium compounds	1.10E-03			3.24E-07	3.24E-07	1.42E-06	1.42E-06
Chromium compounds	1.40E-03			4.12E-07	4.12E-07	1.80E-06	1.80E-06
Cobalt compounds	8.40E-05			2.47E-08	2.47E-08	1.08E-07	1.08E-07
Formaldehyde	7.50E-02			2.21E-05	2.21E-05	9.66E-05	9.66E-05
Hexane	1.80E+00			5.29E-04	5.29E-04	2.32E-03	2.32E-03
Manganese compounds	3.80E-04			1.12E-07	1.12E-07	4.90E-07	4.90E-07
Mercury	2.60E-04			7.65E-08	7.65E-08	3.35E-07	3.35E-07
Naphthalene	6.10E-04			1.79E-07	1.79E-07	7.86E-07	7.86E-07
Nickel compounds	2.10E-03			6.18E-07	6.18E-07	2.71E-06	2.71E-06
Polycyclic organic matter (POM)	6.98E-04			2.05E-07	2.05E-07	8.99E-07	8.99E-07
Selenium compounds	2.40E-05			7.06E-09	7.06E-09	3.09E-08	3.09E-08
Toluene	3.40E-03			1.00E-06	1.00E-06	4.38E-06	4.38E-06

Other Emission Factor and/or Control Efficiency Factor Notes:

Firing Options

Large, Uncontrolled
Pre-NSPS

Large, Uncontrolled
Post-NSPS

Large, Controlled
Low Nox

Large, Controlled, Flue Gas Recirculation

Small, Uncontrolled

Small, Controlled
Low NOx burners

Small, Controlled, Flue Gas Recirculation

Tangential Fired, Uncontrolled

Tangential Fired, Controlled, Flue Gas Recirculation

Residential, Uncontrolled

Minnesota Pollution Control Agency
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EC-01
General Emissions Calculation Form
Air Quality Permit Program

\\pca.state.mn.us\ad\net\Public\Boerman_Erin.EB4229 Kingspan Insulation\[PCA PTE Calculations.xls]A Hot Wire

Use this form to calculate the actual emissions for processes or process units that cannot be accounted for in process/unit specific emission calculation forms. Duplicate this form as necessary to identify all emission units, or attach sheets with equivalent information.

1a) AQD Facility ID No.: 17100085 **1b) AQ File No.** 2273B

2) Facility Name: Kingspan Insulation LLC - West

3) Emission Unit Identification Number: Hot Wire Cutters (Insignificant Activity)

4) Stack/Vent Designation Number: Vented inside building

5) Pollution Control Equipment Identification Number:

6) Process Type: ☑ Batch Process ☐ Continuous Process

7) Operating Capacity: 18.60 Units: lb/hr or 0.35 MMBTU/hr (see calculation below)

8) Source of Emission Factors used in table below: The Permittee did an engineering study where material was weighed before and after cutting to determine the PTE of these operations as part of the original 1999 permit application. As part of the first reissuance application, the Permittee submitted new PTE estimates using two methods: a mass balance approach adjusted for water and pentane content of the board (compounds that would not be emitted as particulate) and a combustion-based PTE estimate since the cutters are in a sense "burning" the boards in order to cut them. Both calculations are rough estimates and are only intended for applicability purposes. The combustion approach is relied upon for this application.

Fuel Type: HC	Heat Value:	15272 Btu/lb	Fuel Consumption Rate:	18.6 lbs/hr
Equivalent to a Btu rating of:			0.284	MMBtu/hr
Equivalent #6 fuel rating		(see below)	0.35	MMBtu/hr
Equivalent #6 gallons		0.15 MMBtu/gallon	2.36	gallons/hr
Equivalent #6 gallons - 1000 gallons/hr			**0.00236**	1000 gallons/hour

9) Calculations Summary - Primary Fuel: HC - Treat as #6 - similar BTU/lb - uses 0.00235 1000 gal/hr as calculated above

9a) Pollutant	9b) Emission Factor (lbs/1000 gal)[1]	9c) Emission Rate (lbs/hr)	9d) Maximum Uncontrolled Emissions (tons/yr)	9e) Actual Uncontrolled Emissions (tons/yr)	9f) Pollution Control Efficiency (%)	9g) Maximum Controlled Emissions (tons/yr)	9h) Actual Controlled Emissions (tons/yr)	9i) Limited Controlled Emissions (tons/yr)
PM	4.7	0.01	0.05	NA	0.00%	0.05	NA	0.05
PM_{10}	4.7	0.01	0.05	NA	0.00%	0.05	NA	0.05
$PM_{2.5}$	4.7	0.01	0.05	NA	0.00%	0.05	NA	0.05
SO_2	0.00	0.00	0.00	NA	0.00%	0.00	NA	0.00
NO_x	55	0.13	0.57	NA	0.00%	0.57	NA	0.57
VOC	1.13	2.67E-03	0.012	NA	0.00%	0.012	NA	0.012
CO	5	0.01	0.05	NA	0.00%	0.05	NA	0.05
Lead	0.00E+00	0.00	0.00	NA	0.00%	0.00	NA	0.00

[1] Emission Factors from AP-42, Chapter 1.3, dated 5/10; used 3.22 + 1.5 for PM because S = 0

10) Check all of the following that are appropriate:

☐ This process/unit combusts fuel. Include fuel combustion emissions on Form EC-02 (Boilers), EC-03 (Internal Combustion Engines), or EC-08 (Ovens, Dryers, Furnaces), as appropriate.

☐ The cyclone/fabric filter associated with this equipment is considered process equipment with respect to CAM because all material collected is used in the process.

☐ This process/unit emits Hazardous Air Pollutants (HAPs). Include HAP emissions on Form EC-13A (VOC HAPs), EC-13B (Particulate HAPs), or EC-13C (Combustion HAPs), as appropriate

11) Operating Limitations, if applicable:
This emission unit qualifies as an Insignificant Activity as the maximum emissions are below 2000 lbs per year according to Minn. R. 7007.1300, Subp. 3(F).

Hot Wire Cutter Emission Calculations (continued)

Calculation of Material Loss Rate

Loss rate of material:	0.0029	lbs/lb	from facility mass balance
Material Process Rate	**6800**	lbs/hr	maximum This is an updated value - maximum hourly rate.
Material Loss	19.72	lbs/hr	maximum
Water Content	4%		from facility analysis
Pentane Content	1.90%		Pentane losses are accounted for via overall facility pentane use calculations. This value from literature.
Total Deductions	1.16	lbs/hr	maximum
Net Material Loss	18.6	lbs/hr	maximum

Compare Btu Values:

	lbs/gallon	Btu/gallon	Btu/lb	Ratio to HC
Residual	7.88	150,000	19,036	80%
Dist. Oil	7.05	140,000	19,858	
Gasoline	6.17	130,000	21,070	
Propane	4.24	94,000	22,170	
MDP HC			15,272	

Pollutant	Limited Emissions (tpy)	Limited Emissions (lb/yr)	MN Rule 7007.1300 Subp 3(F) lb/yr	MN Rule 7007.1300 Subp 3(F) tpy	Above Threshold?
PM	0.05	97.18	2,000	1.0	No
PM_{10}	0.05	97.18	2,000	1.0	No
$PM_{2.5}$	0.05	97.18	-	-	-
SO_x	0.00	0.00	2,000	1.0	No
NO_x	0.57	1137.24	2,000	1.0	No
VOC	0.01	23.37	2,000	1.0	No
CO	0.05	103.39	4,000	2.0	No
Lead	0.00	0.0E+00	-	-	-

Thresholds as listed in MN Rules

		MN Rule 7007.1300 Subp 3(F) [lb/yr]	MN Rule 7007.1300 Subp 3(F) [tpy]
3.F.1	CO	4000	-
3.F.2	NOx, SO2, PM, PM10, VOC, O3	2000	-
3.F.3	CO2e	-	1000

Minnesota Pollution Control Agency
520 Lafayette Road North
St. Paul, MN 55155-4194

EC-17

Greenhouse Gas Emissions

Air Quality Permit Program

Doc Type: Permit Application

1a) AQ Facility ID No.: **17100085** 1b) AQ File No.: 2273B

2) Facility Name: **Kingspan Insulation LLC - West**

3) Emission unit ID number: **Hot Wire Cutters (IA)**

4) Stack/Vent designation number(s): Vented inside building

5) Control equipment number(s): N/A

6) Operating Limitations, if applicable: None

7) Greenhouse Gas Emissions Summary.

Maximum Rated Capacity: **0.35 MMBtu/hr**

Fuel Parameters:

Fuel Type	Heat Value	Fuel Consumption Rate
Natural Gas	0.15 MMBtu/gallon	2.36 gallons/hr

Natural Gas

7a)	7b)	7c)	7d)			7e)	7f)			7g)			7h)	
GHG Pollutant	**GWP**	**Emission Factor**	**Uncontrolled Emission Rate**			**Pollution Control Efficiency**	**Controlled Emission Rate**			**Limited and Controlled Emission Rate**			**Expected Actual Controlled Emission Rate [2]**	
		(lb/MMbtu)[1]	(lb/hr)	(tpy)	**CO_2e (tpy)**	(%)	(lb/hr)	(tpy)	**CO_2e (tpy)**	(lb/hr)	(tpy)	**CO_2e (tpy)**	(tpy)	**CO_2e (tpy)**
CO_2	1	165.57	59	257	257	0.0%	59	257	257	59	257	257	NA	NA
CH_4	28	6.61E-03	2.34E-03	1.03E-02	0.3	0.0%	2.34E-03	1.03E-02	0.3	2.34E-03	1.03E-02	0.3	NA	NA
N_2O	265	1.32E-03	4.68E-04	2.05E-03	0.5	0.0%	4.68E-04	2.05E-03	0.5	4.68E-04	2.05E-03	0.5	NA	NA
HFCs		N/A	--	--	--	--	--	--	--	--	--	--	--	--
PFCs		N/A	--	--	--	--	--	--	--	--	--	--	--	--
SF_6	23,500	N/A	--	--	--	--	--	--	--	--	--	--	--	--
Total GHG (CO_2e)					258				258			258		NA

[1] - See the Emission Factor sheet for the selection of the emission factor for the process. Emissions factors from 40 CFR 98, subp. C.

Thresholds as listed in MN Rules

		MN Rule 7007.1300 Subp 3(F) [lb/yr]	MN Rule 7007.1300 Subp 3(F) [tpy]
3.F.1	CO	4000	-
3.F.2	NOx, SO2, PM, PM10, VOC, O3	2000	-
3.F.3	CO2e	-	1000

MN Rule 7007.1300 Subp 3(F) (tpy)	Above Threshold ?
-	-
-	-
-	-
1,000	**No**

Minnesota Pollution Control Agency
520 Lafayette Road North
St. Paul, MN 55155-4194

EC-01

General Emissions Calculation Form

Air Quality Permit Program

\\pca.state.mn.us\sdrive\Public\Bosman_Erin.EB\4229 Kingspan Insulation\[PCA PTE Calculations.xlsx]IA Grinding

Use this form to calculate the actual emissions for processes or process units that cannot be accounted for in process/unit specific emission calculation forms. Duplicate this form as necessary to identify all emission units, or attach sheets with equivalent information.

1a) AQD Facility ID No.: 17100085 **1b) AQ File No.** 2273B

2) Facility Name: Kingspan Insulation LLC - West

3) Emission Unit Identification Number: EPS Milling, Planing, Cutting, and Grinding Equipment (Insignificant Activity)

4) Stack/Vent Designation Number: NA

5) Pollution Control Equipment Identification Number:

6) Process Type: ☑ Batch Process ☐ Continuous Process

7) Operating Capacity: 0.54 Units: ton/hr

8) Source of Emission Factors used in table below: AP-42 Section 11.28 Vermiculite Processing (11/1995), Product Grinding with fabric filter

9) Calculations Summary

9a) Pollutant	9b) Emission Factor (lbs/ton)	9c) Emission Rate (lbs/hr)	9d) Maximum Uncontrolled Emissions (tons/yr)	9e) Actual Uncontrolled Emissions (tons/yr)	9f) Pollution Control Efficiency (%)	9g) Maximum Controlled Emissions (tons/yr)	9h) Actual Controlled Emissions (tons/yr)	9i) Limited Controlled Emissions (tons/yr)
PM	0.36	0.20	0.86	NA	0.00%	0.86	NA	0.86
PM_{10}	0.36	0.20	0.86	NA	0.00%	0.86	NA	0.86
$PM_{2.5}$	0.36	0.20	0.86	NA	0.00%	0.86	NA	0.86
SO_2								
NO_x								
VOC								
CO								
Lead								

10) Check all of the following that are appropriate:

☐ This process/unit combusts fuel. Include fuel combustion emissions on Form EC-02 (Boilers), EC-03 (Internal Combustion Engines), or EC-08 (Ovens, Dryers, Furnaces), as appropriate.

☐ This process/unit uses clean-up solvents in addition to the process described by the emissions above. Include clean-up solvent emissions on Form EC-12.

☐ This process/unit emits Hazardous Air Pollutants (HAPs). Include HAP emissions on Form EC-13A (VOC HAPs), EC-13B (Particulate HAPs), or EC-13C (Combustion HAPs), as appropriate

11) Operating Limitations, if applicable:

This emission unit qualifies as an Insignificant Activity as the maximum emissions are below 2000 lbs per year according to Minn. R. 7007.1300, Subp. 3(F). The cyclone/fabric filter associated with this equipment is considered process equipment with respect to CAM because all material collected is used in the process.

Natural Gas

EQUI ID	IA - Makeup Air
Heat Input (MMBtu/hr)	1.469
Fuel Usage (MMSCF/hr)	0.001440196
Unlimited Operating Hours	8760
Limited Operating Hours	8760
Firing Type	Small, Uncontrolled

Pollutant	AP-42 Emission Factor (lb/MMSCF)	Other Emission Factor (lb/MMscf)	Control Efficiency (%)	Unrestriced Emission Rate (lb/hr)	Controlled Emission Rate (lb/hr)	Unrestricted Emissions (tpy)	Limited Emissions (tpy)
Particulate Matter	7.60E+00			1.09E-02	1.09E-02	4.79E-02	4.79E-02
PM < 10 micron	7.60E+00			1.09E-02	1.09E-02	4.79E-02	4.79E-02
PM < 2.5 micron	7.60E+00			1.09E-02	1.09E-02	4.79E-02	4.79E-02
Nitrogen Oxides	1.00E+02			1.44E-01	1.44E-01	6.31E-01	6.31E-01
Carbon Monoxide	8.40E+01			1.21E-01	1.21E-01	5.30E-01	5.30E-01
Sulfur Dioxide	6.00E-01			8.64E-04	8.64E-04	3.78E-03	3.78E-03
Volatile Organic Compounds	5.50E+00			7.92E-03	7.92E-03	3.47E-02	3.47E-02
Lead Compounds	5.00E-04			7.20E-07	7.20E-07	3.15E-06	3.15E-06
HAPs - Total	1.89E+00			2.72E-03	2.72E-03	1.19E-02	1.19E-02
Carbon Dioxide	1.17E+02			1.72E+02	1.72E+02	7.53E+02	7.53E+02
Methane	2.20E-03			3.24E-03	3.24E-03	1.42E-02	1.42E-02
Nitrous Oxide	2.20E-04			3.24E-04	3.24E-04	1.42E-03	1.42E-03
Carbon Dioxide Equivalent	1.17E+02			1.72E+02	1.72E+02	7.53E+02	7.53E+02
1,4-Dichlorobenzene (para-)	1.20E-03			1.73E-06	1.73E-06	7.57E-06	7.57E-06
Arsenic compounds	2.00E-04			2.88E-07	2.88E-07	1.26E-06	1.26E-06
Benzene	2.10E-03			3.02E-06	3.02E-06	1.32E-05	1.32E-05
Beryllium compounds	1.20E-05			1.73E-08	1.73E-08	7.57E-08	7.57E-08
Cadmium compounds	1.10E-03			1.58E-06	1.58E-06	6.94E-06	6.94E-06
Chromium compounds	1.40E-03			2.02E-06	2.02E-06	8.83E-06	8.83E-06
Cobalt compounds	8.40E-05			1.21E-07	1.21E-07	5.30E-07	5.30E-07
Formaldehyde	7.50E-02			1.08E-04	1.08E-04	4.73E-04	4.73E-04
Hexane	1.80E+00			2.59E-03	2.59E-03	1.14E-02	1.14E-02
Manganese compounds	3.80E-04			5.47E-07	5.47E-07	2.40E-06	2.40E-06
Mercury	2.60E-04			3.74E-07	3.74E-07	1.64E-06	1.64E-06
Naphthalene	6.10E-04			8.79E-07	8.79E-07	3.85E-06	3.85E-06
Nickel compounds	2.10E-03			3.02E-06	3.02E-06	1.32E-05	1.32E-05
Polycyclic organic matter (POM)	6.98E-04			1.01E-06	1.01E-06	4.40E-06	4.40E-06
Selenium compounds	2.40E-05			3.46E-08	3.46E-08	1.51E-07	1.51E-07
Toluene	3.40E-03			4.90E-06	4.90E-06	2.14E-05	2.14E-05

Other Emission Factor and/or Control Efficiency Factor Notes:

Notes for AP-42, Section 1.4 Calculations:

Emission factors for CO2, CH4, and N2O are from 40 CFR Part 98, Subpart C, Table C-1 and C-2 (November 29, 2013). CO2e emissions are based on global warming potentials from 40 CFR Part 98, Subpart A, Table A-1 (CO2 = 1, CH4 = 25, and N2O = 298) (November 29, 2013).

Firing Options

Large, Uncontrolled Pre-NSPS
Large, Uncontrolled Post-NSPS
Large, Controlled Low Nox
Large, Controlled, Flue Gas Recirculation
Small, Uncontrolled
Small, Controlled Low NOx burners
Small, Controlled, Flue Gas Recirculation
Tangential Fired, Uncontrolled
Tangential Fired, Controlled, Flue Gas Recirculation
Residential, Uncontrolled

Conversion of Boiler PTE from lb/hr to lb/MMBtu:

6.33E-02	lb/hr
8.5	MMBtu/hr
7.5E-03	**lb/MMBtu**

Conversion from lb/MMscf to lb/MMBtu [1] for IA Heaters and IA Air Makeup Unit:

7.60E+00	lb/MMscf
7.5E-03	**lb/MMBtu**

[1] AP-42 1.4 Reference 11

Emission Factors

AP-42, Section 1.1 Emission Factors for Bituminous and Sub-bituminous Coal [1,2]

