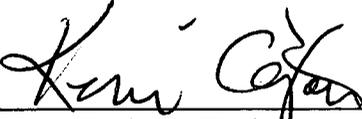


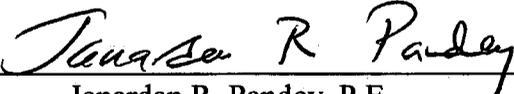
COMMONWEALTH OF VIRGINIA
Department of Environmental Quality
Valley Regional Office

STATEMENT OF LEGAL AND FACTUAL BASIS
Significant Permit Modification

Kingspan Insulation LLC
Winchester, Frederick County, Virginia
Permit No. VRO81095
Effective Date: June 7, 2015
Expiration Date: June 6, 2020

As required by 40 CFR Part 70 and 9 VAC 5 Chapter 80, Kingspan Insulation LLC has applied for a significant permit modification to the Title V Operating Permit for its extruded polystyrene foam production facility located in Winchester, Virginia. The Department has reviewed the application and has prepared a modified Title V Operating Permit.

Air Permit Writer:  Date: 6/23/17
Kevin B. Covington
(540) 574-7881

Air Permit Manager:  Date: 6/26/17
Janardan R. Pandey, P.E.

REQUESTED MODIFICATION

Kingspan Insulation LLC (Kingspan or the Company) operates an extruded polystyrene foam production facility in Winchester, Virginia. The facility primarily produces industrial foam products for building underlayment and insulation. The basic operations at the facility include raw material receiving and handling, foam extrusion, roll storage, printing on finished goods, finished goods storage, and product reclaim.

Kingspan currently operates under the following air permits issued by DEQ:

- Minor new source review (NSR) permit dated December 20, 2016, as amended June 1, 2017, to operate and modify an extruded polystyrene foam production facility (which is included as Attachment A);
- State Operating Permit (SOP) dated March 13, 2017, to operate a polystyrene foam extrusion process (the new E-7 line); and
- Title V operating permit that became effective on June 7, 2015.

The Valley Regional Office of the Department of Environmental Quality (DEQ) received a Form 805 air permit application from Kingspan dated March 1, 2017. The application requests modifications to the facility's Title V operating permit that correspond to changes that were approved by DEQ in the minor NSR permit modification that was issued on December 20, 2016, as amended June 1, 2017. The changes made in this recent minor NSR permit modification and requested for this Title V modification are described below.

REASON FOR MODIFICATION

As authorized in the minor NSR permit dated December 20, 2016, as amended June 1, 2017, Kingspan is making the following changes to its facility:

- Construction of a new foam extrusion line, designated E-7. E-7 will produce insulation board, similar to the existing E-6 line, using the same raw materials and blowing agents as on the E-6 line.
- Removal of the existing E-1 foam extrusion line, which produces underlayment.
- Changes to the reclaim processes, including the removal of the existing R-1 reclaim extruder; the installation of the new R-7 reclaim extruder; and the move of the existing R-6 reclaim extruder from the Insulation Board Reclaim (IBR) process to the Non-Insulation Board Reclaim (NIBR) process.
- Other ancillary changes, such as the removal of the flexographic printer serving the E-1 line and the installation of a new printer to serve the new E-7 line.

In addition to the physical changes outlined above, the minor NSR permit dated December 20, 2016, as amended June 1, 2017, also reorganizes many of the emissions units at this facility into functional groups that more closely reflect operations at the facility.

The minor NSR permit dated December 20, 2016, as amended June 1, 2017, reflects the following changes from the preceding minor NSR permit, which was dated December 21, 2015:

- The deletion of all conditions pertaining solely to the E-1 foam extrusion line, which will be removed from the facility.¹
- The addition of all conditions pertaining to the new E-7 process line, which will be constructed at the facility upon issuance of the proposed permit modification.
- The separation of process VOC emission limits from reclaim VOC emission limits for each process line.
- The establishment of single VOC emission limits for each distinct and independent reclaim process - IBR and NIBR.
- Condition 15, which established a throughput limit on HFC-134a use on the E-6 line, was removed from the permit. This condition was created to avoid PSD applicability for GHG, but as recently directed by the U.S. Supreme Court in *Utility Air Regulatory Group V. Environmental Protection Agency* (June 23, 2014) and subsequent EPA and DEQ guidance (see DEQ guidance APG-311 (August 25, 2014)), DEQ no longer has the authority to regulate GHG emissions in a minor NSR permit. Accordingly, there is no limitation on HFC-134a use on the new E-7 line either.
- Condition 54, which established a throughput limit for HAPs for all of the flexographic printers at the facility in order to limit MACT Subpart KK applicability solely to recordkeeping requirements, was removed from the minor NSR permit and incorporated into the state operating permit (SOP) that was issued on March 13, 2017, because an SOP is the appropriate permit for a condition pertaining only to HAPs. This and the other conditions of the SOP will be incorporated into the Title V permit at its next renewal.

These changes are described in greater detail in the Engineering Memorandum that supports the permit dated December 20, 2016, which is included as Attachment B. The existing Title V permit should be modified to incorporate the changes described above to the minor NSR permit.

¹ The E-1 foam extruder and related equipment is being removed. Certain equipment that serves E-1 and one or more other process lines, such as resin pellet silos and fluff storage silos, will remain in operation at the facility and thus will also remain in the permits.

APPLICABILITY OF 9 VAC 5-80-230

According to 9 VAC 5-80-230, the significant modification