	PC, dry bottom, wall-fired, bituminous Pre-NSPS	PC, dry bottom, wall-fired, bituminous, Pre-NSPS with low-NOx burner	PC, dry bottom, wall-fired, bituminous NSPS	PC, dry bottom, wall-fired, sub-bituminous Pre-NSPS	PC, dry bottom, wall-fired, sub-bituminous NSPS	PC, dry bottom, cell burner fired, bituminous	PC, dry bottom, cell burner fired, sub-bituminous	PC, dry bottom, tangentially fired, bituminous, Pre-NSPS	PC, dry bottom, tangentially fired, bituminous, Pre-NSPS with low-NOx burner	PC, dry bottom, tangentially fired, bituminous, NSPS
Parameter Code	lb/ton									
Particulate Matter	10	10	10	10	10	10	10	10	10	10
PM < 10 micron	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
PM < 2.5 micron	0.6	0.6	0.6	2.3	2.3	2.3	2.3	0.6	0.6	0.6
Nitrogen Oxides	22	11	12	12	7.4	31	14	15	9.7	10
Carbon Monoxide	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Sulfur Dioxide	38	38	38	35	35	38	35	38	38	38
Volatile Organic Compounds	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
Lead Compounds	4.20E-04	4.20E-04	4.20E-04	4.20E-04	4.20E-04	4.20E-04	4.20E-04	4.20E-04	4.20E-04	4.20E-04
Parameter Code	kg/MMBtu									
Carbon Dioxide	93.28	93.28	93.28	97.17	97.17	93.28	97.17	93.28	93.28	93.28
Methane	0.011	0.011	0.011	0.011	0.011	0.011	0.011	0.011	0.011	0.011
Nitrous Oxide	0.0016	0.0016	0.0016	0.0016	0.0016	0.0016	0.0016	0.0016	0.0016	0.0016
Carbon Dioxide Equivalent	94.0318	94.0318	94.0318	97.9218	97.9218	94.0318	97.9218	94.0318	94.0318	94.0318
Parameter Code	lb/ton									
HAPs - Total	2.08E+03	2.08E+03	2.08E+03	2.08E+03	2.08E+03	1.58E+00	1.58E+00	2.40E+03	2.40E+03	2.40E+03
HAPs										
1,1,1-Trichloroethane	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05
1,2-Dibromoethane (Ethylene dibromide); EDB	1.20E-06	1.20E-06	1.20E-06	1.20E-06	1.20E-06	1.20E-06	1.20E-06	1.20E-06	1.20E-06	1.20E-06
1,2-Dichloroethane	4.00E-05	4.00E-05	4.00E-05	4.00E-05	4.00E-05	4.00E-05	4.00E-05	4.00E-05	4.00E-05	4.00E-05
1,4-Dichlorobenzene (para-)										
1,2-Dichloropropane										
2,4,6-Trichlorophenol										
2,4-Dinitrophenol										
2,4-Dinitrotoluene	2.80E-07	2.80E-07	2.80E-07	2.80E-07	2.80E-07	2.80E-07	2.80E-07	2.80E-07	2.80E-07	2.80E-07
2-Chloroacetophenone	7.00E-06	7.00E-06	7.00E-06	7.00E-06	7.00E-06	7.00E-06	7.00E-06	7.00E-06	7.00E-06	7.00E-06
Acetaldehyde	5.70E-04	5.70E-04	5.70E-04	5.70E-04	5.70E-04	5.70E-04	5.70E-04	5.70E-04	5.70E-04	5.70E-04
Acetophenone	1.50E-05	1.50E-05	1.50E-05	1.50E-05	1.50E-05	1.50E-05	1.50E-05	1.50E-05	1.50E-05	1.50E-05
Acrolein	2.90E-04	2.90E-04	2.90E-04	2.90E-04	2.90E-04	2.90E-04	2.90E-04	2.90E-04	2.90E-04	2.90E-04
Antimony compounds	2.25E-03	2.25E-03	2.25E-03	2.25E-03	2.25E-03	2.25E-03	2.25E-03	2.25E-03	2.25E-03	2.25E-03
Arsenic compounds	5.13E-02	5.13E-02	5.13E-02	5.13E-02	5.13E-02	5.13E-02	5.13E-02	5.13E-02	5.13E-02	5.13E-02
Benzene	1.30E-03	1.30E-03	1.30E-03	1.30E-03	1.30E-03	1.30E-03	1.30E-03	1.30E-03	1.30E-03	1.30E-03
Benzyl chloride	7.00E-04	7.00E-04	7.00E-04	7.00E-04	7.00E-04	7.00E-04	7.00E-04	7.00E-04	7.00E-04	7.00E-04
Beryllium Compounds	2.63E-03	2.63E-03	2.63E-03	2.63E-03	2.63E-03	2.63E-03	2.63E-03	2.63E-03	2.63E-03	2.63E-03
Bis(2-ethylhexyl) phthalate	7.30E-05	7.30E-05	7.30E-05	7.30E-05	7.30E-05	7.30E-05	7.30E-05	7.30E-05	7.30E-05	7.30E-05
Bromoform	3.90E-05	3.90E-05	3.90E-05	3.90E-05	3.90E-05	3.90E-05	3.90E-05	3.90E-05	3.90E-05	3.90E-05
Bromomethane (Methyl bromide)	1.60E-04	1.60E-04	1.60E-04	1.60E-04	1.60E-04	1.60E-04	1.60E-04	1.60E-04	1.60E-04	1.60E-04
Cadmium compounds	6.37E-03	6.37E-03	6.37E-03	6.37E-03	6.37E-03	6.37E-03	6.37E-03	6.37E-03	6.37E-03	6.37E-03
Carbon disulfide	1.30E-04	1.30E-04	1.30E-04	1.30E-04	1.30E-04	1.30E-04	1.30E-04	1.30E-04	1.30E-04	1.30E-04
Carbon tetrachloride										
Chlorine										
Chlorobenzene (Monochlorobenzene)	2.20E-05	2.20E-05	2.20E-05	2.20E-05	2.20E-05	2.20E-05	2.20E-05	2.20E-05	2.20E-05	2.20E-05
Chloroethane	4.20E-05	4.20E-05	4.20E-05	4.20E-05	4.20E-05	4.20E-05	4.20E-05	4.20E-05	4.20E-05	4.20E-05
Chloroform	5.90E-05	5.90E-05	5.90E-05	5.90E-05	5.90E-05	5.90E-05	5.90E-05	5.90E-05	5.90E-05	5.90E-05
Chloromethane	5.30E-04	5.30E-04	5.30E-04	5.30E-04	5.30E-04	5.30E-04	5.30E-04	5.30E-04	5.30E-04	5.30E-04
Chromium compounds	4.24E-02	4.24E-02	4.24E-02	4.24E-02	4.24E-02	4.24E-02	4.24E-02	4.24E-02	4.24E-02	4.24E-02
Cobalt compounds	1.25E-02	1.25E-02	1.25E-02	1.25E-02	1.25E-02	1.25E-02	1.25E-02	1.25E-02	1.25E-02	1.25E-02
Cumene (Isopropylbenzene)	5.30E-06	5.30E-06	5.30E-06	5.30E-06	5.30E-06	5.30E-06	5.30E-06	5.30E-06	5.30E-06	5.30E-06
Cyanide compounds	2.50E-03	2.50E-03	2.50E-03	2.50E-03	2.50E-03	2.50E-03	2.50E-03	2.50E-03	2.50E-03	2.50E-03
Dichloromethane (Methylene chloride)	2.90E-04	2.90E-04	2.90E-04	2.90E-04	2.90E-04	2.90E-04	2.90E-04	2.90E-04	2.90E-04	2.90E-04
Dimethyl sulfate	4.80E-05	4.80E-05	4.80E-05	4.80E-05	4.80E-05	4.80E-05	4.80E-05	4.80E-05	4.80E-05	4.80E-05
Ethylbenzene	9.40E-05	9.40E-05	9.40E-05	9.40E-05	9.40E-05	9.40E-05	9.40E-05	9.40E-05	9.40E-05	9.40E-05
Formaldehyde	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04
Hexane	6.70E-05	6.70E-05	6.70E-05	6.70E-05	6.70E-05	6.70E-05	6.70E-05	6.70E-05	6.70E-05	6.70E-05
Hydrogen Chloride	1.20E+00	1.20E+00	1.20E+00	1.20E+00	1.20E+00	1.20E+00	1.20E+00	1.20E+00	1.20E+00	1.20E+00
Hydrogen Fluoride	1.50E-01	1.50E-01	1.50E-01	1.50E-01	1.50E-01	1.50E-01	1.50E-01	1.50E-01	1.50E-01	1.50E-01
Isophorone	5.80E-04	5.80E-04	5.80E-04	5.80E-04	5.80E-04	5.80E-04	5.80E-04	5.80E-04	5.80E-04	5.80E-04
Manganese compounds	6.12E-02	6.12E-02	6.12E-02	6.12E-02	6.12E-02	6.12E-02	6.12E-02	6.12E-02	6.12E-02	6.12E-02
Mercury	1.04E-02	1.04E-02	1.04E-02	1.04E-02	1.04E-02	1.04E-02	1.04E-02	1.04E-02	1.04E-02	1.04E-02
Methyl methacrylate	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05
Methylhydrazine	1.70E-04	1.70E-04	1.70E-04	1.70E-04	1.70E-04	1.70E-04	1.70E-04	1.70E-04	1.70E-04	1.70E-04
Methyl-tert-butylether	3.50E-05	3.50E-05	3.50E-05	3.50E-05	3.50E-05	3.50E-05	3.50E-05	3.50E-05	3.50E-05	3.50E-05
Nickel compounds	3.50E-02	3.50E-02	3.50E-02	3.50E-02	3.50E-02	3.50E-02	3.50E-02	3.50E-02	3.50E-02	3.50E-02
Pentachlorophenol (PCP)										
Phenol	1.60E-05	1.60E-05	1.60E-05	1.60E-05	1.60E-05	1.60E-05	1.60E-05	1.60E-05	1.60E-05	1.60E-05
Phosphorus										
Polycyclic organic matter (POM)	2.08E+03	2.08E+03	2.08E+03	2.08E+03	2.08E+03	2.08E-05	2.08E-05	2.40E+03	2.40E+03	2.40E+03
Propionaldehyde	3.80E-04	3.80E-04	3.80E-04	3.80E-04	3.80E-04	3.80E-04	3.80E-04	3.80E-04	3.80E-04	3.80E-04
Selenium compounds	1.30E-03	1.30E-03	1.30E-03	1.30E-03	1.30E-03	1.30E-03	1.30E-03	1.30E-03	1.30E-03	1.30E-03
Styrene	2.50E-05	2.50E-05	2.50E-05	2.50E-05	2.50E-05	2.50E-05	2.50E-05	2.50E-05	2.50E-05	2.50E-05
Tetrachloroethylene (Perchloroethylene)	4.30E-05	4.30E-05	4.30E-05	4.30E-05	4.30E-05	4.30E-05	4.30E-05	4.30E-05	4.30E-05	4.30E-05
Toluene	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04
Vinyl acetate (Acetic acid)	7.60E-06	7.60E-06	7.60E-06	7.60E-06	7.60E-06	7.60E-06	7.60E-06	7.60E-06	7.60E-06	7.60E-06
Vinyl chloride (chloroethene)										
Xylenes, Total	3.70E-05	3.70E-05	3.70E-05	3.70E-05	3.70E-05	3.70E-05	3.70E-05	3.70E-05	3.70E-05	3.70E-05
POMs										
2-Methylnaphthalene										
5-Methylchrysene	2.20E-08	2.20E-08	2.20E-08	2.20E-08	2.20E-08	2.20E-08	2.20E-08	2.20E-08	2.20E-08	2.20E-08
7,12-Dimethylbenz[a]anthracene										
Acenaphthene	5.10E-07	5.10E-07	5.10E-07	5.10E-07	5.10E-07	5.10E-07	5.10E-07	5.10E-07	5.10E-07	5.10E-07
Acenaphthylene	2.50E-07	2.50E-07	2.50E-07	2.50E-07	2.50E-07	2.50E-07	2.50E-07	2.50E-07	2.50E-07	2.50E-07
Anthracene	2.10E-07	2.10E-07	2.10E-07	2.10E-07	2.10E-07	2.10E-07	2.10E-07	2.10E-07	2.10E-07	2.10E-07
Benzo(a)anthracene	8.00E-08	8.00E-08	8.00E-08	8.00E-08	8.00E-08	8.00E-08	8.00E-08	8.00E-08	8.00E-08	8.00E-08
Benzo(b)fluoranthene										
Benzo(e)pyrene										
Benzo(ghi)perylene	2.70E-08	2.70E-08	2.70E-08	2.70E-08	2.70E-08	2.70E-08	2.70E-08	2.70E-08	2.70E-08	2.70E-08
Benzo(b)fluoranthene	1.10E-07	1.10E-07	1.10E-07	1.10E-07	1.10E-07	1.10E-07	1.10E-07	1.10E-07	1.10E-07	1.10E-07
Benzo(k)fluoranthene										
Benzo[a]pyrene	3.80E-08	3.80E-08	3.80E-08	3.80E-08	3.80E-08	3.80E-08	3.80E-08	3.80E-08	3.80E-08	3.80E-08
Biphenyl	1.70E-06	1.70E-06	1.70E-06	1.70E-06	1.70E-06	1.70E-06	1.70E-06	1.70E-06	1.70E-06	1.70E-06
Chrysene	1.00E-07	1.00E-07	1.00E-07	1.00E-07	1.00E-07	1.00E-07	1.00E-07	1.00E-07	1.00E-07	1.00E-07
Dibenz[a,h]anthracene										
Dioxins and Furans										
Fluoranthene	7.10E-07	7.10E-07	7.10E-07	7.10E-07	7.10E-07	7.10E-07	7.10E-07	7.10E-07	7.10E-07	7.10E-07
Fluorene	9.10E-07	9.10E-07	9.10E-07	9.10E-07	9.10E-07	9.10E-07	9.10E-07	9.10E-07	9.10E-07	9.10E-07
Indeno(1,2,3-cd)pyrene	6.10E-08	6.10E-08	6.10E-08	6.10E-08	6.10E-08	6.10E-08	6.10E-08	6.10E-08	6.10E-08	6.10E-08
Naphthalene	1.30E-05	1.30E-05	1.30E-05	1.30E-05	1.30E-05	1.30E-05	1.30E-05	1.30E-05	1.30E-05	1.30E-05
Octachlorodibenzo-p-dioxin										
PCBs (Polychlorinated biphenyls)										
Phenanthrene	2.70E-06	2.70E-06	2.70E-06	2.70E-06	2.70E-06	2.70E-06	2.70E-06	2.70E-06	2.70E-06	2.70E-06
Pyrene	3.30E-07	3.30E-07	3.30E-07	3.30E-07	3.30E-07	3.30E-07	3.30E-07	3.30E-07	3.30E-07	3.30E-07
Total POM	2.08E-05	2.08E-05	2.08E-05	2.08E-05	2.08E-05	2.08E-05	2.08E-05	2.08E-05	2.08E-05	2.08E-05

[1] Uncontrolled emission factors are derived from AP-42 Section 1.1 controlled emission factors assuming an ESP with a control efficiency of 99.2%.

[2] Polycyclic Organic Matter (POM) emission factor has units of lb/MMBtu for the following firing types:

PC, dry bottom, wall-fired, bituminous Pre-NSPS
PC, dry bottom, wall-fired, bituminous, Pre-NSPS with low-NOx burner
PC, dry bottom, wall-fired, bituminous NSPS
PC, dry bottom, wall-fired, sub-bituminousPre-NSPS
PC, dry bottom, wall-fired, sub-bituminous NSPS
PC, dry bottom, tangentially fired, bituminous, Pre-NSPS
PC, dry bottom, tangentially fired, bituminous, Pre-NSPS with low-NOx burner
PC, dry bottom, tangentially fired, bituminous, NSPS
PC, dry bottom, tangentially fired, sub-bituminous, pre-NSPS
PC, dry bottom, tangentially fired, sub-bituminous, NSPS

Emission Factors

	PC, dry bottom, tangentially fired, sub-bituminous, pre-NSPS	PC, dry bottom, tangentially fired, sub-bituminous, NSPS	PC, wet bottom, wall-fired, bituminous, Pre-NSPS	PC, wet bottom, wall-fired, bituminous, NSPS	PC, wet bottom, wall-fired, sub-bituminous	Cyclone Furnace, bituminous	Cyclone Furnace, sub-bituminous	Spreader stoker, bituminous	Spreader stoker, bituminous, with multiple cyclones, with reinjection	Spreader stoker, bituminous, with multiple cyclones, no reinjection
Parameter Code										
Particulate Matter	10	10	7	7	7	2	2	66	17.0	12.0
PM < 10 micron	2.3	2.3	2.6	2.6	2.6	0.26	0.26	13.2	12	7.8
PM < 2.5 micron	2.3	2.3	1.48	2.6	2.6	0.11	0.26	4.6	1.4	3.2
Nitrogen Oxides	8.4	7.2	31	14	24	33	17	11	11	11
Carbon Monoxide	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	5	5
Sulfur Dioxide	35	35	38	38	35	38	35	38	38	38
Volatile Organic Compounds	0.06	0.06	0.04	0.04	0.04	0.11	0.11	0.05	0.05	0.05
Lead Compounds	4.20E-04	4.20E-04	4.20E-04	4.20E-04	4.20E-04	4.20E-04	4.20E-04	4.20E-04	4.20E-04	4.20E-04
Parameter Code										
Carbon Dioxide	97.17	97.17	93.28	93.28	97.17	93.28	97.17	93.28	93.28	93.28
Methane	0.011	0.011	0.011	0.011	0.011	0.011	0.011	0.011	0.011	0.011
Nitrous Oxide	0.0016	0.0016	0.0016	0.0016	0.0016	0.0016	0.0016	0.0016	0.0016	0.0016
Carbon Dioxide Equivalent	97.9218	97.9218	94.0318	94.0318	97.9218	94.0318	97.9218	94.0318	94.0318	94.0318
Parameter Code										
HAPs - Total	2.40E+03	2.40E+03	1.58E+00	1.58E+00	1.58E+00	1.58E+00	1.58E+00	1.58E+00	1.58E+00	1.58E+00
HAPs										
1,1,1-Trichloroethane	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05
1,2-Dibromoethane (Ethylene dibromide); EDB	1.20E-06	1.20E-06	1.20E-06	1.20E-06	1.20E-06	1.20E-06	1.20E-06	1.20E-06	1.20E-06	1.20E-06
1,2-Dichloroethane	4.00E-05	4.00E-05	4.00E-05	4.00E-05	4.00E-05	4.00E-05	4.00E-05	4.00E-05	4.00E-05	4.00E-05
1,4-Dichlorobenzene (para-)										
1,2-Dichloropropane										
2,4,6-Trichlorophenol										
2,4-Dinitrophenol										
2,4-Dinitrotoluene	2.80E-07	2.80E-07	2.80E-07	2.80E-07	2.80E-07	2.80E-07	2.80E-07	2.80E-07	2.80E-07	2.80E-07
2-Chloroacetophenone	7.00E-06	7.00E-06	7.00E-06	7.00E-06	7.00E-06	7.00E-06	7.00E-06	7.00E-06	7.00E-06	7.00E-06
Acetaldehyde	5.70E-04	5.70E-04	5.70E-04	5.70E-04	5.70E-04	5.70E-04	5.70E-04	5.70E-04	5.70E-04	5.70E-04
Acetophenone	1.50E-05	1.50E-05	1.50E-05	1.50E-05	1.50E-05	1.50E-05	1.50E-05	1.50E-05	1.50E-05	1.50E-05
Acrolein	2.90E-04	2.90E-04	2.90E-04	2.90E-04	2.90E-04	2.90E-04	2.90E-04	2.90E-04	2.90E-04	2.90E-04
Antimony compounds	2.25E-03	2.25E-03	2.25E-03	2.25E-03	2.25E-03	2.25E-03	2.25E-03	2.25E-03	2.25E-03	2.25E-03
Arsenic compounds	5.13E-02	5.13E-02	5.13E-02	5.13E-02	5.13E-02	5.13E-02	5.13E-02	5.13E-02	5.13E-02	5.13E-02
Benzene	1.30E-03	1.30E-03	1.30E-03	1.30E-03	1.30E-03	1.30E-03	1.30E-03	1.30E-03	1.30E-03	1.30E-03
Benzyl chloride	7.00E-04	7.00E-04	7.00E-04	7.00E-04	7.00E-04	7.00E-04	7.00E-04	7.00E-04	7.00E-04	7.00E-04
Beryllium Compounds	2.63E-03	2.63E-03	2.63E-03	2.63E-03	2.63E-03	2.63E-03	2.63E-03	2.63E-03	2.63E-03	2.63E-03
Bis(2-ethylhexyl) phthalate	7.30E-05	7.30E-05	7.30E-05	7.30E-05	7.30E-05	7.30E-05	7.30E-05	7.30E-05	7.30E-05	7.30E-05
Bromoform	3.90E-05	3.90E-05	3.90E-05	3.90E-05	3.90E-05	3.90E-05	3.90E-05	3.90E-05	3.90E-05	3.90E-05
Bromomethane (Methyl bromide)	1.60E-04	1.60E-04	1.60E-04	1.60E-04	1.60E-04	1.60E-04	1.60E-04	1.60E-04	1.60E-04	1.60E-04
Cadmium compounds	6.37E-03	6.37E-03	6.37E-03	6.37E-03	6.37E-03	6.37E-03	6.37E-03	6.37E-03	6.37E-03	6.37E-03
Carbon disulfide	1.30E-04	1.30E-04	1.30E-04	1.30E-04	1.30E-04	1.30E-04	1.30E-04	1.30E-04	1.30E-04	1.30E-04
Carbon tetrachloride										
Chlorine										
Chlorobenzene (Monochlorobenzene)	2.20E-05	2.20E-05	2.20E-05	2.20E-05	2.20E-05	2.20E-05	2.20E-05	2.20E-05	2.20E-05	2.20E-05
Chloroethane	4.20E-05	4.20E-05	4.20E-05	4.20E-05	4.20E-05	4.20E-05	4.20E-05	4.20E-05	4.20E-05	4.20E-05
Chloroform	5.90E-05	5.90E-05	5.90E-05	5.90E-05	5.90E-05	5.90E-05	5.90E-05	5.90E-05	5.90E-05	5.90E-05
Chloromethane	5.30E-04	5.30E-04	5.30E-04	5.30E-04	5.30E-04	5.30E-04	5.30E-04	5.30E-04	5.30E-04	5.30E-04
Chromium compounds	4.24E-02	4.24E-02	4.24E-02	4.24E-02	4.24E-02	4.24E-02	4.24E-02	4.24E-02	4.24E-02	4.24E-02
Cobalt compounds	1.25E-02	1.25E-02	1.25E-02	1.25E-02	1.25E-02	1.25E-02	1.25E-02	1.25E-02	1.25E-02	1.25E-02
Cumene (Isopropylbenzene)	5.30E-06	5.30E-06	5.30E-06	5.30E-06	5.30E-06	5.30E-06	5.30E-06	5.30E-06	5.30E-06	5.30E-06
Cyanide compounds	2.50E-03	2.50E-03	2.50E-03	2.50E-03	2.50E-03	2.50E-03	2.50E-03	2.50E-03	2.50E-03	2.50E-03
Dichloromethane (Methylene chloride)	2.90E-04	2.90E-04	2.90E-04	2.90E-04	2.90E-04	2.90E-04	2.90E-04	2.90E-04	2.90E-04	2.90E-04
Dimethyl sulfate	4.80E-05	4.80E-05	4.80E-05	4.80E-05	4.80E-05	4.80E-05	4.80E-05	4.80E-05	4.80E-05	4.80E-05
Ethylbenzene	9.40E-05	9.40E-05	9.40E-05	9.40E-05	9.40E-05	9.40E-05	9.40E-05	9.40E-05	9.40E-05	9.40E-05
Formaldehyde	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04
Hexane	6.70E-05	6.70E-05	6.70E-05	6.70E-05	6.70E-05	6.70E-05	6.70E-05	6.70E-05	6.70E-05	6.70E-05
Hydrogen Chloride	1.20E+00	1.20E+00	1.20E+00	1.20E+00	1.20E+00	1.20E+00	1.20E+00	1.20E+00	1.20E+00	1.20E+00
Hydrogen Fluoride	1.50E-01	1.50E-01	1.50E-01	1.50E-01	1.50E-01	1.50E-01	1.50E-01	1.50E-01	1.50E-01	1.50E-01
Isophorone	5.80E-04	5.80E-04	5.80E-04	5.80E-04	5.80E-04	5.80E-04	5.80E-04	5.80E-04	5.80E-04	5.80E-04
Manganese compounds	6.12E-02	6.12E-02	6.12E-02	6.12E-02	6.12E-02	6.12E-02	6.12E-02	6.12E-02	6.12E-02	6.12E-02
Mercury	1.04E-02	1.04E-02	1.04E-02	1.04E-02	1.04E-02	1.04E-02	1.04E-02	1.04E-02	1.04E-02	1.04E-02
Methyl methacrylate	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05
Methylhydrazine	1.70E-04	1.70E-04	1.70E-04	1.70E-04	1.70E-04	1.70E-04	1.70E-04	1.70E-04	1.70E-04	1.70E-04
Methyl-tert-butylether	3.50E-05	3.50E-05	3.50E-05	3.50E-05	3.50E-05	3.50E-05	3.50E-05	3.50E-05	3.50E-05	3.50E-05
Nickel compounds	3.50E-02	3.50E-02	3.50E-02	3.50E-02	3.50E-02	3.50E-02	3.50E-02	3.50E-02	3.50E-02	3.50E-02
Pentachlorophenol (PCP)										
Phenol	1.60E-05	1.60E-05	1.60E-05	1.60E-05	1.60E-05	1.60E-05	1.60E-05	1.60E-05	1.60E-05	1.60E-05
Phosphorus										
Polycyclic organic matter (POM)	2.40E+03	2.40E+03	2.08E-05	2.08E-05	2.08E-05	2.08E-05	2.08E-05	2.08E-05	2.08E-05	2.08E-05
Propionaldehyde	3.80E-04	3.80E-04	3.80E-04	3.80E-04	3.80E-04	3.80E-04	3.80E-04	3.80E-04	3.80E-04	3.80E-04
Selenium compounds	1.30E-03	1.30E-03	1.30E-03	1.30E-03	1.30E-03	1.30E-03	1.30E-03	1.30E-03	1.30E-03	1.30E-03
Styrene	2.50E-05	2.50E-05	2.50E-05	2.50E-05	2.50E-05	2.50E-05	2.50E-05	2.50E-05	2.50E-05	2.50E-05
Tetrachloroethylene (Perchloroethylene)	4.30E-05	4.30E-05	4.30E-05	4.30E-05	4.30E-05	4.30E-05	4.30E-05	4.30E-05	4.30E-05	4.30E-05
Toluene	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04
Vinyl acetate (Acetic acid)	7.60E-06	7.60E-06	7.60E-06	7.60E-06	7.60E-06	7.60E-06	7.60E-06	7.60E-06	7.60E-06	7.60E-06
Vinyl chloride (chloroethene)										
Xylenes, Total	3.70E-05	3.70E-05	3.70E-05	3.70E-05	3.70E-05	3.70E-05	3.70E-05	3.70E-05	3.70E-05	3.70E-05
POMs										
2-Methylnaphthalene										
5-Methylchrysene	2.20E-08	2.20E-08	2.20E-08	2.20E-08	2.20E-08	2.20E-08	2.20E-08	2.20E-08	2.20E-08	2.20E-08
7,12-Dimethylbenz[a]anthracene										
Acenaphthene	5.10E-07	5.10E-07	5.10E-07	5.10E-07	5.10E-07	5.10E-07	5.10E-07	5.10E-07	5.10E-07	5.10E-07
Acenaphthylene	2.50E-07	2.50E-07	2.50E-07	2.50E-07	2.50E-07	2.50E-07	2.50E-07	2.50E-07	2.50E-07	2.50E-07
Anthracene	2.10E-07	2.10E-07	2.10E-07	2.10E-07	2.10E-07	2.10E-07	2.10E-07	2.10E-07	2.10E-07	2.10E-07
Benzo(a)anthracene	8.00E-08	8.00E-08	8.00E-08	8.00E-08	8.00E-08	8.00E-08	8.00E-08	8.00E-08	8.00E-08	8.00E-08
Benzo(b)fluoranthene										
Benzo(e)pyrene										
Benzo(ghi)perylene	2.70E-08	2.70E-08	2.70E-08	2.70E-08	2.70E-08	2.70E-08	2.70E-08	2.70E-08	2.70E-08	2.70E-08
Benzo(b)fluoranthene	1.10E-07	1.10E-07	1.10E-07	1.10E-07	1.10E-07	1.10E-07	1.10E-07	1.10E-07	1.10E-07	1.10E-07
Benzo(k)fluoranthene										
Benzo[a]pyrene	3.80E-08	3.80E-08	3.80E-08	3.80E-08	3.80E-08	3.80E-08	3.80E-08	3.80E-08	3.80E-08	3.80E-08
Biphenyl	1.70E-06	1.70E-06	1.70E-06	1.70E-06	1.70E-06	1.70E-06	1.70E-06	1.70E-06	1.70E-06	1.70E-06
Chrysene	1.00E-07	1.00E-07	1.00E-07	1.00E-07	1.00E-07	1.00E-07	1.00E-07	1.00E-07	1.00E-07	1.00E-07
Dibenz[a,h]anthracene										
Dioxins and Furans										
Fluoranthene	7.10E-07	7.10E-07	7.10E-07	7.10E-07	7.10E-07	7.10E-07	7.10E-07	7.10E-07	7.10E-07	7.10E-07
Fluorene	9.10E-07	9.10E-07	9.10E-07	9.10E-07	9.10E-07	9.10E-07	9.10E-07	9.10E-07	9.10E-07	9.10E-07
Indeno(1,2,3-cd)pyrene	6.10E-08	6.10E-08	6.10E-08	6.10E-08	6.10E-08	6.10E-08	6.10E-08	6.10E-08	6.10E-08	6.10E-08
Naphthalene	1.30E-05	1.30E-05	1.30E-05	1.30E-05	1.30E-05	1.30E-05	1.30E-05	1.30E-05	1.30E-05	1.30E-05
Octachlorodibenzo-p-dioxin										
PCBs (Polychlorinated biphenyls)										
Phenanthrene	2.70E-06	2.70E-06	2.70E-06	2.70E-06	2.70E-06	2.70E-06	2.70E-06	2.70E-06	2.70E-06	2.70E-06
Pyrene	3.30E-07	3.30E-07	3.30E-07	3.30E-07	3.30E-07	3.30E-07	3.30E-07	3.30E-07	3.30E-07	3.30E-07
Total POM	2.08E-05	2.08E-05	2.08E-05	2.08E-05	2.08E-05	2.08E-05	2.08E-05	2.08E-05	2.08E-05	2.08E-05

Emission Factors

	Spreader stoker, sub-bituminous	Spreader stoker, sub-bituminous, with multiple cyclones, with reinjection	Spreader stoker, sub-bituminous, with multiple cyclones, no reinjection	Overfeed stoker, bituminous	Overfeed stoker, bituminous, with multiple cyclones	Overfeed stoker, sub-bituminous	Overfeed stoker, sub-bituminous, with multiple cyclones	Underfeed stoker, bituminous	Underfeed stoker, bituminous, with multiple cyclones	Underfeed stoker, sub-bituminous
Parameter Code										
Particulate Matter	66	17	12	16.0	9.0	16.0	9.0	15	11	15
PM < 10 micron	13.2	12.4	7.8	6.0	5.0	6.0	5.0	6.2	6.2	6.2
PM < 2.5 micron	4.6	12.4	7.8	2.2	3.8	2.2	5.0	3.8	6.2	6.2
Nitrogen Oxides	8.8	8.8	8.8	7.5	7.5	7.5	7.5	9.5	9.5	9.5
Carbon Monoxide	5	5	5	6	6	6	6	11	11	11
Sulfur Dioxide	35	35	35	38	38	35	35	31	31	31
Volatile Organic Compounds	0.05	0.05	0.05	0.05	0.05	0.05	0.05	1.3	1.3	1.3
Lead Compounds	4.20E-04	4.20E-04	4.20E-04	4.20E-04	4.20E-04	4.20E-04	4.20E-04	4.20E-04	4.20E-04	4.20E-04
Parameter Code										
Carbon Dioxide	97.17	97.17	97.17	93.28	93.28	97.17	97.17	93.28	93.28	97.17
Methane	0.011	0.011	0.011	0.011	0.011	0.011	0.011	0.011	0.011	0.011
Nitrous Oxide	0.0016	0.0016	0.0016	0.0016	0.0016	0.0016	0.0016	0.0016	0.0016	0.0016
Carbon Dioxide Equivalent	97.9218	97.9218	97.9218	94.0318	94.0318	97.9218	97.9218	94.0318	94.0318	97.9218
Parameter Code										
HAPs - Total	1.58E+00	1.58E+00	1.58E+00	1.58E+00	1.58E+00	1.58E+00	1.58E+00	1.58E+00	1.58E+00	1.58E+00
HAPs										
1,1,1-Trichloroethane	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05
1,2-Dibromoethane (Ethylene dibromide); EDB	1.20E-06	1.20E-06	1.20E-06	1.20E-06	1.20E-06	1.20E-06	1.20E-06	1.20E-06	1.20E-06	1.20E-06
1,2-Dichloroethane	4.00E-05	4.00E-05	4.00E-05	4.00E-05	4.00E-05	4.00E-05	4.00E-05	4.00E-05	4.00E-05	4.00E-05
1,4-Dichlorobenzene (para-)										
1,2-Dichloropropane										
2,4,6-Trichlorophenol										
2,4-Dinitrophenol										
2,4-Dinitrotoluene	2.80E-07	2.80E-07	2.80E-07	2.80E-07	2.80E-07	2.80E-07	2.80E-07	2.80E-07	2.80E-07	2.80E-07
2-Chloroacetophenone	7.00E-06	7.00E-06	7.00E-06	7.00E-06	7.00E-06	7.00E-06	7.00E-06	7.00E-06	7.00E-06	7.00E-06
Acetaldehyde	5.70E-04	5.70E-04	5.70E-04	5.70E-04	5.70E-04	5.70E-04	5.70E-04	5.70E-04	5.70E-04	5.70E-04
Acetophenone	1.50E-05	1.50E-05	1.50E-05	1.50E-05	1.50E-05	1.50E-05	1.50E-05	1.50E-05	1.50E-05	1.50E-05
Acrolein	2.90E-04	2.90E-04	2.90E-04	2.90E-04	2.90E-04	2.90E-04	2.90E-04	2.90E-04	2.90E-04	2.90E-04
Antimony compounds	2.25E-03	2.25E-03	2.25E-03	2.25E-03	2.25E-03	2.25E-03	2.25E-03	2.25E-03	2.25E-03	2.25E-03
Arsenic compounds	5.13E-02	5.13E-02	5.13E-02	5.13E-02	5.13E-02	5.13E-02	5.13E-02	5.13E-02	5.13E-02	5.13E-02
Benzene	1.30E-03	1.30E-03	1.30E-03	1.30E-03	1.30E-03	1.30E-03	1.30E-03	1.30E-03	1.30E-03	1.30E-03
Benzyl chloride	7.00E-04	7.00E-04	7.00E-04	7.00E-04	7.00E-04	7.00E-04	7.00E-04	7.00E-04	7.00E-04	7.00E-04
Beryllium Compounds	2.63E-03	2.63E-03	2.63E-03	2.63E-03	2.63E-03	2.63E-03	2.63E-03	2.63E-03	2.63E-03	2.63E-03
Bis(2-ethylhexyl) phthalate	7.30E-05	7.30E-05	7.30E-05	7.30E-05	7.30E-05	7.30E-05	7.30E-05	7.30E-05	7.30E-05	7.30E-05
Bromoform	3.90E-05	3.90E-05	3.90E-05	3.90E-05	3.90E-05	3.90E-05	3.90E-05	3.90E-05	3.90E-05	3.90E-05
Bromomethane (Methyl bromide)	1.60E-04	1.60E-04	1.60E-04	1.60E-04	1.60E-04	1.60E-04	1.60E-04	1.60E-04	1.60E-04	1.60E-04
Cadmium compounds	6.37E-03	6.37E-03	6.37E-03	6.37E-03	6.37E-03	6.37E-03	6.37E-03	6.37E-03	6.37E-03	6.37E-03
Carbon disulfide	1.30E-04	1.30E-04	1.30E-04	1.30E-04	1.30E-04	1.30E-04	1.30E-04	1.30E-04	1.30E-04	1.30E-04
Carbon tetrachloride										
Chlorine										
Chlorobenzene (Monochlorobenzene)	2.20E-05	2.20E-05	2.20E-05	2.20E-05	2.20E-05	2.20E-05	2.20E-05	2.20E-05	2.20E-05	2.20E-05
Chloroethane	4.20E-05	4.20E-05	4.20E-05	4.20E-05	4.20E-05	4.20E-05	4.20E-05	4.20E-05	4.20E-05	4.20E-05
Chloroform	5.90E-05	5.90E-05	5.90E-05	5.90E-05	5.90E-05	5.90E-05	5.90E-05	5.90E-05	5.90E-05	5.90E-05
Chloromethane	5.30E-04	5.30E-04	5.30E-04	5.30E-04	5.30E-04	5.30E-04	5.30E-04	5.30E-04	5.30E-04	5.30E-04
Chromium compounds	4.24E-02	4.24E-02	4.24E-02	4.24E-02	4.24E-02	4.24E-02	4.24E-02	4.24E-02	4.24E-02	4.24E-02
Cobalt compounds	1.25E-02	1.25E-02	1.25E-02	1.25E-02	1.25E-02	1.25E-02	1.25E-02	1.25E-02	1.25E-02	1.25E-02
Cumene (Isopropylbenzene)	5.30E-06	5.30E-06	5.30E-06	5.30E-06	5.30E-06	5.30E-06	5.30E-06	5.30E-06	5.30E-06	5.30E-06
Cyanide compounds	2.50E-03	2.50E-03	2.50E-03	2.50E-03	2.50E-03	2.50E-03	2.50E-03	2.50E-03	2.50E-03	2.50E-03
Dichloromethane (Methylene chloride)	2.90E-04	2.90E-04	2.90E-04	2.90E-04	2.90E-04	2.90E-04	2.90E-04	2.90E-04	2.90E-04	2.90E-04
Dimethyl sulfate	4.80E-05	4.80E-05	4.80E-05	4.80E-05	4.80E-05	4.80E-05	4.80E-05	4.80E-05	4.80E-05	4.80E-05
Ethylbenzene	9.40E-05	9.40E-05	9.40E-05	9.40E-05	9.40E-05	9.40E-05	9.40E-05	9.40E-05	9.40E-05	9.40E-05
Formaldehyde	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04
Hexane	6.70E-05	6.70E-05	6.70E-05	6.70E-05	6.70E-05	6.70E-05	6.70E-05	6.70E-05	6.70E-05	6.70E-05
Hydrogen Chloride	1.20E+00	1.20E+00	1.20E+00	1.20E+00	1.20E+00	1.20E+00	1.20E+00	1.20E+00	1.20E+00	1.20E+00
Hydrogen Fluoride	1.50E-01	1.50E-01	1.50E-01	1.50E-01	1.50E-01	1.50E-01	1.50E-01	1.50E-01	1.50E-01	1.50E-01
Isophorone	5.80E-04	5.80E-04	5.80E-04	5.80E-04	5.80E-04	5.80E-04	5.80E-04	5.80E-04	5.80E-04	5.80E-04
Manganese compounds	6.12E-02	6.12E-02	6.12E-02	6.12E-02	6.12E-02	6.12E-02	6.12E-02	6.12E-02	6.12E-02	6.12E-02
Mercury	1.04E-02	1.04E-02	1.04E-02	1.04E-02	1.04E-02	1.04E-02	1.04E-02	1.04E-02	1.04E-02	1.04E-02
Methyl methacrylate	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05
Methylhydrazine	1.70E-04	1.70E-04	1.70E-04	1.70E-04	1.70E-04	1.70E-04	1.70E-04	1.70E-04	1.70E-04	1.70E-04
Methyl-tert-butylether	3.50E-05	3.50E-05	3.50E-05	3.50E-05	3.50E-05	3.50E-05	3.50E-05	3.50E-05	3.50E-05	3.50E-05
Nickel compounds	3.50E-02	3.50E-02	3.50E-02	3.50E-02	3.50E-02	3.50E-02	3.50E-02	3.50E-02	3.50E-02	3.50E-02
Pentachlorophenol (PCP)										
Phenol	1.60E-05	1.60E-05	1.60E-05	1.60E-05	1.60E-05	1.60E-05	1.60E-05	1.60E-05	1.60E-05	1.60E-05
Phosphorus										
Polycyclic organic matter (POM)	2.08E-05	2.08E-05	2.08E-05	2.08E-05	2.08E-05	2.08E-05	2.08E-05	2.08E-05	2.08E-05	2.08E-05
Propionaldehyde	3.80E-04	3.80E-04	3.80E-04	3.80E-04	3.80E-04	3.80E-04	3.80E-04	3.80E-04	3.80E-04	3.80E-04
Selenium compounds	1.30E-03	1.30E-03	1.30E-03	1.30E-03	1.30E-03	1.30E-03	1.30E-03	1.30E-03	1.30E-03	1.30E-03
Styrene	2.50E-05	2.50E-05	2.50E-05	2.50E-05	2.50E-05	2.50E-05	2.50E-05	2.50E-05	2.50E-05	2.50E-05
Tetrachloroethylene (Perchloroethylene)	4.30E-05	4.30E-05	4.30E-05	4.30E-05	4.30E-05	4.30E-05	4.30E-05	4.30E-05	4.30E-05	4.30E-05
Toluene	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04
Vinyl acetate (Acetic acid)	7.60E-06	7.60E-06	7.60E-06	7.60E-06	7.60E-06	7.60E-06	7.60E-06	7.60E-06	7.60E-06	7.60E-06
Vinyl chloride (chloroethene)										
Xylenes, Total	3.70E-05	3.70E-05	3.70E-05	3.70E-05	3.70E-05	3.70E-05	3.70E-05	3.70E-05	3.70E-05	3.70E-05
POMs										
2-Methylnaphthalene										
5-Methylchrysene	2.20E-08	2.20E-08	2.20E-08	2.20E-08	2.20E-08	2.20E-08	2.20E-08	2.20E-08	2.20E-08	2.20E-08
7,12-Dimethylbenz[a]anthracene										
Acenaphthene	5.10E-07	5.10E-07	5.10E-07	5.10E-07	5.10E-07	5.10E-07	5.10E-07	5.10E-07	5.10E-07	5.10E-07
Acenaphthylene	2.50E-07	2.50E-07	2.50E-07	2.50E-07	2.50E-07	2.50E-07	2.50E-07	2.50E-07	2.50E-07	2.50E-07
Anthracene	2.10E-07	2.10E-07	2.10E-07	2.10E-07	2.10E-07	2.10E-07	2.10E-07	2.10E-07	2.10E-07	2.10E-07
Benzo(a)anthracene	8.00E-08	8.00E-08	8.00E-08	8.00E-08	8.00E-08	8.00E-08	8.00E-08	8.00E-08	8.00E-08	8.00E-08
Benzo(b)fluoranthene										
Benzo(e)pyrene										
Benzo(ghi)perylene	2.70E-08	2.70E-08	2.70E-08	2.70E-08	2.70E-08	2.70E-08	2.70E-08	2.70E-08	2.70E-08	2.70E-08
Benzo(b)fluoranthene	1.10E-07	1.10E-07	1.10E-07	1.10E-07	1.10E-07	1.10E-07	1.10E-07	1.10E-07	1.10E-07	1.10E-07
Benzo(k)fluoranthene										
Benzo[a]pyrene	3.80E-08	3.80E-08	3.80E-08	3.80E-08	3.80E-08	3.80E-08	3.80E-08	3.80E-08	3.80E-08	3.80E-08
Biphenyl	1.70E-06	1.70E-06	1.70E-06	1.70E-06	1.70E-06	1.70E-06	1.70E-06	1.70E-06	1.70E-06	1.70E-06
Chrysene	1.00E-07	1.00E-07	1.00E-07	1.00E-07	1.00E-07	1.00E-07	1.00E-07	1.00E-07	1.00E-07	1.00E-07
Dibenz[a,h]anthracene										
Dioxins and Furans										
Fluoranthene	7.10E-07	7.10E-07	7.10E-07	7.10E-07	7.10E-07	7.10E-07	7.10E-07	7.10E-07	7.10E-07	7.10E-07
Fluorene	9.10E-07	9.10E-07	9.10E-07	9.10E-07	9.10E-07	9.10E-07	9.10E-07	9.10E-07	9.10E-07	9.10E-07
Indeno(1,2,3-cd)pyrene	6.10E-08	6.10E-08	6.10E-08	6.10E-08	6.10E-08	6.10E-08	6.10E-08	6.10E-08	6.10E-08	6.10E-08
Naphthalene	1.30E-05	1.30E-05	1.30E-05	1.30E-05	1.30E-05	1.30E-05	1.30E-05	1.30E-05	1.30E-05	1.30E-05
Octachlorodibenzo-p-dioxin										
PCBs (Polychlorinated biphenyls)										
Phenanthrene	2.70E-06	2.70E-06	2.70E-06	2.70E-06	2.70E-06	2.70E-06	2.70E-06	2.70E-06	2.70E-06	2.70E-06
Pyrene	3.30E-07	3.30E-07	3.30E-07	3.30E-07	3.30E-07	3.30E-07	3.30E-07	3.30E-07	3.30E-07	3.30E-07
Total POM	2.08E-05	2.08E-05	2.08E-05	2.08E-05	2.08E-05	2.08E-05	2.08E-05	2.08E-05	2.08E-05	2.08E-05

Emission Factors

	AP-42, Section 1.2 Emission Factors for Anthracite Coal [3]										
	Underfeed stoker, sub-bituminous, with multiple cyclones	Hand-fed units, bituminous	Hand-fed units, sub-bituminous	FBC, circulating bed, bituminous	FBC, circulating bed, sub-bituminous	FBC, bubbling bed, bituminous	FBC, bubbling bed, sub-bituminous	Stoker-fired	FBC	Pulverized coal	Residential space heaters
Parameter Code								lb/ton			
Particulate Matter	11	15	15	17	17	17	17	10	10	10	10
PM < 10 micron	6.2	6.2	6.2	12.4	12.4	12.4	12.4	2.3	2.3	2.3	2.3
PM < 2.5 micron	6.2	6.2	6.2	12.4	12.4	12.4	12.4	0.6	0.6	0.6	0.6
Nitrogen Oxides	9.5	9.1	9.1	5.0	5.0	15.2	15.2	9.0	1.8	18	3
Carbon Monoxide	11	275	275	18	18	18	18	0.6	0.6	0.6	0.6
Sulfur Dioxide	31	31	31	39.6	39.6	39.6	39.6	39	2.9	39	39
Volatile Organic Compounds	1.3	10	10	0.05	0.05	0.05	0.05	0.3	0.3	0.3	0.3
Lead Compounds	4.20E-04	4.20E-04	4.20E-04	4.20E-04	4.20E-04	4.20E-04	4.20E-04	0.0089	0.0089	0.0089	0.0089
Parameter Code								kg/MMBtu			
Carbon Dioxide	97.17	93.28	97.17	93.28	97.17	93.28	97.17	103.69	103.69	103.69	103.69
Methane	0.011	0.011	0.011	0.011	0.011	0.011	0.011	0.011	0.011	0.011	0.011
Nitrous Oxide	0.0016	0.0016	0.0016	0.0016	0.0016	0.0016	0.0016	0.0016	0.0016	0.0016	0.0016
Carbon Dioxide Equivalent	97.9218	94.0318	97.9218	94.0318	97.9218	94.0318	97.9218	104.4418	104.4418	104.4418	104.4418
Parameter Code								lb/ton			
HAPs - Total	1.58E+00	1.58E+00	1.58E+00	1.58E+00	1.58E+00	1.58E+00	1.58E+00	1.59E+00	1.62E+00	1.62E+00	1.59E+00
HAPs											
1,1,1-Trichloroethane	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05
1,2-Dibromoethane (Ethylene dibromide); EDB	1.20E-06	1.20E-06	1.20E-06	1.20E-06	1.20E-06	1.20E-06	1.20E-06	1.20E-06	1.20E-06	1.20E-06	1.20E-06
1,2-Dichloroethane	4.00E-05	4.00E-05	4.00E-05	4.00E-05	4.00E-05	4.00E-05	4.00E-05	4.00E-05	4.00E-05	4.00E-05	4.00E-05
1,4-Dichlorobenzene (para-)											
1,2-Dichloropropane											
2,4,6-Trichlorophenol											
2,4-Dinitrophenol											
2,4-Dinitrotoluene	2.80E-07	2.80E-07	2.80E-07	2.80E-07	2.80E-07	2.80E-07	2.80E-07	2.80E-07	2.80E-07	2.80E-07	2.80E-07
2-Chloroacetophenone	7.00E-06	7.00E-06	7.00E-06	7.00E-06	7.00E-06	7.00E-06	7.00E-06	7.00E-06	7.00E-06	7.00E-06	7.00E-06
Acetaldehyde	5.70E-04	5.70E-04	5.70E-04	5.70E-04	5.70E-04	5.70E-04	5.70E-04	5.70E-04	5.70E-04	5.70E-04	5.70E-04
Acetophenone	1.50E-05	1.50E-05	1.50E-05	1.50E-05	1.50E-05	1.50E-05	1.50E-05	1.50E-05	1.50E-05	1.50E-05	1.50E-05
Acrolein	2.90E-04	2.90E-04	2.90E-04	2.90E-04	2.90E-04	2.90E-04	2.90E-04	2.90E-04	2.90E-04	2.90E-04	2.90E-04
Antimony compounds	2.25E-03	2.25E-03	2.25E-03	2.25E-03	2.25E-03	2.25E-03	2.25E-03	2.25E-03	2.25E-03	2.25E-03	2.25E-03
Arsenic compounds	5.13E-02	5.13E-02	5.13E-02	5.13E-02	5.13E-02	5.13E-02	5.13E-02	1.90E-04	5.13E-02	5.13E-02	5.13E-02
Benzene	1.30E-03	1.30E-03	1.30E-03	1.30E-03	1.30E-03	1.30E-03	1.30E-03	1.30E-03	1.30E-03	1.30E-03	1.30E-03
Benzyl chloride	7.00E-04	7.00E-04	7.00E-04	7.00E-04	7.00E-04	7.00E-04	7.00E-04	7.00E-04	7.00E-04	7.00E-04	7.00E-04
Beryllium Compounds	2.63E-03	2.63E-03	2.63E-03	2.63E-03	2.63E-03	2.63E-03	2.63E-03	3.10E-04	2.63E-03	2.63E-03	2.63E-03
Bis(2-ethylhexyl) phthalate	7.30E-05	7.30E-05	7.30E-05	7.30E-05	7.30E-05	7.30E-05	7.30E-05	7.30E-05	7.30E-05	7.30E-05	7.30E-05
Bromoform	3.90E-05	3.90E-05	3.90E-05	3.90E-05	3.90E-05	3.90E-05	3.90E-05	3.90E-05	3.90E-05	3.90E-05	3.90E-05
Bromomethane (Methyl bromide)	1.60E-04	1.60E-04	1.60E-04	1.60E-04	1.60E-04	1.60E-04	1.60E-04	1.60E-04	1.60E-04	1.60E-04	1.60E-04
Cadmium compounds	6.37E-03	6.37E-03	6.37E-03	6.37E-03	6.37E-03	6.37E-03	6.37E-03	7.10E-05	6.37E-03	6.37E-03	6.37E-03
Carbon disulfide	1.30E-04	1.30E-04	1.30E-04	1.30E-04	1.30E-04	1.30E-04	1.30E-04	1.30E-04	1.30E-04	1.30E-04	1.30E-04
Carbon tetrachloride											
Chlorine											
Chlorobenzene (Monochlorobenzene)	2.20E-05	2.20E-05	2.20E-05	2.20E-05	2.20E-05	2.20E-05	2.20E-05	2.20E-05	2.20E-05	2.20E-05	2.20E-05
Chloroethane	4.20E-05	4.20E-05	4.20E-05	4.20E-05	4.20E-05	4.20E-05	4.20E-05	4.20E-05	4.20E-05	4.20E-05	4.20E-05
Chloroform	5.90E-05	5.90E-05	5.90E-05	5.90E-05	5.90E-05	5.90E-05	5.90E-05	5.90E-05	5.90E-05	5.90E-05	5.90E-05
Chloromethane	5.30E-04	5.30E-04	5.30E-04	5.30E-04	5.30E-04	5.30E-04	5.30E-04	5.30E-04	5.30E-04	5.30E-04	5.30E-04
Chromium compounds	4.24E-02	4.24E-02	4.24E-02	4.24E-02	4.24E-02	4.24E-02	4.24E-02	2.80E-02	4.24E-02	4.24E-02	4.24E-02
Cobalt compounds	1.25E-02	1.25E-02	1.25E-02	1.25E-02	1.25E-02	1.25E-02	1.25E-02	1.25E-02	1.25E-02	1.25E-02	1.25E-02
Cumene (Isopropylbenzene)	5.30E-06	5.30E-06	5.30E-06	5.30E-06	5.30E-06	5.30E-06	5.30E-06	5.30E-06	5.30E-06	5.30E-06	5.30E-06
Cyanide compounds	2.50E-03	2.50E-03	2.50E-03	2.50E-03	2.50E-03	2.50E-03	2.50E-03	2.50E-03	2.50E-03	2.50E-03	2.50E-03
Dichloromethane (Methylene chloride)	2.90E-04	2.90E-04	2.90E-04	2.90E-04	2.90E-04	2.90E-04	2.90E-04	2.90E-04	2.90E-04	2.90E-04	2.90E-04
Dimethyl sulfate	4.80E-05	4.80E-05	4.80E-05	4.80E-05	4.80E-05	4.80E-05	4.80E-05	4.80E-05	4.80E-05	4.80E-05	4.80E-05
Ethylbenzene	9.40E-05	9.40E-05	9.40E-05	9.40E-05	9.40E-05	9.40E-05	9.40E-05	9.40E-05	9.40E-05	9.40E-05	9.40E-05
Formaldehyde	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04
Hexane	6.70E-05	6.70E-05	6.70E-05	6.70E-05	6.70E-05	6.70E-05	6.70E-05	6.70E-05	6.70E-05	6.70E-05	6.70E-05
Hydrogen Chloride	1.20E+00	1.20E+00	1.20E+00	1.20E+00	1.20E+00	1.20E+00	1.20E+00	1.20E+00	1.20E+00	1.20E+00	1.20E+00
Hydrogen Fluoride	1.50E-01	1.50E-01	1.50E-01	1.50E-01	1.50E-01	1.50E-01	1.50E-01	1.50E-01	1.50E-01	1.50E-01	1.50E-01
Isophorone	5.80E-04	5.80E-04	5.80E-04	5.80E-04	5.80E-04	5.80E-04	5.80E-04	5.80E-04	5.80E-04	5.80E-04	5.80E-04
Manganese compounds	6.12E-02	6.12E-02	6.12E-02	6.12E-02	6.12E-02	6.12E-02	6.12E-02	3.60E-03	6.12E-02	6.12E-02	6.12E-02
Mercury	1.04E-02	1.04E-02	1.04E-02	1.04E-02	1.04E-02	1.04E-02	1.04E-02	1.30E-04	1.04E-02	1.04E-02	1.04E-02
Methyl methacrylate	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05
Methylhydrazine	1.70E-04	1.70E-04	1.70E-04	1.70E-04	1.70E-04	1.70E-04	1.70E-04	1.70E-04	1.70E-04	1.70E-04	1.70E-04
Methyl-tert-butylether	3.50E-05	3.50E-05	3.50E-05	3.50E-05	3.50E-05	3.50E-05	3.50E-05	3.50E-05	3.50E-05	3.50E-05	3.50E-05
Nickel compounds	3.50E-02	3.50E-02	3.50E-02	3.50E-02	3.50E-02	3.50E-02	3.50E-02	2.60E-02	3.50E-02	3.50E-02	3.50E-02
Pentachlorophenol (PCP)											
Phenol	1.60E-05	1.60E-05	1.60E-05	1.60E-05	1.60E-05	1.60E-05	1.60E-05	1.60E-05	1.60E-05	1.60E-05	1.60E-05
Phosphorus											
Polycyclic organic matter (POM)	2.08E-05	2.08E-05	2.08E-05	2.08E-05	2.08E-05	2.08E-05	2.08E-05	1.62E-01	3.18E-02	3.18E-02	1.11E-03
Propionaldehyde	3.80E-04	3.80E-04	3.80E-04	3.80E-04	3.80E-04	3.80E-04	3.80E-04	3.80E-04	3.80E-04	3.80E-04	3.80E-04
Selenium compounds	1.30E-03	1.30E-03	1.30E-03	1.30E-03	1.30E-03	1.30E-03	1.30E-03	1.30E-03	1.30E-03	1.30E-03	1.30E-03
Styrene	2.50E-05	2.50E-05	2.50E-05	2.50E-05	2.50E-05	2.50E-05	2.50E-05	2.50E-05	2.50E-05	2.50E-05	2.50E-05
Tetrachloroethylene (Perchloroethylene)	4.30E-05	4.30E-05	4.30E-05	4.30E-05	4.30E-05	4.30E-05	4.30E-05	4.30E-05	4.30E-05	4.30E-05	4.30E-05
Toluene	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04	2.40E-04
Vinyl acetate (Acetic acid)	7.60E-06	7.60E-06	7.60E-06	7.60E-06	7.60E-06	7.60E-06	7.60E-06	7.60E-06	7.60E-06	7.60E-06	7.60E-06
Vinyl chloride (chloroethene)											
Xylenes, Total	3.70E-05	3.70E-05	3.70E-05	3.70E-05	3.70E-05	3.70E-05	3.70E-05	3.70E-05	3.70E-05	3.70E-05	3.70E-05
POMs											
2-Methylnaphthalene											
5-Methylchrysene	2.20E-08	2.20E-08	2.20E-08	2.20E-08	2.20E-08	2.20E-08	2.20E-08	2.20E-08	2.20E-08	2.20E-08	2.20E-08
7,12-Dimethylbenz[a]anthracene											
Acenaphthene	5.10E-07	5.10E-07	5.10E-07	5.10E-07	5.10E-07	5.10E-07	5.10E-07	5.10E-07	5.10E-07	5.10E-07	2.20E-05
Acenaphthylene	2.50E-07	2.50E-07	2.50E-07	2.50E-07	2.50E-07	2.50E-07	2.50E-07	2.50E-07	2.50E-07	2.50E-07	8.60E-05
Anthracene	2.10E-07	2.10E-07	2.10E-07	2.10E-07	2.10E-07	2.10E-07	2.10E-07	2.10E-07	2.10E-07	2.10E-07	2.50E-05
Benzo(a)anthracene	8.00E-08	8.00E-08	8.00E-08	8.00E-08	8.00E-08	8.00E-08	8.00E-08	8.00E-08	8.00E-08	8.00E-08	7.10E-05
Benzo(b)fluoranthene											
Benzo(e)pyrene											6.20E-06
Benzo(ghi)perylene	2.70E-08	2.70E-08	2.70E-08	2.70E-08	2.70E-08	2.70E-08	2.70E-08	2.70E-08	2.70E-08	2.70E-08	5.50E-06
Benzo(b)fluoranthene	1.10E-07	1.10E-07	1.10E-07	1.10E-07	1.10E-07	1.10E-07	1.10E-07	1.10E-07	1.10E-07	1.10E-07	2.50E-05
Benzo(k)fluoranthene											
Benzo[a]pyrene	3.80E-08	3.80E-08	3.80E-08	3.80E-08	3.80E-08	3.80E-08	3.80E-08	3.80E-08	3.80E-08	3.80E-08	5.30E-06
Biphenyl	1.70E-06	1.70E-06	1.70E-06	1.70E-06	1.70E-06	1.70E-06	1.70E-06	2.50E-02	2.50E-02	2.50E-02	
Chrysene	1.00E-07	1.00E-07	1.00E-07	1.00E-07	1.00E-07	1.00E-07	1.00E-07	1.00E-07	1.00E-07	1.00E-07	8.30E-05
Dibenz[a,h]anthracene											
Dioxins and Furans											
Fluoranthene	7.10E-07	7.10E-07	7.10E-07	7.10E-07	7.10E-07	7.10E-07	7.10E-07	7.10E-07	7.10E-07	7.10E-07	1.70E-04
Fluorene	9.10E-07	9.10E-07	9.10E-07	9.10E-07	9.10E-07	9.10E-07	9.10E-07	9.10E-07	9.10E-07	9.10E-07	2.50E-05
Indeno(1,2,3-cd)pyrene	6.10E-08	6.10E-08	6.10E-08	6.10E-08	6.10E-08	6.10E-08	6.10E-08	6.10E-08	6.10E-08	6.10E-08	6.90E-06
Naphthalene	1.30E-05	1.30E-05	1.30E-05	1.30E-05	1.30E-05	1.30E-05	1.30E-05	1.30E-01	1.30E-05	1.30E-05	2.20E-04
Octachlorodibenzo-p-dioxin											
PCBs (Polychlorinated biphenyls)											
Phenanthrene	2.70E-06	2.70E-06	2.70E-06	2.70E-06	2.70E-06	2.70E-06	2.70E-06	6.80E-03	6.80E-03	6.80E-03	2.40E-04
Pyrene	3.30E-07	3.30E-07	3.30E-07	3.30E-07	3.30E-07	3.30E-07	3.30E-07	3.30E-07	3.30E-07	3.30E-07	1.20E-04
Total POM	2.08E-05	2.08E-05	2.08E-05	2.08E-05	2.08E-05	2.08E-05	2.08E-05	1.62E-01	3.18E-02	3.18E-02	1.11E-03

[3]Factors from Section 1.2 used where none provided in Section 1.1.

Emission Factors | **AP-42, Section 1.3 Emission Factors for Fuel Oil**

	Large, No. 6 oil fired, normal firing	Large, No. 6 oil fired, normal firing, low NOx burner	Large, No. 6 oil fired, tangential firing	Large, No. 6 oil fired, tangential firing, low NOx burner	Large, No. 5 oil fired, normal firing	Large, No. 5 oil fired, tangential firing	Large, No. 4 oil fired, normal firing	Large, No. 4 oil fired, tangential firing	Large, No. 2 oil fired
Parameter Code	lb/10^3 gal								
Particulate Matter	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	2.00
PM < 10 micron	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	1.00
PM < 2.5 micron	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	0.25
Nitrogen Oxides	47	40	32	26	47	32	47	32	24
Carbon Monoxide	5	5	5	5	5	5	5	5	5
Sulfur Dioxide	157	157	157	157	157	157	150	150	142
Volatile Organic Compounds	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.2
Lead Compounds	1.51E-03	1.51E-03	1.51E-03	1.51E-03	9.00E-09	9.00E-09	9.00E-09	9.00E-09	9.00E-09
Parameter Code	kg/MMBtu								
Carbon Dioxide	75.10	75.10	75.10	75.10	72.93	72.93	75.04	75.04	73.96
Methane	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003
Nitrous Oxide	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006
Carbon Dioxide Equivalent	75.3538	75.3538	75.3538	75.3538	73.1838	73.1838	75.2938	75.2938	74.2138
Parameter Code	lb/10^3 gal								
HAPs - Total	5.00E-01	5.00E-01	5.00E-01	5.00E-01	4.10E-02	4.10E-02	4.10E-02	4.10E-02	4.31E-02
HAPs									
1,1,1-Trichloroethane	2.36E-04	2.36E-04	2.36E-04	2.36E-04	2.36E-04	2.36E-04	2.36E-04	2.36E-04	2.36E-04
1,2-Dibromoethane (Ethylene dibromide); EDB									
1,2-Dichloroethane									
1,4-Dichlorobenzene (para-)									
1,2-Dichloropropane									
2,4,6-Trichlorophenol									
2,4-Dinitrophenol									
2,4-Dinitrotoluene									
2-Chloroacetophenone									
Acetaldehyde									
Acetophenone									
Acrolein									
Antimony compounds	5.25E-03	5.25E-03	5.25E-03	5.25E-03					
Arsenic compounds	1.32E-03	1.32E-03	1.32E-03	1.32E-03	4.00E-09	4.00E-09	4.00E-09	4.00E-09	4.00E-09
Benzene	2.14E-04	2.14E-04	2.14E-04	2.14E-04	2.14E-04	2.14E-04	2.14E-04	2.14E-04	2.14E-04
Benzyl chloride									
Beryllium Compounds	2.78E-05	2.78E-05	2.78E-05	2.78E-05	8.00E-09	8.00E-09	8.00E-09	8.00E-09	8.00E-09
Bis(2-ethylhexyl) phthalate									
Bromoform									
Bromomethane (Methyl bromide)									
Cadmium compounds	3.98E-04	3.98E-04	3.98E-04	3.98E-04	3.00E-09	3.00E-09	3.00E-09	3.00E-09	3.00E-09
Carbon disulfide									
Carbon tetrachloride									
Chlorine	3.47E-01	3.47E-01	3.47E-01	3.47E-01					
Chlorobenzene (Monochlorobenzene)									
Chloroethane									
Chloroform									
Chloromethane									
Chromium compounds	8.45E-04	8.45E-04	8.45E-04	8.45E-04	3.00E-09	3.00E-09	3.00E-09	3.00E-09	3.00E-09
Cobalt compounds	6.02E-03	6.02E-03	6.02E-03	6.02E-03					
Cumene (Isopropylbenzene)									
Cyanide compounds									
Dichloromethane (Methylene chloride)									
Dimethyl sulfate									
Ethylbenzene	6.36E-05	6.36E-05	6.36E-05	6.36E-05	6.36E-05	6.36E-05	6.36E-05	6.36E-05	6.36E-05
Formaldehyde	3.30E-02	3.30E-02	3.30E-02	3.30E-02	3.30E-02	3.30E-02	3.30E-02	3.30E-02	3.30E-02
Hexane									
Hydrogen Chloride									
Hydrogen Fluoride									
Isophorone									
Manganese compounds	3.00E-03	3.00E-03	3.00E-03	3.00E-03	6.00E-09	6.00E-09	6.00E-09	6.00E-09	6.00E-09
Mercury	1.13E-04	1.13E-04	1.13E-04	1.13E-04	3.00E-09	3.00E-09	3.00E-09	3.00E-09	3.00E-09
Methyl methacrylate									
Methylhydrazine									
Methyl-tert-butylether									
Nickel compounds	8.45E-02	8.45E-02	8.45E-02	8.45E-02	3.00E-09	3.00E-09	3.00E-09	3.00E-09	3.00E-09
Pentachlorophenol (PCP)									
Phenol									
Phosphorus	9.46E-03	9.46E-03	9.46E-03	9.46E-03					
Polycyclic organic matter (POM)	1.30E-03	1.30E-03	1.30E-03	1.30E-03	1.19E-03	1.19E-03	1.19E-03	1.19E-03	3.30E-03
Propionaldehyde									
Selenium compounds	6.83E-04	6.83E-04	6.83E-04	6.83E-04	1.50E-08	1.50E-08	1.50E-08	1.50E-08	1.50E-08
Styrene									
Tetrachloroethylene (Perchloroethylene)									
Toluene	6.20E-03	6.20E-03	6.20E-03	6.20E-03	6.20E-03	6.20E-03	6.20E-03	6.20E-03	6.20E-03
Vinyl acetate (Acetic acid)									
Vinyl chloride (chloroethene)									
Xylenes, Total	1.09E-04	1.09E-04	1.09E-04	1.09E-04	1.09E-04	1.09E-04	1.09E-04	1.09E-04	1.09E-04
POMs									
2-Methylnaphthalene									
5-Methylchrysene									
7,12-Dimethylbenz[a]anthracene									
Acenaphthene	2.11E-05	2.11E-05	2.11E-05	2.11E-05	2.11E-05	2.11E-05	2.11E-05	2.11E-05	2.11E-05
Acenaphthylene	2.53E-07	2.53E-07	2.53E-07	2.53E-07	2.53E-07	2.53E-07	2.53E-07	2.53E-07	2.53E-07
Anthracene	1.22E-06	1.22E-06	1.22E-06	1.22E-06	1.22E-06	1.22E-06	1.22E-06	1.22E-06	1.22E-06
Benzo(a)anthracene	4.01E-06	4.01E-06	4.01E-06	4.01E-06	4.01E-06	4.01E-06	4.01E-06	4.01E-06	4.01E-06
Benzo(b)fluoranthene									
Benzo(e)pyrene									
Benzo(ghi)perylene	2.26E-06	2.26E-06	2.26E-06	2.26E-06	2.26E-06	2.26E-06	2.26E-06	2.26E-06	2.26E-06
Benzo(b)fluoranthene	1.48E-06	1.48E-06	1.48E-06	1.48E-06	1.48E-06	1.48E-06	1.48E-06	1.48E-06	1.48E-06
Benzo(k)fluoranthene									
Benzo[a]pyrene									
Biphenyl									
Chrysene	2.38E-06	2.38E-06	2.38E-06	2.38E-06	2.38E-06	2.38E-06	2.38E-06	2.38E-06	2.38E-06
Dibenz[a,h]anthracene	1.67E-06	1.67E-06	1.67E-06	1.67E-06	1.67E-06	1.67E-06	1.67E-06	1.67E-06	1.67E-06
Dioxins and Furans									
Fluoranthene	4.84E-06	4.84E-06	4.84E-06	4.84E-06	4.84E-06	4.84E-06	4.84E-06	4.84E-06	4.84E-06
Fluorene	4.47E-06	4.47E-06	4.47E-06	4.47E-06	4.47E-06	4.47E-06	4.47E-06	4.47E-06	4.47E-06
Indeno(1,2,3-cd)pyrene	2.14E-06	2.14E-06	2.14E-06	2.14E-06	2.14E-06	2.14E-06	2.14E-06	2.14E-06	2.14E-06
Naphthalene	1.13E-03	1.13E-03	1.13E-03	1.13E-03	1.13E-03	1.13E-03	1.13E-03	1.13E-03	1.13E-03
Octachlorodibenzo-p-dioxin	3.10E-09	3.10E-09	3.10E-09	3.10E-09	3.10E-09	3.10E-09	3.10E-09	3.10E-09	3.10E-09
PCBs (Polychlorinated biphenyls)									
Phenanthrene	1.05E-05	1.05E-05	1.05E-05	1.05E-05	1.05E-05	1.05E-05	1.05E-05	1.05E-05	1.05E-05
Pyrene	4.25E-06	4.25E-06	4.25E-06	4.25E-06	4.25E-06	4.25E-06	4.25E-06	4.25E-06	4.25E-06
Total POM	1.30E-03	1.30E-03	1.30E-03	1.30E-03	1.19E-03	1.19E-03	1.19E-03	1.19E-03	3.30E-03

Emission Factors

	Large, No. 2 oil fired, LNB/FGR	Small, No. 6 oil fired	Small, No. 5 oil fired	Small, No. 4 oil fired	Small, Distillate oil fired	Residential furnace	AP-42, Section 1.4 Emission Factors for Natural Gas: Large, Uncontrolled, Pre-NSPS	Large, Uncontrolled, Post-NSPS	Large, Controlled, Low Nox	Large, Controlled, Flue Gas Recirculation
Parameter Code							(lb/MMscf)			
Particulate Matter	2.00	8.34	8.34	8.34	2.00	0.4	7.6	7.6	7.6	7.6
PM < 10 micron	1.00	5.17	5.17	5.17	1.00	0.4	7.6	7.6	7.6	7.6
PM < 2.5 micron	0.25	1.92	1.92	1.92	0.25	0.4	7.6	7.6	7.6	7.6
Nitrogen Oxides	10	55	55	20	20	18	280	190	140	100
Carbon Monoxide	5	5	5	5	5	5	84	84	84	84
Sulfur Dioxide	142	157	157	150	142	142	0.6	0.6	0.6	0.6
Volatile Organic Compounds	0.2	1.13	1.13	0.34	0.2	0.713	5.5	5.5	5.5	5.5
Lead Compounds	9.00E-09	1.51E-03	9.00E-09	9.00E-09	9.00E-09	9.00E-09	0.0005	0.0005	0.0005	0.0005
Parameter Code							kg/MMBtu			
Carbon Dioxide	73.96	75.10	72.93	75.04	73.96	73.96	53.06	53.06	53.06	53.06
Methane	0.003	0.003	0.003	0.003	0.003	0.003	0.001	0.001	0.001	0.001
Nitrous Oxide	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0001	0.0001	0.0001	0.0001
Carbon Dioxide Equivalent	74.2138	75.3538	73.1838	75.2938	74.2138	74.2138	53.1148	53.1148	53.1148	53.1148
Parameter Code							(lb/MMscf)			
HAPs - Total	4.31E-02	1.53E-01	4.10E-02	4.10E-02	4.31E-02	4.10E-02	1.89E+00	1.89E+00	1.89E+00	1.89E+00
HAPs										
1,1,1-Trichloroethane	2.36E-04	2.36E-04	2.36E-04	2.36E-04	2.36E-04	2.36E-04				
1,2-Dibromoethane (Ethylene dibromide); EDB										
1,2-Dichloroethane										
1,4-Dichlorobenzene (para-)							1.20E-03	1.20E-03	1.20E-03	1.20E-03
1,2-Dichloropropane										
2,4,6-Trichlorophenol										
2,4-Dinitrophenol										
2,4-Dinitrotoluene										
2-Chloroacetophenone										
Acetaldehyde										
Acetophenone										
Acrolein										
Antimony compounds		5.25E-03								
Arsenic compounds	4.00E-09	1.32E-03	4.00E-09	4.00E-09	4.00E-09	4.00E-09	2.00E-04	2.00E-04	2.00E-04	2.00E-04
Benzene	2.14E-04	2.14E-04	2.14E-04	2.14E-04	2.14E-04	2.14E-04	2.10E-03	2.10E-03	2.10E-03	2.10E-03
Benzyl chloride										
Beryllium Compounds	8.00E-09	2.78E-05	8.00E-09	8.00E-09	8.00E-09	8.00E-09	1.20E-05	1.20E-05	1.20E-05	1.20E-05
Bis(2-ethylhexyl) phthalate										
Bromoform										
Bromomethane (Methyl bromide)										
Cadmium compounds	3.00E-09	3.98E-04	3.00E-09	3.00E-09	3.00E-09	3.00E-09	1.10E-03	1.10E-03	1.10E-03	1.10E-03
Carbon disulfide										
Carbon tetrachloride										
Chlorine										
Chlorobenzene (Monochlorobenzene)										
Chloroethane										
Chloroform										
Chloromethane										
Chromium compounds	3.00E-09	8.45E-04	3.00E-09	3.00E-09	3.00E-09	3.00E-09	1.40E-03	1.40E-03	1.40E-03	1.40E-03
Cobalt compounds		6.02E-03					8.40E-05	8.40E-05	8.40E-05	8.40E-05
Cumene (Isopropylbenzene)										
Cyanide compounds										
Dichloromethane (Methylene chloride)										
Dimethyl sulfate										
Ethylbenzene	6.36E-05	6.36E-05	6.36E-05	6.36E-05	6.36E-05	6.36E-05				
Formaldehyde	3.30E-02	3.30E-02	3.30E-02	3.30E-02	3.30E-02	3.30E-02	7.50E-02	7.50E-02	7.50E-02	7.50E-02
Hexane							1.80E+00	1.80E+00	1.80E+00	1.80E+00
Hydrogen Chloride										
Hydrogen Fluoride										
Isophorone										
Manganese compounds	6.00E-09	3.00E-03	6.00E-09	6.00E-09	6.00E-09	6.00E-09	3.80E-04	3.80E-04	3.80E-04	3.80E-04
Mercury	3.00E-09	1.13E-04	3.00E-09	3.00E-09	3.00E-09	3.00E-09	2.60E-04	2.60E-04	2.60E-04	2.60E-04
Methyl methacrylate										
Methylhydrazine										
Methyl-tert-butylether										
Nickel compounds	3.00E-09	8.45E-02	3.00E-09	3.00E-09	3.00E-09	3.00E-09	2.10E-03	2.10E-03	2.10E-03	2.10E-03
Pentachlorophenol (PCP)										
Phenol										
Phosphorus		9.46E-03								
Polycyclic organic matter (POM)	3.30E-03	1.30E-03	1.19E-03	1.19E-03	3.30E-03	1.19E-03	6.98E-04	6.98E-04	6.98E-04	6.98E-04
Propionaldehyde										
Selenium compounds	1.50E-08	6.83E-04	1.50E-08	1.50E-08	1.50E-08	1.50E-08	2.40E-05	2.40E-05	2.40E-05	2.40E-05
Styrene										
Tetrachloroethylene (Perchloroethylene)										
Toluene	6.20E-03	6.20E-03	6.20E-03	6.20E-03	6.20E-03	6.20E-03	3.40E-03	3.40E-03	3.40E-03	3.40E-03
Vinyl acetate (Acetic acid)										
Vinyl chloride (chloroethene)										
Xylenes, Total	1.09E-04	1.09E-04	1.09E-04	1.09E-04	1.09E-04	1.09E-04				
POMs										
2-Methylnaphthalene							2.40E-05	2.40E-05	2.40E-05	2.40E-05
5-Methylchrysene							1.80E-06	1.80E-06	1.80E-06	1.80E-06
7,12-Dimethylbenz[a]anthracene							1.60E-05	1.60E-05	1.60E-05	1.60E-05
Acenaphthene	2.11E-05	2.11E-05	2.11E-05	2.11E-05	2.11E-05	2.11E-05	1.80E-06	1.80E-06	1.80E-06	1.80E-06
Acenaphthylene	2.53E-07	2.53E-07	2.53E-07	2.53E-07	2.53E-07	2.53E-07	1.80E-06	1.80E-06	1.80E-06	1.80E-06
Anthracene	1.22E-06	1.22E-06	1.22E-06	1.22E-06	1.22E-06	1.22E-06	2.40E-06	2.40E-06	2.40E-06	2.40E-06
Benzo(a)anthracene	4.01E-06	4.01E-06	4.01E-06	4.01E-06	4.01E-06	4.01E-06	1.80E-06	1.80E-06	1.80E-06	1.80E-06
Benzo(b)fluoranthene										
Benzo(e)pyrene										
Benzo(ghi)perylene	2.26E-06	2.26E-06	2.26E-06	2.26E-06	2.26E-06	2.26E-06	1.20E-06	1.20E-06	1.20E-06	1.20E-06
Benzo(b)fluoranthene	1.48E-06	1.48E-06	1.48E-06	1.48E-06	1.48E-06	1.48E-06	1.80E-06	1.80E-06	1.80E-06	1.80E-06
Benzo(k)fluoranthene							1.80E-06	1.80E-06	1.80E-06	1.80E-06
Benzo[a]pyrene							1.20E-06	1.20E-06	1.20E-06	1.20E-06
Biphenyl										
Chrysene	2.38E-06	2.38E-06	2.38E-06	2.38E-06	2.38E-06	2.38E-06	1.80E-06	1.80E-06	1.80E-06	1.80E-06
Dibenz[a,h]anthracene	1.67E-06	1.67E-06	1.67E-06	1.67E-06	1.67E-06	1.67E-06	1.20E-06	1.20E-06	1.20E-06	1.20E-06
Dioxins and Furans										
Fluoranthene	4.84E-06	4.84E-06	4.84E-06	4.84E-06	4.84E-06	4.84E-06	3.00E-06	3.00E-06	3.00E-06	3.00E-06
Fluorene	4.47E-06	4.47E-06	4.47E-06	4.47E-06	4.47E-06	4.47E-06	2.80E-06	2.80E-06	2.80E-06	2.80E-06
Indeno(1,2,3-cd)pyrene	2.14E-06	2.14E-06	2.14E-06	2.14E-06	2.14E-06	2.14E-06	1.80E-06	1.80E-06	1.80E-06	1.80E-06
Naphthalene	1.13E-03	1.13E-03	1.13E-03	1.13E-03	1.13E-03	1.13E-03	6.10E-04	6.10E-04	6.10E-04	6.10E-04
Octachlorodibenzo-p-dioxin	3.10E-09	3.10E-09	3.10E-09	3.10E-09	3.10E-09	3.10E-09				
PCBs (Polychlorinated biphenyls)										
Phenanthrene	1.05E-05	1.05E-05	1.05E-05	1.05E-05	1.05E-05	1.05E-05	1.70E-05	1.70E-05	1.70E-05	1.70E-05
Pyrene	4.25E-06	4.25E-06	4.25E-06	4.25E-06	4.25E-06	4.25E-06	5.00E-06	5.00E-06	5.00E-06	5.00E-06
Total POM	3.30E-03	1.30E-03	1.19E-03	1.19E-03	3.30E-03	1.19E-03	6.98E-04	6.98E-04	6.98E-04	6.98E-04

Emission Factors

							AP-42, Section 1.5 Emission Factors for Liquid Petroleum Gas[4]		
	Small, Uncontrolled	Small, Controlled, Low NOx burners	Small, Controlled, Flue Gas Recirculation	Tangential Fired, Uncontrolled	Tangential Fired, Controlled, Flue Gas Recirculation	Residential, Uncontrolled	Butane, Industrial	Butane, Commercial	Propane, Industrial
Parameter Code							lb/10^3		
Particulate Matter	7.6	7.6	7.6	7.6	7.6	7.6	0.8	0.8	0.7
PM < 10 micron	7.6	7.6	7.6	7.6	7.6	7.6	0.8	0.8	0.7
PM < 2.5 micron	7.6	7.6	7.6	7.6	7.6	7.6	0.8	0.8	0.7
Nitrogen Oxides	100	50	32	170	76	94	15	15	13
Carbon Monoxide	84	84	84	24	98	40	8.4	8.4	7.5
Sulfur Dioxide	0.6	0.6	0.6	0.6	0.6	0.6	0.09	0.09	0.10
Volatile Organic Compounds	5.5	5.5	5.5	5.5	5.5	5.5	1.1	1.1	1.0
Lead Compounds	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.005	0.005	0.005
Parameter Code							kg/MMBtu		
Carbon Dioxide	53.06	53.06	53.06	53.06	53.06	53.06	64.77	64.77	62.87
Methane	0.001	0.001	0.001	0.001	0.001	0.001	0.003	0.003	0.003
Nitrous Oxide	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0006	0.0006	0.0006
Carbon Dioxide Equivalent	53.1148	53.1148	53.1148	53.1148	53.1148	53.1148	65.0238	65.0238	63.1238
Parameter Code							lb/10^3		
HAPs - Total	1.89E+00	1.89E+00	1.89E+00	1.89E+00	1.89E+00	1.89E+00	1.89E+00	1.89E+00	1.89E+00
HAPs							lb/MMscf		
1,1,1-Trichloroethane									
1,2-Dibromoethane (Ethylene dibromide); EDB									
1,2-Dichloroethane									
1,4-Dichlorobenzene (para-)	1.20E-03	1.20E-03	1.20E-03	1.20E-03	1.20E-03	1.20E-03	1.20E-03	1.20E-03	1.20E-03
1,2-Dichloropropane									
2,4,6-Trichlorophenol									
2,4-Dinitrophenol									
2,4-Dinitrotoluene									
2-Chloroacetophenone									
Acetaldehyde									
Acetophenone									
Acrolein									
Antimony compounds									
Arsenic compounds	2.00E-04	2.00E-04	2.00E-04	2.00E-04	2.00E-04	2.00E-04	2.00E-04	2.00E-04	2.00E-04
Benzene	2.10E-03	2.10E-03	2.10E-03	2.10E-03	2.10E-03	2.10E-03	2.10E-03	2.10E-03	2.10E-03
Benzyl chloride									
Beryllium Compounds	1.20E-05	1.20E-05	1.20E-05	1.20E-05	1.20E-05	1.20E-05	1.20E-05	1.20E-05	1.20E-05
Bis(2-ethylhexyl) phthalate									
Bromoform									
Bromomethane (Methyl bromide)									
Cadmium compounds	1.10E-03	1.10E-03	1.10E-03	1.10E-03	1.10E-03	1.10E-03	1.10E-03	1.10E-03	1.10E-03
Carbon disulfide									
Carbon tetrachloride									
Chlorine									
Chlorobenzene (Monochlorobenzene)									
Chloroethane									
Chloroform									
Chloromethane									
Chromium compounds	1.40E-03	1.40E-03	1.40E-03	1.40E-03	1.40E-03	1.40E-03	1.40E-03	1.40E-03	1.40E-03
Cobalt compounds	8.40E-05	8.40E-05	8.40E-05	8.40E-05	8.40E-05	8.40E-05	8.40E-05	8.40E-05	8.40E-05
Cumene (Isopropylbenzene)									
Cyanide compounds									
Dichloromethane (Methylene chloride)									
Dimethyl sulfate									
Ethylbenzene									
Formaldehyde	7.50E-02	7.50E-02	7.50E-02	7.50E-02	7.50E-02	7.50E-02	7.50E-02	7.50E-02	7.50E-02
Hexane	1.80E+00	1.80E+00	1.80E+00	1.80E+00	1.80E+00	1.80E+00	1.80E+00	1.80E+00	1.80E+00
Hydrogen Chloride									
Hydrogen Fluoride									
Isophorone									
Manganese compounds	3.80E-04	3.80E-04	3.80E-04	3.80E-04	3.80E-04	3.80E-04	3.80E-04	3.80E-04	3.80E-04
Mercury	2.60E-04	2.60E-04	2.60E-04	2.60E-04	2.60E-04	2.60E-04	2.60E-04	2.60E-04	2.60E-04
Methyl methacrylate									
Methylhydrazine									
Methyl-tert-butylether									
Nickel compounds	2.10E-03	2.10E-03	2.10E-03	2.10E-03	2.10E-03	2.10E-03	2.10E-03	2.10E-03	2.10E-03
Pentachlorophenol (PCP)									
Phenol									
Phosphorus									
Polycyclic organic matter (POM)	6.98E-04	6.98E-04	6.98E-04	6.98E-04	6.98E-04	6.98E-04	6.98E-04	6.98E-04	6.98E-04
Propionaldehyde									
Selenium compounds	2.40E-05	2.40E-05	2.40E-05	2.40E-05	2.40E-05	2.40E-05	2.40E-05	2.40E-05	2.40E-05
Styrene									
Tetrachloroethylene (Perchloroethylene)									
Toluene	3.40E-03	3.40E-03	3.40E-03	3.40E-03	3.40E-03	3.40E-03	3.40E-03	3.40E-03	3.40E-03
Vinyl acetate (Acetic acid)									
Vinyl chloride (chloroethene)									
Xylenes, Total									
POMs									
2-Methylnaphthalene	2.40E-05	2.40E-05	2.40E-05	2.40E-05	2.40E-05	2.40E-05	2.40E-05	2.40E-05	2.40E-05
5-Methylchrysene	1.80E-06	1.80E-06	1.80E-06	1.80E-06	1.80E-06	1.80E-06	1.80E-06	1.80E-06	1.80E-06
7,12-Dimethylbenz[a]anthracene	1.60E-05	1.60E-05	1.60E-05	1.60E-05	1.60E-05	1.60E-05	1.60E-05	1.60E-05	1.60E-05
Acenaphthene	1.80E-06	1.80E-06	1.80E-06	1.80E-06	1.80E-06	1.80E-06	1.80E-06	1.80E-06	1.80E-06
Acenaphthylene	1.80E-06	1.80E-06	1.80E-06	1.80E-06	1.80E-06	1.80E-06	1.80E-06	1.80E-06	1.80E-06
Anthracene	2.40E-06	2.40E-06	2.40E-06	2.40E-06	2.40E-06	2.40E-06	2.40E-06	2.40E-06	2.40E-06
Benzo(a)anthracene	1.80E-06	1.80E-06	1.80E-06	1.80E-06	1.80E-06	1.80E-06	1.80E-06	1.80E-06	1.80E-06
Benzo(b)fluoranthene									
Benzo(e)pyrene									
Benzo(ghi)perylene	1.20E-06	1.20E-06	1.20E-06	1.20E-06	1.20E-06	1.20E-06	1.20E-06	1.20E-06	1.20E-06
Benzo(b)fluoranthene	1.80E-06	1.80E-06	1.80E-06	1.80E-06	1.80E-06	1.80E-06	1.80E-06	1.80E-06	1.80E-06
Benzo(k)fluoranthene	1.80E-06	1.80E-06	1.80E-06	1.80E-06	1.80E-06	1.80E-06	1.80E-06	1.80E-06	1.80E-06
Benzo[a]pyrene	1.20E-06	1.20E-06	1.20E-06	1.20E-06	1.20E-06	1.20E-06	1.20E-06	1.20E-06	1.20E-06
Biphenyl									
Chrysene	1.80E-06	1.80E-06	1.80E-06	1.80E-06	1.80E-06	1.80E-06	1.80E-06	1.80E-06	1.80E-06
Dibenz[a,h]anthracene	1.20E-06	1.20E-06	1.20E-06	1.20E-06	1.20E-06	1.20E-06	1.20E-06	1.20E-06	1.20E-06
Dioxins and Furans									
Fluoranthene	3.00E-06	3.00E-06	3.00E-06	3.00E-06	3.00E-06	3.00E-06	3.00E-06	3.00E-06	3.00E-06
Fluorene	2.80E-06	2.80E-06	2.80E-06	2.80E-06	2.80E-06	2.80E-06	2.80E-06	2.80E-06	2.80E-06
Indeno(1,2,3-cd)pyrene	1.80E-06	1.80E-06	1.80E-06	1.80E-06	1.80E-06	1.80E-06	1.80E-06	1.80E-06	1.80E-06
Naphthalene	6.10E-04	6.10E-04	6.10E-04	6.10E-04	6.10E-04	6.10E-04	6.10E-04	6.10E-04	6.10E-04
Octachlorodibenzo-p-dioxin									
PCBs (Polychlorinated biphenyls)									
Phenanthrene	1.70E-05	1.70E-05	1.70E-05	1.70E-05	1.70E-05	1.70E-05	1.70E-05	1.70E-05	1.70E-05
Pyrene	5.00E-06	5.00E-06	5.00E-06	5.00E-06	5.00E-06	5.00E-06	5.00E-06	5.00E-06	5.00E-06
Total POM	6.98E-04	6.98E-04	6.98E-04	6.98E-04	6.98E-04	6.98E-04	6.98E-04	6.98E-04	6.98E-04

[4]HAP factors from AP-42, Section 1.4.

Emission Factors

AP-42, Section 1.6 Emission Factors for Wood Residue

	Propane, Commercial	Bark/Bark and Wet Wood, No Control	Dry Wood, No Control	Wet Wood, No Control	Bark, Mechanical Collector	Bark and Wet Wood, Mechanical Collector	Dry Wood, Mechanical Collector	Wet Wood, Mechanical Collector	Bark/bark and wet wood/wet wood-fired boiler, with Electrolyzed Gravel Bed
Parameter Code		lb/MMBtu							
Particulate Matter	0.7	0.56	0.40	0.33	0.54	0.35	0.30	0.22	0.1
PM < 10 micron	0.7	0.50	0.36	0.29	0.49	0.32	0.27	0.20	0.074
PM < 2.5 micron	0.7	0.43	0.31	0.25	0.29	0.19	0.16	0.12	0.065
Nitrogen Oxides	13	0.22	0.49	0.22	0.22	0.22	0.49	0.22	0.22
Carbon Monoxide	7.5	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.6
Sulfur Dioxide	0.10	0.025	0.025	0.025	0.025	0.025	0.25	0.025	0.025
Volatile Organic Compounds	1.0	0.017	0.017	0.017	0.017	0.017	0.017	0.017	0.017
Lead Compounds	0.005	4.80E-05	4.80E-05	4.80E-05	4.80E-05	4.80E-05	4.80E-05	4.80E-05	4.80E-05
Parameter Code		kg/MMBtu							
Carbon Dioxide	62.87	93.80	93.80	93.80	93.80	93.80	93.80	93.80	93.80
Methane	0.003	0.0072	0.0072	0.0072	0.0072	0.0072	0.0072	0.0072	0.0072
Nitrous Oxide	0.0006	0.0036	0.0036	0.0036	0.0036	0.0036	0.0036	0.0036	0.0036
Carbon Dioxide Equivalent	63.1238	95.0528	95.0528	95.0528	95.0528	95.0528	95.0528	95.0528	95.0528
Parameter Code		lb/MMBtu							
HAPs - Total	1.89E+00	3.86E-02	3.86E-02	3.86E-02	3.86E-02	3.86E-02	3.86E-02	3.86E-02	3.86E-02
HAPs									
1,1,1-Trichloroethane		3.10E-05	3.10E-05	3.10E-05	3.10E-05	3.10E-05	3.10E-05	3.10E-05	3.10E-05
1,2-Dibromoethane (Ethylene dibromide); EDB		5.50E-05	5.50E-05	5.50E-05	5.50E-05	5.50E-05	5.50E-05	5.50E-05	5.50E-05
1,2-Dichloroethane		2.90E-05	2.90E-05	2.90E-05	2.90E-05	2.90E-05	2.90E-05	2.90E-05	2.90E-05
1,4-Dichlorobenzene (para-)	1.20E-03								
1,2-Dichloropropane		3.30E-05	3.30E-05	3.30E-05	3.30E-05	3.30E-05	3.30E-05	3.30E-05	3.30E-05
2,4,6-Trichlorophenol		2.20E-08	2.20E-08	2.20E-08	2.20E-08	2.20E-08	2.20E-08	2.20E-08	2.20E-08
2,4-Dinitrophenol		1.80E-07	1.80E-07	1.80E-07	1.80E-07	1.80E-07	1.80E-07	1.80E-07	1.80E-07
2,4-Dinitrotoluene									
2-Chloroacetophenone									
Acetaldehyde		8.30E-04	8.30E-04	8.30E-04	8.30E-04	8.30E-04	8.30E-04	8.30E-04	8.30E-04
Acetophenone		3.20E-09	3.20E-09	3.20E-09	3.20E-09	3.20E-09	3.20E-09	3.20E-09	3.20E-09
Acrolein		4.00E-03	4.00E-03	4.00E-03	4.00E-03	4.00E-03	4.00E-03	4.00E-03	4.00E-03
Antimony compounds		7.90E-06	7.90E-06	7.90E-06	7.90E-06	7.90E-06	7.90E-06	7.90E-06	7.90E-06
Arsenic compounds	2.00E-04	2.20E-05	2.20E-05	2.20E-05	2.20E-05	2.20E-05	2.20E-05	2.20E-05	2.20E-05
Benzene	2.10E-03	4.20E-03	4.20E-03	4.20E-03	4.20E-03	4.20E-03	4.20E-03	4.20E-03	4.20E-03
Benzyl chloride									
Beryllium Compounds	1.20E-05	1.10E-06	1.10E-06	1.10E-06	1.10E-06	1.10E-06	1.10E-06	1.10E-06	1.10E-06
Bis(2-ethylhexyl) phthalate		4.70E-08	4.70E-08	4.70E-08	4.70E-08	4.70E-08	4.70E-08	4.70E-08	4.70E-08
Bromoform									
Bromomethane (Methyl bromide)		1.50E-05	1.50E-05	1.50E-05	1.50E-05	1.50E-05	1.50E-05	1.50E-05	1.50E-05
Cadmium compounds	1.10E-03	4.10E-06	4.10E-06	4.10E-06	4.10E-06	4.10E-06	4.10E-06	4.10E-06	4.10E-06
Carbon disulfide									
Carbon tetrachloride		4.50E-05	4.50E-05	4.50E-05	4.50E-05	4.50E-05	4.50E-05	4.50E-05	4.50E-05
Chlorine		7.90E-04	7.90E-04	7.90E-04	7.90E-04	7.90E-04	7.90E-04	7.90E-04	7.90E-04
Chlorobenzene (Monochlorobenzene)		3.30E-05	3.30E-05	3.30E-05	3.30E-05	3.30E-05	3.30E-05	3.30E-05	3.30E-05
Chloroethane									
Chloroform		2.80E-05	2.80E-05	2.80E-05	2.80E-05	2.80E-05	2.80E-05	2.80E-05	2.80E-05
Chloromethane		2.30E-05	2.30E-05	2.30E-05	2.30E-05	2.30E-05	2.30E-05	2.30E-05	2.30E-05
Chromium compounds	1.40E-03	2.10E-05	2.10E-05	2.10E-05	2.10E-05	2.10E-05	2.10E-05	2.10E-05	2.10E-05
Cobalt compounds	8.40E-05	6.50E-06	6.50E-06	6.50E-06	6.50E-06	6.50E-06	6.50E-06	6.50E-06	6.50E-06
Cumene (Isopropylbenzene)									
Cyanide compounds									
Dichloromethane (Methylene chloride)		2.90E-04	2.90E-04	2.90E-04	2.90E-04	2.90E-04	2.90E-04	2.90E-04	2.90E-04
Dimethyl sulfate									
Ethylbenzene		3.10E-05	3.10E-05	3.10E-05	3.10E-05	3.10E-05	3.10E-05	3.10E-05	3.10E-05
Formaldehyde	7.50E-02	4.40E-03	4.40E-03	4.40E-03	4.40E-03	4.40E-03	4.40E-03	4.40E-03	4.40E-03
Hexane	1.80E+00								
Hydrogen Chloride		1.90E-02	1.90E-02	1.90E-02	1.90E-02	1.90E-02	1.90E-02	1.90E-02	1.90E-02
Hydrogen Fluoride									
Isophorone									
Manganese compounds	3.80E-04	1.60E-03	1.60E-03	1.60E-03	1.60E-03	1.60E-03	1.60E-03	1.60E-03	1.60E-03
Mercury	2.60E-04	3.50E-06	3.50E-06	3.50E-06	3.50E-06	3.50E-06	3.50E-06	3.50E-06	3.50E-06
Methyl methacrylate									
Methylhydrazine									
Methyl-tert-butylether									
Nickel compounds	2.10E-03	3.30E-05	3.30E-05	3.30E-05	3.30E-05	3.30E-05	3.30E-05	3.30E-05	3.30E-05
Pentachlorophenol (PCP)		5.10E-08	5.10E-08	5.10E-08	5.10E-08	5.10E-08	5.10E-08	5.10E-08	5.10E-08
Phenol		5.10E-05	5.10E-05	5.10E-05	5.10E-05	5.10E-05	5.10E-05	5.10E-05	5.10E-05
Phosphorus		2.70E-05	2.70E-05	2.70E-05	2.70E-05	2.70E-05	2.70E-05	2.70E-05	2.70E-05
Polycyclic organic matter (POM)	6.98E-04	1.27E-04	1.27E-04	1.27E-04	1.27E-04	1.27E-04	1.27E-04	1.27E-04	1.27E-04
Propionaldehyde		3.20E-05	3.20E-05	3.20E-05	3.20E-05	3.20E-05	3.20E-05	3.20E-05	3.20E-05
Selenium compounds	2.40E-05	2.80E-06	2.80E-06	2.80E-06	2.80E-06	2.80E-06	2.80E-06	2.80E-06	2.80E-06
Styrene		1.90E-03	1.90E-03	1.90E-03	1.90E-03	1.90E-03	1.90E-03	1.90E-03	1.90E-03
Tetrachloroethylene (Perchloroethylene)									
Toluene	3.40E-03	9.20E-04	9.20E-04	9.20E-04	9.20E-04	9.20E-04	9.20E-04	9.20E-04	9.20E-04
Vinyl acetate (Acetic acid)									
Vinyl chloride (chloroethene)		1.80E-05	1.80E-05	1.80E-05	1.80E-05	1.80E-05	1.80E-05	1.80E-05	1.80E-05
Xylenes, Total		2.50E-05	2.50E-05	2.50E-05	2.50E-05	2.50E-05	2.50E-05	2.50E-05	2.50E-05
POMs									
2-Methylnaphthalene	2.40E-05	1.60E-07	1.60E-07	1.60E-07	1.60E-07	1.60E-07	1.60E-07	1.60E-07	1.60E-07
5-Methylchrysene	1.80E-06								
7,12-Dimethylbenz[a]anthracene	1.60E-05								
Acenaphthene	1.80E-06	9.10E-07	9.10E-07	9.10E-07	9.10E-07	9.10E-07	9.10E-07	9.10E-07	9.10E-07
Acenaphthylene	1.80E-06	5.00E-06	5.00E-06	5.00E-06	5.00E-06	5.00E-06	5.00E-06	5.00E-06	5.00E-06
Anthracene	2.40E-06	3.00E-06	3.00E-06	3.00E-06	3.00E-06	3.00E-06	3.00E-06	3.00E-06	3.00E-06
Benzo(a)anthracene	1.80E-06	6.50E-08	6.50E-08	6.50E-08	6.50E-08	6.50E-08	6.50E-08	6.50E-08	6.50E-08
Benzo(b)fluoranthene		1.00E-07	1.00E-07	1.00E-07	1.00E-07	1.00E-07	1.00E-07	1.00E-07	1.00E-07
Benzo(e)pyrene		2.60E-09	2.60E-09	2.60E-09	2.60E-09	2.60E-09	2.60E-09	2.60E-09	2.60E-09
Benzo(ghi)perylene	1.20E-06	9.30E-08	9.30E-08	9.30E-08	9.30E-08	9.30E-08	9.30E-08	9.30E-08	9.30E-08
Benzo(b)fluoranthene	1.80E-06	1.60E-07	1.60E-07	1.60E-07	1.60E-07	1.60E-07	1.60E-07	1.60E-07	1.60E-07
Benzo(k)fluoranthene	1.80E-06	3.60E-08	3.60E-08	3.60E-08	3.60E-08	3.60E-08	3.60E-08	3.60E-08	3.60E-08
Benzo[a]pyrene	1.20E-06	2.60E-06	2.60E-06	2.60E-06	2.60E-06	2.60E-06	2.60E-06	2.60E-06	2.60E-06
Biphenyl									
Chrysene	1.80E-06	3.80E-08	3.80E-08	3.80E-08	3.80E-08	3.80E-08	3.80E-08	3.80E-08	3.80E-08
Dibenz[a,h]anthracene	1.20E-06	9.10E-09	9.10E-09	9.10E-09	9.10E-09	9.10E-09	9.10E-09	9.10E-09	9.10E-09
Dioxins and Furans		1.67E-06	1.67E-06	1.67E-06	1.67E-06	1.67E-06	1.67E-06	1.67E-06	1.67E-06
Fluoranthene	3.00E-06	1.60E-06	1.60E-06	1.60E-06	1.60E-06	1.60E-06	1.60E-06	1.60E-06	1.60E-06
Fluorene	2.80E-06	3.40E-06	3.40E-06	3.40E-06	3.40E-06	3.40E-06	3.40E-06	3.40E-06	3.40E-06
Indeno(1,2,3-cd)pyrene	1.80E-06	8.70E-08	8.70E-08	8.70E-08	8.70E-08	8.70E-08	8.70E-08	8.70E-08	8.70E-08
Naphthalene	6.10E-04	9.70E-05	9.70E-05	9.70E-05	9.70E-05	9.70E-05	9.70E-05	9.70E-05	9.70E-05
Octachlorodibenzo-p-dioxin									
PCBs (Polychlorinated biphenyls)		8.15E-09	8.15E-09	8.15E-09	8.15E-09	8.15E-09	8.15E-09	8.15E-09	8.15E-09
Phenanthrene	1.70E-05	7.00E-06	7.00E-06	7.00E-06	7.00E-06	7.00E-06	7.00E-06	7.00E-06	7.00E-06
Pyrene	5.00E-06	3.70E-06	3.70E-06	3.70E-06	3.70E-06	3.70E-06	3.70E-06	3.70E-06	3.70E-06
Total POM	6.98E-04	1.27E-04	1.27E-04	1.27E-04	1.27E-04	1.27E-04	1.27E-04	1.27E-04	1.27E-04

Emission Factors

	Dry wood-fired boilers, with Electrolyzed Gravel Bed	Bark/bark and wet wood/wet wood-fired boiler, with Wet Scrubber	Dry wood-fired boilers, with Wet Scrubber	Bark/bark and wet wood/wet wood-fired boiler, with Fabric Filter	Dry wood-fired boilers, with Fabric Filter	Bark/bark and wet wood/wet wood-fired boiler, with Electrostatis Precipitator	Dry wood-fired boilers, with Electrostatis Precipitator
Parameter Code							
Particulate Matter	0.1	0.066	0.066	0.1	0.1	0.054	0.054
PM < 10 micron	0.074	0.065	0.065	0.074	0.074	0.04	0.04
PM < 2.5 micron	0.065	0.065	0.065	0.065	0.065	0.035	0.035
Nitrogen Oxides	0.49	0.22	0.49	0.22	0.49	0.22	0.49
Carbon Monoxide	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Sulfur Dioxide	0.025	0.025	0.025	0.025	0.025	0.025	0.025
Volatile Organic Compounds	0.017	0.017	0.017	0.017	0.017	0.017	0.017
Lead Compounds	4.80E-05	4.80E-05	4.80E-05	4.80E-05	4.80E-05	4.80E-05	4.80E-05
Parameter Code							
Carbon Dioxide	93.80	93.80	93.80	93.80	93.80	93.80	93.80
Methane	0.0072	0.0072	0.0072	0.0072	0.0072	0.0072	0.0072
Nitrous Oxide	0.0036	0.0036	0.0036	0.0036	0.0036	0.0036	0.0036
Carbon Dioxide Equivalent	95.0528	95.0528	95.0528	95.0528	95.0528	95.0528	95.0528
Parameter Code							
HAPs - Total	3.86E-02	3.86E-02	3.86E-02	3.86E-02	3.86E-02	3.86E-02	3.86E-02
HAPs							
1,1,1-Trichloroethane	3.10E-05	3.10E-05	3.10E-05	3.10E-05	3.10E-05	3.10E-05	3.10E-05
1,2-Dibromoethane (Ethylene dibromide); EDB	5.50E-05	5.50E-05	5.50E-05	5.50E-05	5.50E-05	5.50E-05	5.50E-05
1,2-Dichloroethane	2.90E-05	2.90E-05	2.90E-05	2.90E-05	2.90E-05	2.90E-05	2.90E-05
1,4-Dichlorobenzene (para-)							
1,2-Dichloropropane	3.30E-05	3.30E-05	3.30E-05	3.30E-05	3.30E-05	3.30E-05	3.30E-05
2,4,6-Trichlorophenol	2.20E-08	2.20E-08	2.20E-08	2.20E-08	2.20E-08	2.20E-08	2.20E-08
2,4-Dinitrophenol	1.80E-07	1.80E-07	1.80E-07	1.80E-07	1.80E-07	1.80E-07	1.80E-07
2,4-Dinitrotoluene							
2-Chloroacetophenone							
Acetaldehyde	8.30E-04	8.30E-04	8.30E-04	8.30E-04	8.30E-04	8.30E-04	8.30E-04
Acetophenone	3.20E-09	3.20E-09	3.20E-09	3.20E-09	3.20E-09	3.20E-09	3.20E-09
Acrolein	4.00E-03	4.00E-03	4.00E-03	4.00E-03	4.00E-03	4.00E-03	4.00E-03
Antimony compounds	7.90E-06	7.90E-06	7.90E-06	7.90E-06	7.90E-06	7.90E-06	7.90E-06
Arsenic compounds	2.20E-05	2.20E-05	2.20E-05	2.20E-05	2.20E-05	2.20E-05	2.20E-05
Benzene	4.20E-03	4.20E-03	4.20E-03	4.20E-03	4.20E-03	4.20E-03	4.20E-03
Benzyl chloride							
Beryllium Compounds	1.10E-06	1.10E-06	1.10E-06	1.10E-06	1.10E-06	1.10E-06	1.10E-06
Bis(2-ethylhexyl) phthalate	4.70E-08	4.70E-08	4.70E-08	4.70E-08	4.70E-08	4.70E-08	4.70E-08
Bromoform							
Bromomethane (Methyl bromide)	1.50E-05	1.50E-05	1.50E-05	1.50E-05	1.50E-05	1.50E-05	1.50E-05
Cadmium compounds	4.10E-06	4.10E-06	4.10E-06	4.10E-06	4.10E-06	4.10E-06	4.10E-06
Carbon disulfide							
Carbon tetrachloride	4.50E-05	4.50E-05	4.50E-05	4.50E-05	4.50E-05	4.50E-05	4.50E-05
Chlorine	7.90E-04	7.90E-04	7.90E-04	7.90E-04	7.90E-04	7.90E-04	7.90E-04
Chlorobenzene (Monochlorobenzene)	3.30E-05	3.30E-05	3.30E-05	3.30E-05	3.30E-05	3.30E-05	3.30E-05
Chloroethane							
Chloroform	2.80E-05	2.80E-05	2.80E-05	2.80E-05	2.80E-05	2.80E-05	2.80E-05
Chloromethane	2.30E-05	2.30E-05	2.30E-05	2.30E-05	2.30E-05	2.30E-05	2.30E-05
Chromium compounds	2.10E-05	2.10E-05	2.10E-05	2.10E-05	2.10E-05	2.10E-05	2.10E-05
Cobalt compounds	6.50E-06	6.50E-06	6.50E-06	6.50E-06	6.50E-06	6.50E-06	6.50E-06
Cumene (Isopropylbenzene)							
Cyanide compounds							
Dichloromethane (Methylene chloride)	2.90E-04	2.90E-04	2.90E-04	2.90E-04	2.90E-04	2.90E-04	2.90E-04
Dimethyl sulfate							
Ethylbenzene	3.10E-05	3.10E-05	3.10E-05	3.10E-05	3.10E-05	3.10E-05	3.10E-05
Formaldehyde	4.40E-03	4.40E-03	4.40E-03	4.40E-03	4.40E-03	4.40E-03	4.40E-03
Hexane							
Hydrogen Chloride	1.90E-02	1.90E-02	1.90E-02	1.90E-02	1.90E-02	1.90E-02	1.90E-02
Hydrogen Fluoride							
Isophorone							
Manganese compounds	1.60E-03	1.60E-03	1.60E-03	1.60E-03	1.60E-03	1.60E-03	1.60E-03
Mercury	3.50E-06	3.50E-06	3.50E-06	3.50E-06	3.50E-06	3.50E-06	3.50E-06
Methyl methacrylate							
Methylhydrazine							
Methyl-tert-butylether							
Nickel compounds	3.30E-05	3.30E-05	3.30E-05	3.30E-05	3.30E-05	3.30E-05	3.30E-05
Pentachlorophenol (PCP)	5.10E-08	5.10E-08	5.10E-08	5.10E-08	5.10E-08	5.10E-08	5.10E-08
Phenol	5.10E-05	5.10E-05	5.10E-05	5.10E-05	5.10E-05	5.10E-05	5.10E-05
Phosphorus	2.70E-05	2.70E-05	2.70E-05	2.70E-05	2.70E-05	2.70E-05	2.70E-05
Polycyclic organic matter (POM)	1.27E-04	1.27E-04	1.27E-04	1.27E-04	1.27E-04	1.27E-04	1.27E-04
Propionaldehyde	3.20E-05	3.20E-05	3.20E-05	3.20E-05	3.20E-05	3.20E-05	3.20E-05
Selenium compounds	2.80E-06	2.80E-06	2.80E-06	2.80E-06	2.80E-06	2.80E-06	2.80E-06
Styrene	1.90E-03	1.90E-03	1.90E-03	1.90E-03	1.90E-03	1.90E-03	1.90E-03
Tetrachloroethylene (Perchloroethylene)							
Toluene	9.20E-04	9.20E-04	9.20E-04	9.20E-04	9.20E-04	9.20E-04	9.20E-04
Vinyl acetate (Acetic acid)							
Vinyl chloride (chloroethene)	1.80E-05	1.80E-05	1.80E-05	1.80E-05	1.80E-05	1.80E-05	1.80E-05
Xylenes, Total	2.50E-05	2.50E-05	2.50E-05	2.50E-05	2.50E-05	2.50E-05	2.50E-05
POMs							
2-Methylnaphthalene	1.60E-07	1.60E-07	1.60E-07	1.60E-07	1.60E-07	1.60E-07	1.60E-07
5-Methylchrysene							
7,12-Dimethylbenz[a]anthracene							
Acenaphthene	9.10E-07	9.10E-07	9.10E-07	9.10E-07	9.10E-07	9.10E-07	9.10E-07
Acenaphthylene	5.00E-06	5.00E-06	5.00E-06	5.00E-06	5.00E-06	5.00E-06	5.00E-06
Anthracene	3.00E-06	3.00E-06	3.00E-06	3.00E-06	3.00E-06	3.00E-06	3.00E-06
Benzo(a)anthracene	6.50E-08	6.50E-08	6.50E-08	6.50E-08	6.50E-08	6.50E-08	6.50E-08
Benzo(b)fluoranthene	1.00E-07	1.00E-07	1.00E-07	1.00E-07	1.00E-07	1.00E-07	1.00E-07
Benzo(e)pyrene	2.60E-09	2.60E-09	2.60E-09	2.60E-09	2.60E-09	2.60E-09	2.60E-09
Benzo(ghi)perylene	9.30E-08	9.30E-08	9.30E-08	9.30E-08	9.30E-08	9.30E-08	9.30E-08
Benzo(b)fluoranthene	1.60E-07	1.60E-07	1.60E-07	1.60E-07	1.60E-07	1.60E-07	1.60E-07
Benzo(k)fluoranthene	3.60E-08	3.60E-08	3.60E-08	3.60E-08	3.60E-08	3.60E-08	3.60E-08
Benzo[a]pyrene	2.60E-06	2.60E-06	2.60E-06	2.60E-06	2.60E-06	2.60E-06	2.60E-06
Biphenyl							
Chrysene	3.80E-08	3.80E-08	3.80E-08	3.80E-08	3.80E-08	3.80E-08	3.80E-08
Dibenz[a,h]anthracene	9.10E-09	9.10E-09	9.10E-09	9.10E-09	9.10E-09	9.10E-09	9.10E-09
Dioxins and Furans	1.67E-06	1.67E-06	1.67E-06	1.67E-06	1.67E-06	1.67E-06	1.67E-06
Fluoranthene	1.60E-06	1.60E-06	1.60E-06	1.60E-06	1.60E-06	1.60E-06	1.60E-06
Fluorene	3.40E-06	3.40E-06	3.40E-06	3.40E-06	3.40E-06	3.40E-06	3.40E-06
Indeno(1,2,3-cd)pyrene	8.70E-08	8.70E-08	8.70E-08	8.70E-08	8.70E-08	8.70E-08	8.70E-08
Naphthalene	9.70E-05	9.70E-05	9.70E-05	9.70E-05	9.70E-05	9.70E-05	9.70E-05
Octachlorodibenzo-p-dioxin							
PCBs (Polychlorinated biphenyls)	8.15E-09	8.15E-09	8.15E-09	8.15E-09	8.15E-09	8.15E-09	8.15E-09
Phenanthrene	7.00E-06	7.00E-06	7.00E-06	7.00E-06	7.00E-06	7.00E-06	7.00E-06
Pyrene	3.70E-06	3.70E-06	3.70E-06	3.70E-06	3.70E-06	3.70E-06	3.70E-06
Total POM	1.27E-04	1.27E-04	1.27E-04	1.27E-04	1.27E-04	1.27E-04	1.27E-04

Kingspan Insulation LLC - West
Greenhouse Gas Potential Emissions Evaluation

Selection of GHG Emission Factors

Fuel	Emission Factor Source [2]: HHV [1]	Pollutant	§98 Subpart C EF (kg/MMBtu)	§98 Subpart C EF (lb/MMBtu)	Notes
Industrial Boilers & Dryers - Fuel Combustion					
Natural Gas	1020 btu/scf	CO_2	53.06	116.98	
		CH_4	1.0E-03	2.2E-03	
		N_2O	1.0E-04	2.2E-04	
Space Heaters - Fuel Combustion					
Propane	90,500 Btu/ gal	CO_2	62.87	138.60	
		CH_4	3.0E-03	6.6E-03	
		N_2O	6.0E-04	1.3E-03	
No. 6 Fuel Oil	0.150 MMBtu/ gal	CO_2	75.10	165.57	
		CH_4	3.0E-03	6.6E-03	
		N_2O	6.0E-04	1.3E-03	

Conversion:	
lb/kg	2.2046

[1] - Higher Heat Values (HHV) from previous permit applications.

[2] - Emission Factor Sources:

40 CFR 98 Subpart C - 40 CFR Part 98 Subpart C (EPA GHG Mandatory Reporting Rule). final rule published in Federal Register 01/15/2025 (No change from previous rule published 2016)

GHG Pollutant	GWP
CO_2	1
CH_4	28
N_2O	265
HFCs	
PFCs	
SF_6	23,500

GWP source:

40 CFR 98 Subpart A - 40 CFR Part 98 Subpart A [Table A-1, April 25, 2024]

Attachment 2: Subject item inventory and facility requirements

SI List

AI ID (Name): 4229 (Kingspan Insulation LLC - West)
Activity: IND20250001

SI Category	SI Type	Subject Item ID	Delta Designation	Description	
Activity	Insignificant Air Emissions Activity	ACTV 3	Null	All IA's	
Agency Interest	Conventional Site	AISI 4229	Null	Null	
Component Group	Air Component Group	COMG 2	GP001	Total Facility VOC Limit	
Equipment	Boiler	EQUI 1	EU001	Boiler 1 - Boiler	
	Mixing Equipment	EQUI 2	EU002	Pre-Expander - Mixing Equipment	
	Molding Equipment	EQUI 4	EU004	Molder - Molding Equipment	
	Pressing Equipment	EQUI 6	EU007	Mold Press - Pressing Equipment	
		EQUI 7	EU008	Mold Press - Pressing Equipment	
Structure	Building	STRU 2	BG001	West Plant Production Line	
	Stack/Vent	STRU 1	SV006	Stack/Vent for Mold Press EQUI7	
		STRU 3	SV001	Stack/Vent for Boiler EQUI1	
		STRU 4	SV002	Building Ventilation	
		STRU 5	SV003	Stack/Vent for Pre-Expander EQUI2	
		STRU 6	SV004	Stack/Vent for Molder EQUI4	
		STRU 8	SV005	Stack/Vent for Mold Press EQUI6	
Total Facility	Air Quality Total Facility	TFAC 1	17100085	Kingspan Insulation LLC - West	

Insignificant Activities

AI ID (Name): 4229 (Kingspan Insulation LLC - West)
Activity: IND20250001

SI Category	SI Type	Status Description	Sub Attribute Description	
Activity	Insignificant Air Emissions Activity	Active / Existing	Minn. R. 7007.1300, subp. 3(F)	

Emission Units 1

AI ID (Name): 4229 (Kingspan Insulation LLC - West)
Activity: IND20250001

SI Type	Subject Item ID	Delta Designation	Description	Manufacturer	Model	Max Design Capacity	Max Design Capacity Units	Material	Firing Method	Subject to CSAPR?	Electric Generating Capacity (MW)	Construction Start Date	Operation Start Date	Modification Date	
Boiler	EQUI 1	EU001	Boiler 1 - Boiler	Kewanee	435-25OX	8.5	million British thermal units/hours	Heat	Not coal burning	N	Null	1/1/1999	1/1/1999	Null	

Emission Units 3

AI ID (Name): 4229 (Kingspan Insulation LLC - West)
Activity: IND20250001

SI Type	Subject Item ID	Delta Designation	Description	Manufacturer	Model	Max Design Capacity	Max Design Capacity Units	Material	Construction Start Date	Operation Start Date	Modification Date	
Mixing Equipment	EQUI 2	EU002	Pre-Expander - Mixing Equipment	Kurtz	180-250-VD-157	5,500	pounds/hours	Foam	1/1/1999	1/1/1999	Null	
Molding Equipment	EQUI 4	EU004	Molder - Molding Equipment	Kurtz	7,8-1,2-1/265	5,500	pounds/hours	Foam	1/1/1999	1/1/1999	Null	
Pressing Equipment	EQUI 6	EU007	Mold Press - Pressing Equipment	Kurtz	14.512S	252	pounds/hours	Foam	7/15/2005	7/15/2005	Null	
	EQUI 7	EU008	Mold Press - Pressing Equipment	Hirsch	HS1400	350	pounds/hours	Foam	3/1/2012	5/1/2012	Null	

Component Groups

AI ID (Name): 4229 (Kingspan Insulation LLC - West)
Activity: IND20250001

Subject Item ID	Delta Designation	Description	Group Member ID	
COMG 2	GP001	Total Facility VOC Limit	EQUI 2	
			EQUI 4	
			EQUI 6	
			EQUI 7	

PTE by SI

AI ID (Name): 4229 (Kingspan Insulation LLC - West)
Activity: IND20250001

SI Category	SI Type	Subject Item ID	Delta Designation	Description	Pollutant	Potential (lbs/hr)	Unrestricted Potential (tons/yr)
Component Group	Air Component Group	COMG 2	GP001	Total Facility VOC Limit	HAPs - Total		
					Styrene		
					Volatile Organic Compounds		
Equipment	Boiler	EQUI 1	EU001	Boiler 1 - Boiler	1,4-Dichlorobenzene (para-)	1e-05	4.38e-05
					Arsenic compounds	1.67e-06	7.3e-06
					Benzene	1.75e-05	7.67e-05
					Beryllium Compounds	1e-07	4.38e-07
					Cadmium compounds	9.17e-06	4.02e-05
					Carbon Dioxide	994	4,355
					Carbon Dioxide Equivalent	995	4,360
					Carbon Monoxide	0.7	3.07
					Chromium compounds	1.17e-05	5.11e-05
					Cobalt compounds	7e-07	3.07e-06
					Formaldehyde	0.000625	0.00274
					HAPs - Total	0.0157	0.0689
					Hexane	0.015	0.0657
					Lead	4.17e-06	1.83e-05
					Manganese compounds	3.17e-06	1.39e-05
					Mercury Compounds	2.17e-06	9.49e-06
					Methane	0.0187	0.0821
					Naphthalene	5.08e-06	2.23e-05
					Nickel compounds	1.75e-05	7.67e-05
					Nitrogen Oxides	0.833	3.65
					Nitrous Oxide	0.00187	0.00821
					Particulate Matter	0.0633	0.277
					PM < 2.5 micron	0.0633	0.277
					PM < 10 micron	0.0633	0.277
					Polycyclic organic matter	5.82e-06	2.55e-05
					Selenium compounds	2e-07	8.76e-07
					Sulfur Dioxide	0.005	0.0219
					Toluene	2.83e-05	0.000124
					Volatile Organic Compounds	0.0458	0.201
	Mixing Equipment	EQUI 2	EU002	Pre-Expander - Mixing Equipment	HAPs - Total	4.95	10.8
					Styrene	4.95	10.8
					Volatile Organic Compounds	385	843.2
	Molding Equipment	EQUI 4	EU004	Molder - Molding Equipment	HAPs - Total	4.95	10.8
					Styrene	4.95	10.8
					Volatile Organic Compounds	385	843.2
	Pressing Equipment	EQUI 6	EU007	Mold Press - Pressing Equipment	HAPs - Total	0.227	0.497
					Styrene	0.227	0.497
					Volatile Organic Compounds	17.64	38.6
		EQUI 7	EU008	Mold Press - Pressing Equipment	HAPs - Total	0.315	0.69
					Styrene	0.315	0.69
					Volatile Organic Compounds	24.5	53.7

PTE by SI

AI ID (Name): 4229 (Kingspan Insulation LLC - West)
Activity: IND20250001

SI Category	SI Type	Subject Item ID	Delta Designation	Description	Pollutant	Potential Limited (tons/yr)	Actual Emissions (tons/yr)
Component Group	Air Component Group	COMG 2	GP001	Total Facility VOC Limit	HAPs - Total	2.85	
					Styrene	2.85	
					Volatile Organic Compounds	225	
Equipment	Boiler	EQUI 1	EU001	Boiler 1 - Boiler	1,4-Dichlorobenzene (para-)	4.38e-05	
					Arsenic compounds	7.3e-06	
					Benzene	7.67e-05	
					Beryllium Compounds	4.38e-07	
					Cadmium compounds	4.02e-05	
					Carbon Dioxide	4,355	
					Carbon Dioxide Equivalent	4,360	
					Carbon Monoxide	3.07	
					Chromium compounds	5.11e-05	
					Cobalt compounds	3.07e-06	
					Formaldehyde	0.00274	
					HAPs - Total	0.0689	
					Hexane	0.0657	
					Lead	1.83e-05	
					Manganese compounds	1.39e-05	
					Mercury Compounds	9.49e-06	
					Methane	0.0821	
					Naphthalene	2.23e-05	
					Nickel compounds	7.67e-05	
					Nitrogen Oxides	3.65	
					Nitrous Oxide	0.00821	
					Particulate Matter	0.277	
					PM < 2.5 micron	0.277	
					PM < 10 micron	0.277	
					Polycyclic organic matter	2.55e-05	
					Selenium compounds	8.76e-07	
					Sulfur Dioxide	0.0219	
					Toluene	0.000124	
					Volatile Organic Compounds	0.201	
	Mixing Equipment	EQUI 2	EU002	Pre-Expander - Mixing Equipment	HAPs - Total	0	
					Styrene	0	
					Volatile Organic Compounds	0	
	Molding Equipment	EQUI 4	EU004	Molder - Molding Equipment	HAPs - Total	0	
					Styrene	0	
					Volatile Organic Compounds	0	
	Pressing Equipment	EQUI 6	EU007	Mold Press - Pressing Equipment	HAPs - Total	0	
					Styrene	0	
					Volatile Organic Compounds	0	
		EQUI 7	EU008	Mold Press - Pressing Equipment	HAPs - Total	0	
					Styrene	0	
					Volatile Organic Compounds	0	

Relationships

AI ID (Name): 4229 (Kingspan Insulation LLC - West)
Activity: IND20250001

SI Category	SI Type	Subject Item ID	Delta Designation	Description	Relationship	Related SI ID	% Flow	Related SI Type	Related Delta Designation	Relationship Start Date	Relationship End Date	
Equipment	Boiler	EQUI 1	EU001	Boiler 1 - Boiler	sends to	STRU 3	100	Stack/Vent	SV001	10/25/1999	Null	
	Mixing Equipment	EQUI 2	EU002	Pre-Expander - Mixing Equipment	sends to	STRU 5	100	Stack/Vent	SV003	7/18/2005	Null	
	Molding Equipment	EQUI 4	EU004	Molder - Molding Equipment	sends to	STRU 6	100	Stack/Vent	SV004	7/18/2005	Null	
	Pressing Equipment	EQUI 6	EU007	Mold Press - Pressing Equipment	sends to	STRU 8	100	Stack/Vent	SV005	9/29/2005	Null	
		EQUI 7	EU008	Mold Press - Pressing Equipment	sends to	STRU 1	100	Stack/Vent	SV006	2/21/2006	Null	

Building

AI ID (Name): 4229 (Kingspan Insulation LLC - West)
Activity: IND20250001

Subject Item ID	Delta Designation	Description	Height	Units (height)	Length	Units (length)	Width	Units (width)	
STRU 2	BG001	West Plant Production Line	24	feet	544	feet	348	feet	

Stack/Vents

AI ID (Name): 4229 (Kingspan Insulation LLC - West)
Activity: IND20250001

Subject Item ID	Delta Designation	Description	Stack Height (feet)	Stack Diameter (feet)	Stack Length (feet)	Stack Width (feet)	Stack Flow Rate (cubic ft/min)	Discharge Temperature (°F)	Flow Rate/Temp Information Source	Discharge Direction	
STRU 1	SV006	Stack/Vent for Mold Press EQUI7	28	1	Null	Null	500	160	Estimate	Upwards with a cap on stack/vent	
STRU 3	SV001	Stack/Vent for Boiler EQUI1	28	2.5	Null	Null	4,000	110	Estimate	Upwards with a cap on stack/vent	
STRU 4	SV002	Building Ventilation	27	1.5	Null	Null	7,000	78	Estimate	Horizontally	
STRU 5	SV003	Stack/Vent for Pre-Expander EQUI2	20	0.5	Null	Null	500	160	Estimate	Horizontally	
STRU 6	SV004	Stack/Vent for Molder EQUI4	28	1	Null	Null	500	160	Estimate	Upwards with a cap on stack/vent	
STRU 8	SV005	Stack/Vent for Mold Press EQUI6	28	1	Null	Null	500	160	Estimate	Upwards with a cap on stack/vent	

SI Id	Sequence	Requirement
TFAC 1	1240	Permit Appendices: This permit contains appendices as listed in the permit Table of Contents. The Permittee shall comply with all requirements contained in Appendices A and B. [Minn. R. 7007.0800, subp. 2(A) & (B)]
	4090	This permit establishes limits on the facility to keep it a minor source under New Source Review and NESHAPs. The Permittee cannot make any change at the source that would make the source a major source under New Source Review and NESHAPs until a permit amendment has been issued. This includes changes that might otherwise qualify as insignificant modifications and minor or moderate amendments. [Title I Condition: Avoid major modification under 40 CFR 52.21(b)(2) and Minn. R. 7007.3000, Title I Condition: Avoid major source under 40 CFR 52.21(b)(1)(i) and Minn. R. 7007.3000]
	4100	The Permittee must submit an annual report by the 31st of January. The report must describe the changes made at the Facility during the previous calendar year using the latest MPCA application forms. The report must include information for any new, modified, or replaced Subject Items. The report must document the VOC 12-month rolling sum calculations for the previous calendar year. The report must be submitted with the annual Compliance Certification required by this permit. As part of the Annual Report, the Permittee must verify and certify that the Facility has maintained minor source status for New Source Review. [Minn. R. 7007.0800, subp. 2(A)]
	4110	Equipment Labeling: The Permittee must permanently affix a unique number to each emissions unit for tracking purposes. Each number must correlate the unit to the appropriate Subject Item number used in this permit. The number can be affixed by placard, stencil, or other means. The number must be maintained so that it is readable and visible at all times from a safe distance. If equipment is added, it must be given a new unique number; numbers from replaced or removed equipment must not be reused. [Minn. R. 7007.0800, subp. 2(A)]
	4120	Equipment Inventory: The Permittee must maintain a written list of all emissions units and control equipment on site. The Permittee must update the list to include any replaced, modified, or new equipment prior to making the change. The list must correlate the units to the Subject Item numbers used in this permit and must include the data on GI-04, GI-05B, GI-05C, and GI-05F. The date of construction must be the date the change was made for replaced, modified, or new equipment. [Minn. R. 7007.0800, subp. 2(A)]
	7400	The Permittee must comply with Minn. Stat. 116.385. The Permittee may not use trichloroethylene at its permitted facility including in any manufacturing, processing, or cleaning processes, except as described in Minn. Stat. 116.385, subd. 2(b) and 4. This is a state-only requirement and is not enforceable by the U.S. Environmental Protection Agency (EPA) Administrator and citizens under the Clean Air Act. [Minn. R. 7007.0100, subp. 7(X), Minn. Stat. 116.385]
	7420	PERMIT SHIELD: Subject to the limitations in Minn. R. 7007.1800, compliance with the conditions of this permit shall be deemed compliance with the specific provision of the applicable requirement identified in the permit as the basis of each condition. Subject to the limitations of Minn. R. 7007.1800 and 7017.0100, subp. 2, notwithstanding the conditions of this permit specifying compliance practices for applicable requirements, any person (including the Permittee) may also use other credible evidence to establish compliance or noncompliance with applicable requirements. This permit shall not alter or affect the liability of the Permittee for any violation of applicable requirements prior to or at the time of permit issuance. [Minn. R. 7007.1800(A)(2)]
	7450	The Permittee must comply with National Primary and Secondary Ambient Air Quality Standards, 40 CFR pt. 50, and the Minnesota Ambient Air Quality Standards, Minn. R. 7009.0010 to 7009.0090. Compliance must be demonstrated upon written request by the MPCA. [Minn. R. 7007.0800, subp. 2(A) & (B), Minn. R. 7009.0020-7009.0090, Minn. Stat. 116.07, subd. 4a(a)]
	7540	Circumvention: Do not install or use a device or means that conceals or dilutes emissions, which would otherwise violate a federal or state air pollution control rule, without reducing the total amount of pollutant emitted. [Minn. R. 7011.0020]
	7550	The Permittee must at all times properly operate and maintain the facilities and systems of treatment and control and the appurtenances related to them that are installed or used by the Permittee to achieve compliance with the conditions of the permit. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls, including appropriate quality assurance procedures. [Minn. R. 7007.0800, subp. 16(J)]

SI Id	Sequence	Requirement
	7560	Operation and Maintenance Plan: Retain at the stationary source an operation and maintenance plan for all air pollution control equipment. At a minimum, the O & M plan shall identify all air pollution control equipment and control practices and shall include a preventative maintenance program for the equipment and practices, a description of (the minimum but not necessarily the only) corrective actions to be taken to restore the equipment and practices to proper operation to meet applicable permit conditions, a description of the employee training program for proper operation and maintenance of the control equipment and practices, and the records kept to demonstrate plan implementation. [Minn. R. 7007.0800, subp. 14, Minn. R. 7007.0800, subp. 16(J)]
	7570	Operation Changes: In any shutdown, breakdown, or deviation the Permittee must immediately or as soon as possible considering plant and personnel safety take all practical steps to modify operations to reduce the emission of any regulated air pollutant. No emissions units that have an unreasonable shutdown or breakdown frequency of process or control equipment are permitted to operate. [Minn. R. 7019.1000, subp. 4]
	7580	Fugitive Emissions: Do not cause or permit the handling, use, transporting, or storage of any material in a manner which may allow avoidable amounts of particulate matter to become airborne. Comply with all other requirements listed in Minn. R. 7011.0150. [Minn. R. 7011.0150]
	7590	Noise: The Permittee shall comply with the noise standards set forth in Minn. R. 7030.0010 to 7030.0080 at all times during the operation of any emission units. This is a state only requirement and is not enforceable by the U.S. Environmental Protection Agency (EPA) Administrator and citizens under the Clean Air Act. [Minn. R. 7030.0010-7030.0080]
	7600	Inspections: The Permittee shall comply with the inspection procedures and requirements as found in Minn. R. 7007.0800, subp. 9(A). [Minn. R. 7007.0800, subp. 9(A)]
	7610	The Permittee shall comply with the General Conditions listed in Minn. R. 7007.0800, subp. 16. [Minn. R. 7007.0800, subp. 16]
	7650	Monitoring Equipment Calibration - The Permittee shall either: 1. Calibrate or replace required monitoring equipment every 12 months; or 2. Calibrate at the frequency stated in the manufacturer's specifications. For each monitor, the Permittee shall maintain a record of all calibrations, including the date conducted, and any corrective action that resulted. The Permittee shall include the calibration frequencies, procedures, and manufacturer's specifications (if applicable) in the Operations and Maintenance Plan. Any requirements applying to continuous emission monitors are listed separately in this permit. [Minn. R. 7007.0800, subp. 4(D)]
	7660	Operation of Monitoring Equipment: Unless noted elsewhere in this permit, monitoring a process or control equipment connected to that process is not necessary during periods when the process is shutdown, or during checks of the monitoring systems, such as calibration checks and zero and span adjustments. If monitoring records are required, they should reflect any such periods of process shutdown or checks of the monitoring system. [Minn. R. 7007.0800, subp. 4(D)]
	7670	Recordkeeping: Retain all records at the stationary source, unless otherwise specified within this permit, for five (5) years from the date of monitoring, sample, measurement, or report. Records which must be retained at this location include all calibration and maintenance records, all original recordings for continuous monitoring instrumentation, and copies of all reports required by the permit. Records must conform to the requirements listed in Minn. R. 7007.0800, subp. 5(A). [Minn. R. 7007.0800, subp. 5(C)]
	7680	Recordkeeping: Maintain records describing any insignificant modifications (as required by Minn. R. 7007.1250, subp. 3) or changes contravening permit terms (as required by Minn. R. 7007.1350, subp. 2), including records of the emissions resulting from those changes. [Minn. R. 7007.0800, subp. 5(B)]
	7690	If the Permittee determines that no permit amendment or notification is required prior to making a change, the Permittee must retain records of all calculations required under Minn. R. 7007.1200. For expiring permits, these records shall be kept for a period of five years from the date the change was made or until permit reissuance, whichever is longer. The records shall be kept at the stationary source for the current calendar year of operation and may be kept at the stationary source or office of the stationary source for all other years. The records may be maintained in either electronic or paper format. [Minn. R. 7007.1200, subp. 4]

SI Id	Sequence	Requirement
	7770	Shutdown Notifications: Notify the commissioner at least 24 hours in advance of a planned shutdown of any control equipment or process equipment if the shutdown would cause any increase in the emissions of any regulated air pollutant. If the Permittee does not have advance knowledge of the shutdown, the Permittee must notify the commissioner as soon as possible after the shutdown. However, notification is not required in the circumstances outlined in items A, B, and C of Minn. R. 7019.1000, subp. 3. At the time of notification, the owner or operator must inform the commissioner of the cause of the shutdown and the estimated duration. The owner or operator must notify the commissioner when the shutdown is over. [Minn. R. 7019.1000, subp. 3]
	7780	Breakdown Notifications: Notify the commissioner within 24 hours of a breakdown of more than one hour of any control equipment or process equipment if the breakdown causes any increase in the emissions of any regulated air pollutant. The 24-hour time period starts when the breakdown was discovered or reasonably should have been discovered by the owner or operator. However, notification is not required in the circumstances outlined in items A, B, and C of Minn. R. 7019.1000, subp. 2. At the time of notification or as soon as possible thereafter, the Permittee must inform the commissioner of the cause of the breakdown and the estimated duration. The Permittee must notify the commissioner when the breakdown is over. [Minn. R. 7019.1000, subp. 2]
	7790	Notification of Deviations Endangering Human Health or the Environment: Immediately after discovery of the deviation or immediately after when the deviation reasonably should have been discovered, notify the commissioner either orally or by e-mail, or telephone the state duty officer at 800-422-0798 or 651-649-5451, of any deviation from permit conditions that could endanger human health or the environment. [Minn. R. 7019.1000, subp. 1]
	7800	Notification of Deviations Endangering Human Health or the Environment Report: Within two working days of discovery, notify the commissioner in writing of any deviation from permit conditions that could endanger human health or the environment. Include the following information in this written description: 1. the cause of the deviation; 2. the exact dates of the period of the deviation, if the deviation has been corrected; 3. whether or not the deviation has been corrected; 4. the anticipated time by which the deviation is expected to be corrected, if not yet corrected; and 5. steps taken or planned to reduce, eliminate, and prevent reoccurrence of the deviation. [Minn. R. 7019.1000, subp. 1]
	7810	The Permittee must submit a semiannual deviations report : Due semiannually, by the 30th of January and July. The first semiannual report submitted by the Permittee must cover the calendar half-year in which the permit is issued. The first report of each calendar year covers January 1 - June 30. The second report of each calendar year covers July 1 - December 31. Submit this on form DRF-2 (Deviation Reporting Form). If no deviations have occurred, submit the signed report certifying that there were no deviations. [Minn. R. 7007.0800, subp. 6(B)(2)]
	7830	Application for Permit Amendment: If a permit amendment is needed, submit an application in accordance with the requirements of Minn. R. 7007.1150 through Minn. R. 7007.1500. Submittal dates vary, depending on the type of amendment needed. Upon adoption of a new or amended federal applicable requirement, and if there are three or more years remaining in the permit term, the Permittee shall file an application for an amendment within nine months of promulgation of the applicable requirement, pursuant to Minn. R. 7007.0400, subp. 3. [Minn. R. 7007.0400, subp. 3, Minn. R. 7007.1150 - 7007.1500]
	7840	Extension Requests: The Permittee may apply for an Administrative Amendment to extend a deadline in a permit by no more than 120 days, provided the proposed deadline extension meets the requirements of Minn. R. 7007.1400, subp. 1(H). Performance testing deadlines from the General Provisions of 40 CFR pt. 60 and pt. 63 are examples of deadlines for which the MPCA does not have authority to grant extensions and therefore do not meet the requirements of Minn. R. 7007.1400, subp. 1(H). [Minn. R. 7007.1400, subp. 1(H)]

SI Id	Sequence	Requirement
	7860	The Permittee must submit a compliance certification : Due annually, by the 31st of January (for the previous calendar year). Submit this on form CR-04 (Annual Compliance Certification Report). This report covers all deviations experienced during the calendar year. If no deviations have occurred, submit the signed report certifying that there were no deviations. [Minn. R. 7007.0800, subp. 6(D)]
	7890	The Permittee shall submit an application for permit reissuance : Due 180 calendar days before Permit Expiration Date. [Minn. R. 7007.0400, subp. 2]
	7900	Emission Inventory Report: due on or before April 1 of each calendar year following permit issuance. Submit in a format specified by the Commissioner. [Minn. R. 7019.3000-7019.3100]
	7910	Emission Fees: due 30 days after receipt of an MPCA bill. [Minn. R. 7002.0005-7002.0085]
COMG 2	1	The Permittee must limit emissions of Volatile Organic Compounds <= 37,500 pounds per month 12-month rolling average to be calculated by the 15th day of each month for the previous 12-month period as described later in this permit. All VOC-emitting equipment at the Facility is subject to this limit except for the following: combustion and insignificant activities listed in Appendix A of this permit. If the Permittee replaces any existing VOC-emitting equipment, adds new VOC-emitting equipment, or modifies the existing VOC-emitting equipment , such equipment is subject to this permit limit as well as all of the requirements in COMG 2. Prior to making such a change, the Permittee must apply for and obtain the appropriate permit amendment, as applicable. The Permittee is not required to complete VOC calculations described in Minn. R. 7007.1200, subp. 2. A permit amendment will still be needed regardless of the emissions increase if the change will be subject to a new applicable requirement or requires revisions to the limits or monitoring and recordkeeping in this permit. VOC contents for each VOC-containing material must be determined as described under the Material Content requirement in this permit. [Title I Condition: Avoid major modification under 40 CFR 52.21(b)(2) and Minn. R. 7007.3000, Title I Condition: Avoid major source under 40 CFR 52.21(b)(1)(i) and Minn. R. 7007.3000, Title I Condition: Avoid major source under 40 CFR 63.2]
	3680	Opacity <= 20 percent opacity. This applies separately to each subject item in COMG 2. [Minn. R. 7011.0715, subp. 1(B)]
	3690	Particulate Matter <= 0.30 grains per dry standard cubic foot of exhaust gas unless required to further reduce emissions to comply with the less stringent limit of either Minn. R. 7011.0730 or Minn. R. 7011.0735. This applies separately to each subject item in COMG 2. [Minn. R. 7011.0715, subp. 1(A)]
	4335	Daily Recordkeeping. For EPS bead processes: On each day of operation, the Permittee must calculate, record, and maintain the total quantity of each VOC-containing material used at the facility. This must be based on written usage logs and flow meters. For all other VOC-containing materials: The Permittee must calculate, record, and maintain monthly records of the total quantity of each material used. This must be based on written usage logs or purchase/delivery records. [Title I Condition: Avoid major modification under 40 CFR 52.21(b)(2) and Minn. R. 7007.3000, Title I Condition: Avoid major source under 40 CFR 52.21(b)(1)(i) and Minn. R. 7007.3000, Title I Condition: Avoid major source under 40 CFR 63.2]
	4340	Volatile Organic Compounds: Monthly Recordkeeping -- VOC Emissions. By the 15th of the month, the Permittee must calculate and record the following: 1) The total usage of each VOC-containing material for the previous calendar month using the daily usage records. This record must also include the VOC and solids contents of each material as determined by the Material Content requirement of this permit; 2) The VOC emissions for the previous month using the formulas specified in this permit; and 3) The 12-month rolling sum VOC emissions for the previous 12-month period by summing the monthly VOC emissions data for the previous 12 months. [Minn. R. 7007.0800, subps. 4-5]

SI Id	Sequence	Requirement
	4350	Volatile Organic Compounds: Monthly Calculation -- VOC Emissions. The Permittee must calculate VOC emissions using the following equations: VOC (tons/month) = V V = (A1 x B1) + (A2 x B2) + (A3 x B3) + ... where: V = total VOC used in tons/month; A# = amount of each VOC-containing material used, in tons/month; B# = weight percent VOC in A#, as a fraction; [Minn. R. 7007.0800, subps. 4-5]
	7010	Material Content. Fore EPS beads, VOC contents must be determined by using the Certificate of Analysis (COA) from the supplier. If a COA is unavailable, the VOC content must be determined by the Safety Data Sheet (SDS) or the Material Safety Data Sheet (MSDS) provided by the supplier for each material used. If a material content range is given on the SDS or the MSDS, the highest number in the range must be used in all compliance calculations. If there is information provided in the Regulatory Section of the SDS, the highest number in the range of that section may be used. For all materials other than EPS beads, VOC contents must be determined by the Safety Data Sheet (SDS) or the Material Safety Data Sheet (MSDS) provided by the supplier for each material. If a material content range is given on the SDS or the MSDS, the highest number in the range must be used in all compliance calculations. If there is information provided in the Regulatory Section of the SDS, the highest number in the range of that section may be used. If a COA, MSDS, or SDS is not available or does not include VOC content from the supplier, the Permittee must assume that the pentane content of that shipment is 7% by weight and the styrene monomer content is 0.1% by weight. However, if in the preceding 12 months, EPS beads with a VOC content greater than 7.1% was used, then the Permittee shall assume that the VOC content of that shipment is equivalent to the highest VOC content used in the preceding 12 months. Other alternative methods approved by the MPCA may be used to determine the VOC, HAPs, and solids contents. The Commissioner reserves the right to require the Permittee to determine the VOC, HAP, and solids contents of any material, according to EPA or ASTM reference methods. If an EPA or ASTM reference method is used for material content determination, the data obtained must supersede the SDS or the MSDS. [Minn. R. 7007.0800, subps. 4-5]
	7030	Maximum Contents of Materials and Process Rate: The Permittee assumed certain worst-case contents of materials and process rates when determining the short term potential to emit of units in COMG 2. These assumptions are listed in Appendix B of this permit. Increasing the process rate or changing to a material that has a higher content of any of the given pollutants is considered a change in method of operation that must be evaluated under Minn. R. 7007.1200, subp. 3 to determine if a permit amendment or notification is required under Minn. R. 7007.1150. [Minn. R. 7005.0100, subp. 35a]
EQUI 1	3570	Filterable Particulate Matter <= 0.40 pounds per million Btu heat input. The potential to emit from the unit is 0.0075 lb/MMBtu due to equipment design and allowable fuels. [Minn. R. 7011.0515, subp. 1]
	3580	Opacity <= 20 percent opacity except for one six-minute period per hour of not more than 60 percent opacity. [Minn. R. 7011.0515, subp. 2]
	3632	Fuel type: Natural gas only. [Minn. R. 7005.0100, subp. 35a]
	3637	The Permittee shall keep records of fuel purchases showing fuel types. [Minn. R. 7007.0800, subp. 5]

Attachment 3: Safety Data Sheets

1. Identification

Product identifier used on the label

STYROPEK® BF Series

BF 295, BF 395, BF 395M, BF 395S, BF 495

Recommended use of the chemical and restriction on use
Recommended use*: for industrial processing only; Expanding-agent containing plastic for the production of foam plastics

* The “recommended use” identified for this product is provided solely to comply with a US Federal requirement and is not part of the seller's published specification. The terms of this Safety Data Sheet do not create or infer any warranty, express or implied, including by incorporation into or reference in the seller's sales agreement.

Details of the supplier of the safety data sheet

Company:
Styropek México SA de CV
Fernando Montes de Oca 71
Col. Condesa, C.P. 06140,
Ciudad de México, México
Telephone: +52 55 9140 0500

Manufacturer / importer:

STYROPEK S.A. DE C.V.

Emergency telephone number

24 Hour Emergency Response Information

SETIQ México: 01 800 0021400

CHEMTREC: 01 800 424-9300
832-446-6154 (in USA)
Int.: +1-703-527-3887

Manufacturing site: +52 833 500 2400 Ext: 3910

Other means of identification

Chemical name:	Polystyrene
Commercial name:	Styropek BF
Chemical family:	Polymer
Synonyms:	Expandable Polystyrene

2. Hazards Identification

According to Regulation 2012 OSHA Hazard Communication Standard; 29 CFR Part 1910.1200

Classification of the product
No need for classification according to GHS criteria for this product.

Label elements

Hazard Statement:

EUH018	In use may form flammable/explosive vapor-air mixture.
	Precautionary Statement:
P210	Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P233	Keep container tightly closed.
P243	Take precautionary measures against static discharge.
P403 + P235	Store in a well-ventilated place. Keep cool.

Hazards not otherwise classified

May cause some eye irritation which should cease after removal of the product.

Labeling of special preparations (GHS):
Product releases a flammable hydrocarbon.

According to Regulation 1994 OSHA Hazard Communication Standard; 29 CFR Part 1910.1200

Emergency overview

WARNING:
FLAMMABLE.
Releases flammable vapor.
MAY CAUSE EYE, SKIN AND RESPIRATORY TRACT IRRITATION.
PROLONGED OR REPEATED CONTACT MAY DRY SKIN AND CAUSE IRRITATION. CONTAINS MATERIAL WHICH MAY CAUSE KIDNEY DAMAGE BASED ON ANIMAL DATA.
Eye wash fountains and safety showers must be easily accessible.
Use with local exhaust ventilation.
Avoid contact with the skin, eyes and clothing.

3. Composition / Information on Ingredients

According to Regulation 2012 OSHA Hazard Communication Standard; 29 CFR Part 1910.1200

CAS Number	Content (W/W)	Chemical name
78-78-4	>= 0.3 - < 3.0 %	Isopentane
109-66-0	>= 3.0 - < 7.0 %	Pentane
1195978-93-8	>= 0.2 - < 1.0 %	Flame retardant

According to Regulation 1994 OSHA Hazard Communication Standard; 29 CFR Part 1910.1200

CAS Number	Content (W/W)	Chemical name
9003-53-6	>= 92.0 %	Polystyrene
109-66-0	<= 6.0 %	Pentane
78-78-4	<= 1.5 %	Isopentane

4. First-Aid Measures

Description of first aid measures

General advice:
Remove contaminated clothing.

If inhaled:
Remove the affected individual into fresh air and keep the person calm. If difficulties occur: Seek medical attention.

If on skin:
Wash affected areas thoroughly with soap and water. If irritation develops, seek medical attention.

If in eyes:
In case of contact with the eyes, rinse immediately for at least 15 minutes with plenty of water. If irritation develops, seek medical attention.

If swallowed:
No hazards anticipated. Rinse mouth and then drink plenty of water. If difficulties occur: Seek medical attention.

Most important symptoms and effects, both acute and delayed
Symptoms: headache, dizziness, incoordination, dazed state, Eye irritation, skin irritation

Indication of any immediate medical attention and special treatment needed
Note to physician
Treatment: Treat according to the symptoms under clinical conditions.

5. Fire-Fighting Measures

Extinguishing media
Suitable extinguishing media:
dry powder, water spray, carbon dioxide, foam

Special hazards arising from the substance or mixture
Hazards during fire-fighting:
Substance/product is dangerous when exposed to heat or flames.

Advice for fire-fighters
Protective equipment for fire-fighting:
Firefighters should be equipped with self-contained breathing apparatus and turn-out gear.

Further information:
When large quantities of solid substance/product are involved, melting may occur, in which condition, application of water may cause extensive scattering of molten material. Dense smoke produced during combustion may obscure vision. To prevent re-ignition of interior, target center of fire with large amounts of water. Vapors are heavier than air and may accumulate in low areas and travel a considerable distance up to the source of ignition.

6. Accidental release measures

Further accidental release measures:
High risk of slipping due to leakage/spillage of product.

Personal precautions, protective equipment and emergency procedures
Sources of ignition should be kept well clear. Extinguish sources of ignition nearby and downwind. Avoid dust formation. Avoid inhalation. Ensure adequate ventilation. Wear appropriate respiratory protection.

Environmental precautions
Discharge into the environment must be avoided. Do not release untreated into natural waters.

Methods and material for containment and cleaning up
Sweep/shovel up. Avoid raising dust. Ensure adequate ventilation. Place into suitable containers for reuse or disposal in a licensed facility. After decontamination, spill area can be washed with water.

7. Handling and Storage

Precautions for safe handling
Upon delivery, trailer and/or container should be opened and allowed to vent for a minimum of one hour before unloading. The substance/product in bead or expanded form generates static charges during handling which are difficult to dissipate due to the insulating properties. Take precautionary measures against static discharges. Containers should be opened carefully in well-ventilated areas to avoid static discharge. Maintain air circulation and ventilation at a minimum rate of six air changes per hour to prevent the formation of flammable concentrations.

Protection against fire and explosion:
Prevent electrostatic charge - sources of ignition should be kept well clear - fire extinguishers should be kept handy. Substance/product is capable of accumulating a static charge which could act as an ignition source. Wear non-sparking safety shoes. Ground conductive equipment properly to prevent electrostatic discharge. Vapours are heavier than air and may accumulate in low areas and travel a considerable distance up to the source of ignition. Higher line velocity can increase the build-up of static electric charge.

Conditions for safe storage, including any incompatibilities
Segregate from strong oxidizing agents.

Storage stability:
Maintain relative humidity at 40% to minimize static accumulation.
Avoid prolonged storage at high temperatures.

8. Exposure Controls/Personal Protection

Components with occupational exposure limits

Pentane	Exposure limits NIOS Pocket Guide to Chemical Hazards (US)	TWA value 600 ppm 1,800 mg/m^3 STEL value 760 ppm 2,250 mg/m^3 REL value 120 ppm 350 mg/m^3 Ceil_Time 610 ppm 1,800 mg/m^3

Advice on system design:
Provide local exhaust ventilation to control vapours/mists.

Personal protective equipment

Respiratory protection:
Respiratory protection may not be required under normal operating conditions if adequate ventilation is provided. Wear respiratory protection if ventilation is inadequate. Breathing protection if dusts are formed.

Hand protection:
non-static gloves (e.g. of leather)

Eye protection:
Tightly fitting safety goggles (chemical goggles).

Body protection:
Anti-static protective clothing, Antistatic safety shoes

General safety and hygiene measures:
Avoid contact with the skin, eyes and clothing. Avoid inhalation of dusts/mists/vapours. Eye wash fountains and safety showers must be easily accessible. Handle in accordance with good industrial hygiene and safety practice.

9. Physical and Chemical Properties

Form:	beads
Odor:	of pentane
Color:	white
pH value:	not soluble
softening point:	approx. 71 °C
onset of boiling:	The substance / product decomposes therefore not determined.
Sublimation point:	No applicable information available.
Flash point:	79 - 85 °C (ASTM D3278)
Flammability:	not highly flammable (UN Test N.1 (ready combustible solids))
Flammability of Aerosol products:	Not applicable, the product does not form flammable aerosols.
Lower explosion limit:	1.4 %(V) (air)
Upper explosion limit:	8.3 %(V) (air)
Autoignition:	285 °C (DIN 51794)
Vapor pressure:	Not applicable
Density:	Approx. 1.02 – (20 °C), 1.05 g/cm^3
Bulk density:	approx. 640 kg/m^3 (20 °C)

Vapor density:	Heavier than air.
Partitioning coefficient noctanol/ water (log Pow):	Not applicable
Self-ignition temperature:	Not self-igniting
Thermal decomposition:	No applicable information available.
Viscosity, kinematic:	No applicable information available.
Solubility in water:	Not soluble
Miscibility with water:	Immiscible
Solubility (quantitative):	No applicable information available.
Solubility (qualitative):	Soluble Solvent(s): aromatic hydrocarbons, organic solvents, ketones,
Evaporation rate:	The product is a non-volatile solid.

10. Stability and Reactivity

Reactivity:
No applicable information available.

Corrosion to metals:
No corrosive effect on metal.

Oxidizing properties:
Not an oxidizer.

Chemical stability
No applicable information available.

Possibility of hazardous reactions
The product is stable if stored and handled as prescribed/indicated.

Conditions to avoid
Avoid all sources of ignition: heat, sparks, open flame. Avoid electro-static discharge.

Incompatible materials
strong oxidizing agents, aromatic solvents

Hazardous decomposition products

Decomposition products:
Possible thermal decomposition products: gases/vapors, monomers, cyclic low molecular weight oligomers, oxides, hydrocarbons

Thermal decomposition:
No applicable information available.

11. Toxicological information

Primary routes of exposure

Routes of entry for solids and liquids are ingestion and inhalation but may include eye or skin contact. Routes of entry for gases include inhalation and eye contact. Skin contact may be a route of entry for liquefied gases.

Acute Toxicity/Effects

Acute toxicity
Assessment of acute toxicity: Contact with molten product may cause thermal burns.

Information on: isopentane
Assessment of acute toxicity: Aspiration may result in chemical pneumonitis, which may be fatal.

Oral
Type of value: LD50
Value: > 2,000 mg/kg

Inhalation
Type of value: LC50
Value: > 5 mg/l

Dermal
Type of value: LD50
Value: > 2,000 mg/kg

Irritation / corrosion
Assessment of irritating effects: Frequent and prolonged contact can lead to skin irritation.

Skin
Prolonged contact with the product can result in skin irritation.

Eye
Similar findings as for skin apply to eyes.

Sensitization
Assessment of sensitization: There is no evidence of a skin-sensitizing potential.
Result: Non-sensitizing.

Chronic Toxicity/Effects

Repeated dose toxicity
Assessment of repeated dose toxicity: The substance is inert.

Information on: isopentane
Assessment of repeated dose toxicity: Chronic overexposure has been shown to cause adverse kidney effects in experimental animals.

Genetic toxicity
Assessment of mutagenicity: Based on our experience and the information available, no adverse health effects are expected if handled as recommended with suitable precautions for designated uses.

Carcinogenicity
Assessment of carcinogenicity: Based on our experience and the information available, no adverse health effects are expected if handled as recommended with suitable precautions for designated uses.

Reproductive toxicity
Assessment of reproduction toxicity: Based on our experience and the information available, no adverse health effects are expected if handled as recommended with suitable precautions for designated uses.

Other Information
Information on: Pentane
Has a degreasing effect on skin

Symptoms of Exposure
Headache, dizziness, incoordination, dazed state, Eye irritation, skin irritation

12. Ecological Information

Toxicity

Aquatic toxicity
Information on: Pentane
Assessment of aquatic toxicity:
Acutely toxic for aquatic organisms.

Persistence and degradability

Assessment biodegradation and elimination (H_2O)
On the basis of the data available concerning eliminability/degradation and bioaccumulation potential, longer-term harm to the environment is improbable.

Elimination information
Non-biodegradable.

Bioaccumulative potential

Bioaccumulation potential
The product will not be readily bioavailable due to its consistency and insolubility in water.

Additional information
Add. remarks environmental fate & pathway:
Because of the product's consistency and low water solubility, bioavailability is improbable.

13. Disposal considerations

Waste disposal of substance:
Dispose of in accordance with national, state and local regulations. Do not discharge into waterways or sewer systems without proper authorization.

Container disposal:
Dispose of in accordance with national, state and local regulations. Uncontaminated packaging can be recycled. Contact manufacturer regarding recycling.

14. Transport Information

Land transport
TDG

Hazard class:	9
Packing group:	III
ID number:	UN 2211
Hazard label:	9
Proper shipping name:	POLYMERIC BEADS, EXPANDABLE

Sea transport
IMDG

Hazard class:	9
Packing group:	III
ID number:	UN 2211
Hazard label:	9
Marine pollutant:	NO
Proper shipping name:	POLYMERIC BEADS, EXPANDABLE

Air transport
IATA/ICAO

Hazard class:	9
Packing group:	III
ID number:	UN 2211
Hazard label:	9
Proper shipping name:	POLYMERIC BEADS, EXPANDABLE

15. Regulatory Information

Federal Regulations
Not applicable

NFPA Hazard codes:
Health : 1 Fire: 2 Reactivity: 1 Special:

HMIS III rating
Health: 1 Flammability: 2 Physical hazard:0

16. Other Information

We support worldwide Responsible Care® initiatives. We value the health and safety of our employees, customers, suppliers and neighbors, and the protection of the environment. Our commitment to Responsible Care is integral to conducting our business and operating our facilities in a safe and environmentally responsible fashion, supporting our customers and suppliers in ensuring the safe and environmentally sound handling of our products, and minimizing the impact of our operations on society and the environment during production, storage, transport, use and disposal of our products.

Safety Data Sheet
STYROPEK® BFL Series

1. Identification

Product identifier used on the label

STYROPEK® BFL Series
BFL 295, BFL 395, BFL 397, BFL 397S, BFL 495

Recommended use of the chemical and restriction on use
Recommended use*: for industrial processing only; Expanding-agent containing plastic for the production of foam plastics.

*The “recommended use” identified for this product is provided solely to comply with a US Federal requirement and is not part of the seller's published specification. The terms of this Safety Data Sheet (SDS) do not create or infer any warranty, express or implied, including by incorporation into or reference in the seller's sales agreement.

Details of the supplier of the safety data sheet

Company:
Styropek México SA de CV
Fernando Montes de Oca 71
Col. Condesa, C.P. 06140,
Ciudad de México, México
Telephone: +52 55 9140 0523

Manufacturer / importer:

STYROPEK S.A. DE C.V.

Emergency telephone number

24 Hour Emergency Response Information
SETIQ Mexico: 01 800 0021400
CHEMTREC: 01 800 424-9300
832-446-6154 (in USA)
Int.: +1-703-527-3887

Manufacturing plant: +52-833-500-2400, ext: 3934, 3910.

Other means of identification

Chemical name:	Polystyrene
Commercial name:	Styropek BF
Chemical family:	Polymer
Synonyms:	Expandable Polystyrene

2. Hazards Identification

According to Regulation 2012 OSHA Hazard Communication Standard; 29 CFR Part 1910.1200

Classification of the product

No need for classification according to GHS criteria for this product.

Label elements

Hazard Statement:

EUH018	In use may form flammable/explosive vapor-air mixture.
	Precautionary Statement:
P210	Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P233	Keep container tightly closed.
P243	Take precautionary measures against static discharge.
P403 + P235	Store in a well-ventilated place. Keep cool.

Hazards not otherwise classified.

May cause some eye irritation which should cease after removal of the product.

Labeling of special preparations (GHS): Product releases a flammable hydrocarbon.

According to Regulation 1994 OSHA Hazard Communication Standard; 29 CFR Part 910.1200

Emergency overview

WARNING:
FLAMMABLE.
Releases flammable vapor.
MAY CAUSE EYE, SKIN AND RESPIRATORY TRACT IRRITATION.
PROLONGED OR REPEATED CONTACT MAY DRY SKIN AND CAUSE IRRITATION. CONTAINS MATERIAL WHICH MAY CAUSE KIDNEY DAMAGE BASED ON ANIMAL DATA.
Eye wash fountains and safety showers must be easily accessible.
Use with local exhaust ventilation.
Avoid contact with the skin, eyes and clothing.

3. Composition / Information on Ingredients

According to Regulation 2012 OSHA Hazard Communication Standard; 29 CFR Part 1910.1200

CAS Number	Content (W/W)	Chemical name
78-78-4	>= 0.3 - < 3.0 %	Isopentane
109-66-0	>= 3.0 - < 7.0 %	Pentane
1195978-93-8	>= 0.2 - < 1.0 %	Polymeric FR

According to Regulation 1994 OSHA Hazard Communication Standard; 29 CFR Part 1910.1200

CAS Number	Content (W/W)	Chemical name
9003-53-6	>= 92.0 %	Polystyrene
109-66-0	<= 6.0 %	Pentane
78-78-4	<= 1.5 %	Isopentane

4. First-Aid Measures

Description of first aid measures

General advice:
Remove contaminated clothing.

If inhaled:
Remove the affected individual into fresh air and keep the person calm. If difficulties occur: Seek medical attention.

If on skin:
Wash affected areas thoroughly with soap and water. If irritation develops, seek medical attention.

If in eyes:
In case of contact with the eyes, rinse immediately for at least 15 minutes with plenty of water. If irritation develops, seek medical attention.

If swallowed:
No hazards anticipated. Rinse mouth and then drink plenty of water. If difficulties occur: Seek medical attention.

Most important symptoms and effects, both acute and delayed.

Symptoms: headache, dizziness, incoordination, dazed state, Eye irritation, skin irritation

Indication of any immediate medical attention and special treatment needed

Note to physician.
Treatment: Treat according to the symptoms under clinical conditions.

5. Fire-Fighting Measures

Extinguishing media
Suitable extinguishing media:
dry powder, water spray, carbon dioxide, foam

Special hazards arising from the substance or mixture.
Hazards during firefighting: Substance/product is dangerous when exposed to heat or flames.

Advice for fire-fighters
Protective equipment for firefighting: Firefighters should be equipped with self-contained breathing apparatus and turn-out gear.

Further information:
When large quantities of solid substance/product are involved, melting may occur, in which condition, application of water may cause extensive scattering of molten material. Dense smoke produced during combustion may obscure vision. To prevent re-ignition of interior, target center of fire with large amounts of water. Vapors are heavier than air and may accumulate in low areas and travel a considerable distance up to the source of ignition.

6. Accidental release measures

Further accidental release measures: High risk of slipping due to leakage/spillage of product.

Personal precautions, protective equipment and emergency procedures
Sources of ignition should be kept well clear. Extinguish sources of ignition nearby and downwind. Avoid dust formation. Avoid inhalation. Ensure adequate ventilation. Wear appropriate respiratory protection.

Environmental precautions
Discharge into the environment must be avoided. Do not release untreated into natural waters.

Methods and material for containment and cleaning up
Sweep/shovel up. Avoid raising dust. Ensure adequate ventilation. Place into suitable containers for reuse or disposal in a licensed facility. After decontamination, spill area can be washed with water.

7. Handling and Storage

Precautions for safe handling
Upon delivery, trailer and/or container should be opened and allowed to vent for a minimum of one hour before unloading. The substance/product in bead or expanded form generates static charges during handling which are difficult to dissipate due to the insulating properties. Take precautionary measures against static discharges. Containers should be opened carefully in well-ventilated areas to avoid static discharge. Maintain air circulation and ventilation at a minimum rate of six air changes per hour to prevent the formation of flammable concentrations.

Protection against fire and explosion:
Prevent electrostatic charge - sources of ignition should be kept well clear - fire extinguishers should be kept handy. Substance/product can accumulate a static charge which could act as an ignition source. Wear non-sparking safety shoes. Ground conductive equipment properly to prevent electrostatic discharge. Vapors are heavier than air and may accumulate in low areas and travel a considerable distance up to the source of ignition. Higher line velocity can increase the build-up of static electric charge.

Conditions for safe storage, including any incompatibilities:
Segregate from strong oxidizing agents.

Storage stability:
Maintain relative humidity at 40% to minimize static accumulation.
Avoid prolonged storage at high temperatures.

8. Exposure Controls/Personal Protection

Components with occupational exposure limits

Pentane	Exposure limits NIOS Pocket Guide to Chemical Hazards (US)	TWA value 600 ppm 1,800 mg/m^3 STEL value 760 ppm 2,250 mg/m^3 REL value 120 ppm 350 mg/m^3 Ceil_Time 610 ppm 1,800 mg/m^3

Advice on system design:
Provide local exhaust ventilation to control vapors/mists.

Personal protective equipment

Respiratory protection: Respiratory protection may not be required under normal operating conditions if adequate ventilation is provided. Wear respiratory protection if ventilation is inadequate. Breathing protection if dusts are formed.

Hand protection: non-static gloves (e.g. of leather)

Eye protection: Tightly fitting safety goggles (chemical goggles).

Body protection: Anti-static protective clothing, Antistatic safety shoes

General safety and hygiene measures: Avoid contact with the skin, eyes and clothing. Avoid inhalation of dusts/mists/vapors. Eye wash fountains and safety showers must be easily accessible. Handle in accordance with good industrial hygiene and safety practice.

9. Physical and Chemical Properties

Form:	beads
Odour:	of pentane
Colour:	white
pH value:	not soluble
softening point:	approx. 71 °C
onset of boiling:	The substance / product decomposes therefore not determined.
Sublimation point:	No applicable information available.
Flash point:	79 - 85 °C (ASTM D3278)
Flammability:	Not highly flammable (UN Test N.1 (ready combustible solids))
Flammability of Aerosol Products:	Not applicable, the product does not form flammable aerosoles)
Lower explosion limit:	1.4 %(V) (air)
Upper explosion limit:	8.3 %(V) (air)
Autoignition:	285 °C (DIN 51794)
Vapour pressure:	Not applicable
Density:	Approx. 1.02 – (20 °C) 1.05 g/cm^3
Bulk density:	Approx. 640 kg/m^3 (20 °C)
Vapour density:	Heavier than air.
Partitioning coefficient noctanol/water (log Pow):	Not applicable

Self-ignition temperature:	Not self-igniting
Thermal decomposition:	No applicable information available.
Viscosity, kinematic:	No applicable information available.
Solubility in water:	Not soluble
Miscibility with water:	Immiscible
Solubility (quantitative):	No applicable information available.
Solubility (qualitative):	Soluble Solvent(s): aromatic hydrocarbons, organic solvents, ketones,
Evaporation rate:	The product is a non-volatile solid.

10. Stability and Reactivity

Reactivity:
No applicable information available.
Corrosion to metals:
No corrosive effect on metal.
Oxidizing properties:
Not an oxidizer.
Chemical stability:
No applicable information available.
Possibility of hazardous reactions:
The product is stable if stored and handled as prescribed/indicated.
Conditions to avoid:
Avoid all sources of ignition: heat, sparks, open flame. Avoid electro-static discharge.
Incompatible materials:
Strong oxidizing agents, aromatic solvents

Hazardous decomposition products
Decomposition products: Possible thermal decomposition products: gases/vapors, monomers, cyclic low molecular weight oligomers, oxides, hydrocarbons
Thermal decomposition: No applicable information available.

11. Toxicological information

Primary routes of exposure
Routes of entry for solids and liquids are ingestion and inhalation but may include eye or skin contact. Routes of entry for gases include inhalation and eye contact. Skin contact may be a route of entry for liquefied gases.

Acute Toxicity/Effects
Acute toxicity
Assessment of acute toxicity: Contact with molten product may cause thermal burns.

Information on: Isopentane
Assessment of acute toxicity: Aspiration may result in chemical pneumonitis, which may be fatal.

Oral
Type of value: LD50
Value: > 2,000 mg/kg

Inhalation
Type of value: LC50
Value: > 5 mg/l

Dermal
Type of value: LD50
Value: > 2,000 mg/kg

Irritation / corrosion
Assessment of irritating effects: Frequent and prolonged contact can lead to skin irritation.
Information on: Sulfonium compounds, C11-14-alkylbis(hydroxyethyl), 2-hydroxyethyl sulfates (salts)
Assessment of irritating effects: Corrosive! Damages skin and eyes.

Skin: Prolonged contact with the product can result in skin irritation.

Eye: Similar findings as for skin apply to eyes.

Sensitization: Assessment of sensitization: There is no evidence of a skin-sensitizing potential.

Result: Non-sensitizing.

Chronic Toxicity/Effects

Repeated dose toxicity
Assessment of repeated dose toxicity: The substance is inert.

Information on: isopentane
Assessment of repeated dose toxicity: Chronic overexposure has been shown to cause adverse kidney effects in experimental animals.

Genetic toxicity
Assessment of mutagenicity: Based on our experience and the information available, no adverse health effects are expected if handled as recommended with suitable precautions for designated uses.

Carcinogenicity
Assessment of carcinogenicity: Based on our experience and the information available, no adverse health effects are expected if handled as recommended with suitable precautions for designated uses.

Reproductive toxicity
Assessment of reproduction toxicity: Based on our experience and the information available, no adverse health effects are expected if handled as recommended with suitable precautions for designated uses.

Other Information
Information on: Pentane
Has a degreasing effect on skin.

Symptoms of Exposure
Headache, dizziness, incoordination, dazed state, Eye irritation, skin irritation

12. Ecological Information

Toxicity
Aquatic toxicity
Information on: Pentane
Assessment of aquatic toxicity:
Acutely toxic for aquatic organisms.

Persistence and degradability

Assessment biodegradation and elimination (H_2O)
Based on the data available concerning eliminability/degradation and bioaccumulation potential, longer-term harm to the environment is improbable.

Elimination information
Non-biodegradable.

Bioaccumulative potential

Bioaccumulation potential
The product will not be readily bioavailable due to its consistency and insolubility in water.

Additional information
Add. remarks environm. fate & pathway:
Because of the product's consistency and low water solubility, bioavailability is improbable.

13. Disposal considerations

Waste disposal of substance:
Dispose of in accordance with national, state and local regulations. Do not discharge into waterways or sewer systems without proper authorization.

Container disposal:
Dispose of in accordance with national, state and local regulations. Uncontaminated packaging can be recycled. Contact manufacturer regarding recycling.

14. Transport Information

Land transport
TDG

Hazard class:	9
Packing group:	III
ID number:	UN 2211
Hazard label:	9
Proper shipping name:	POLYMERIC BEADS, EXPANDABLE

Sea transport
IMDG

Hazard class:	9
Packing group:	III
ID number:	UN 2211
Hazard label:	9
Marine pollutant:	NO
Proper shipping name:	POLYMERIC BEADS, EXPANDABLE

Air transport
IATA/ICAO

Hazard class:	9
Packing group:	III
ID number:	UN 2211
Hazard label:	9
Proper shipping name:	POLYMERIC BEADS, EXPANDABLE

15. Regulatory Information

Federal Regulations
Not applicable

NFPA Hazard codes:
Health : 1 Fire: 2 Reactivity: 0 Special:

HMIS III rating
Health: 1 Flammability: 2 Physical hazard:0

16. Other Information

We support worldwide Responsible Care® initiatives. We value the health and safety of our employees, customers, suppliers and neighbors, and the protection of the environment. Our commitment to Responsible Care is integral to conducting our business and operating our facilities in a safe and environmentally responsible fashion, supporting our customers and suppliers in ensuring the safe and environmentally sound handling of our products, and minimizing the impact of our operations on society and the environment during production, storage, transport, use and disposal of our products.

SAFETY DATA SHEET

H.B. Fuller® HL-1486-XDR

Version 1.2 Revision Date 06/26/2020

SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product name : H.B. Fuller® HL-1486-XDR
Product code : 100000001841

Manufacturer or supplier's details

Company : H.B. Fuller Company

Address : 1200 Willow Lake Boulevard
Vadnais Heights, MN 55110
Telephone : 1-888-423-8553

Medical Emergency Phone Number (24 Hours): 1-888-853-1758

Transport Emergency Phone Number (CHEMTREC): 1-800-424-9300

Recommended use of the chemical and restrictions on use

Recommended use : Hot melt adhesive

Restrictions on use : For industrial use only.

SECTION 2. HAZARDS IDENTIFICATION

Emergency Overview

Appearance	Solid form
Color	Light Amber
Odor	Neutral

GHS Classification

Not a hazardous substance or mixture.

GHS label elements

Not a hazardous substance or mixture.

Potential Health Effects

Inhalation : Vapors/fumes may be irritating at application temperatures.

Skin : Contact with hot product will cause thermal burns.

Aggravated Medical Condition : None known.

Carcinogenicity:

IARC No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

OSHA No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

NTP	No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance / Mixture : Mixture

Hazardous ingredients

No hazardous ingredients

SECTION 4. FIRST AID MEASURES

General advice	:	Show this material safety data sheet to the doctor in attendance.
If inhaled	:	Move to fresh air. If symptoms persist, call a physician.
In case of skin contact	:	Wash off with soap and water. Cool melted product on skin with plenty of water. Do not remove solidified product.
In case of eye contact	:	In the case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
If swallowed	:	Do not induce vomiting. Seek medical attention if symptoms develop. Provide medical care provider with this SDS.
Notes to physician	:	Use mineral oil to soften and loosen product for removal.

SECTION 5. FIRE-FIGHTING MEASURES

Suitable extinguishing media	:	Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.
Unsuitable extinguishing media	:	Do NOT use water jet.
Specific hazards during fire fighting	:	Burning produces irritant fumes.
Special protective equipment for fire-fighters	:	Wear self-contained breathing apparatus for firefighting if necessary.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures	:	Refer to protective measures listed in sections 7 and 8.

SAFETY DATA SHEET

H.B. Fuller® HL-1486-XDR

Version 1.2 Revision Date 06/26/2020

Methods and materials for containment and cleaning up	:	Allow to solidify.

SECTION 7. HANDLING AND STORAGE

Advice on safe handling	:	Avoid breathing vapors/fumes of heated product. Prevent contact with molten product.
Conditions for safe storage	:	Keep in a dry, cool place.
Materials to avoid	:	No special restrictions on storage with other products.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Ingredients with workplace control parameters

Contains no substances with occupational exposure limit values.

Engineering measures	:	At the application temperature, use of local exhaust over the premelting reservoir is encouraged.

Personal protective equipment

Respiratory protection	:	In case of insufficient ventilation, wear suitable respiratory equipment.
Filter type	:	Particulates type
Hand protection		
Material	:	Protective gloves
Remarks	:	When handling hot material, use heat resistant gloves.
Eye protection	:	Safety glasses

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	:	Solid form
Color	:	Light Amber
Odor	:	Neutral
Odor Threshold	:	No data available
Boiling point/boiling range	:	is not determined
Evaporation rate	:	is not determined
Flammability (solid, gas)	:	Not classified as a flammability hazard
Upper explosion limit	:	Upper flammability limit is not determined
Lower explosion limit	:	Lower flammability limit is not determined

Relative vapor density	:	is not determined
Density	:	0.960 g/cm3
Solubility(ies)		
Water solubility	:	insoluble
Partition coefficient: n-octanol/water	:	No data available
Autoignition temperature	:	is not determined
Thermal decomposition	:	Carbon monoxide, carbon dioxide and unburned hydrocarbons (smoke).
Viscosity		
Viscosity, kinematic	:	Not applicable
Solid Content, % by weight	:	100
VOC, % by weight	:	0

SECTION 10. STABILITY AND REACTIVITY

Chemical stability	:	The product is chemically stable.
Possibility of hazardous reactions	:	Hazardous polymerization does not occur.
Hazardous decomposition products	:	Stable under normal conditions. Thermal decomposition can lead to release of irritating gases and vapors.

SECTION 11. TOXICOLOGICAL INFORMATION

Acute toxicity

No data available

Skin corrosion/irritation

No data available

Serious eye damage/eye irritation

No data available

Respiratory or skin sensitization

No data available

Germ cell mutagenicity

No data available

Carcinogenicity

No data available

Reproductive toxicity

No data available

STOT-single exposure

No data available

STOT-repeated exposure

No data available

Aspiration toxicity

No data available

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity

No data available

Persistence and degradability

No data available

Bioaccumulative potential

Mobility in soil

No data available

Other adverse effects

No data available

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods

Waste from residues	:	To the best of our knowledge, this product does not meet the definition of hazardous waste under the U.S. EPA Hazardous Waste Regulations 40 CFR 261. Solidify and dispose of in an approved landfill. Consult state, local or provincial authorities for more restrictive requirements. The hazard and precautionary statements displayed on the label also apply to any residues left in the container.

SECTION 14. TRANSPORT INFORMATION

Special precautions for user

Remarks	:	Not dangerous goods

Domestic regulation

49 CFR
Not regulated as a dangerous good

International Regulations

UNRTDG
Not regulated as a dangerous good

IATA-DGR
Not regulated as a dangerous good

IMDG-Code
Not regulated as a dangerous good

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

Not applicable for product as supplied.

SECTION 15. REGULATORY INFORMATION

SARA 311/312 Hazards : No SARA Hazards

SARA 302 : This material does not contain any components with a section 302 EHS TPQ.

SARA 313 : This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

Clean Air Act

This product does not contain any hazardous air pollutants (HAP), as defined by the U.S. Clean Air Act Section 112 (40 CFR 61).

US State Regulations

California Prop 65 Please contact Supplier for more information.

The ingredients of this product are reported in the following inventories:

TSCA	On the inventory, or in compliance with the inventory
DSL	All components of this product are on the Canadian DSL
AICS	On the inventory, or in compliance with the inventory
ENCS	On the inventory, or in compliance with the inventory
KECI	On the inventory, or in compliance with the inventory
PICCS	On the inventory, or in compliance with the inventory
IECSC	On the inventory, or in compliance with the inventory

Inventories LegendTSCA (USA), DSL (Canada), REACH(Europe), AICS (Australia), NZIoC (New Zealand), ENCS (Japan), KECI (Korea), PICCS (Philippines), IECSC (China), TWINV (Taiwan)

SECTION 16. OTHER INFORMATION

SAFETY DATA SHEET

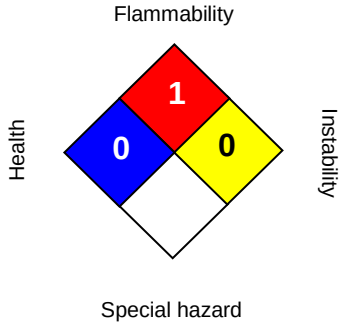
H.B. Fuller® HL-1486-XDR

Version 1.2 Revision Date 06/26/2020

Prepared by: Global Regulatory Department - phone: 1-651-236-5842 - email: msds.request@hbfuller.com

Further information

NFPA:



HMIS III:

HEALTH	0
FLAMMABILITY	1
PHYSICAL HAZARD	0

0 = not significant, 1 =Slight,
2 = Moderate, 3 = High
4 = Extreme, * = Chronic

The information and recommendations set forth herein are believed to be accurate. Because some of the information is derived from information provided to the H.B. Fuller Company from its suppliers, and because the H.B. Fuller Company has no control over the conditions of handling and use, the H.B. Fuller Company makes no warranty, expressed or implied, regarding the accuracy of the data or the results to be obtained from the use thereof. The information is supplied solely for your information and consideration, and the H.B. Fuller Company assumes no responsibility for use or reliance thereon. It is the responsibility of the user of H.B. Fuller Company products to comply with all applicable federal, state and local laws and regulations.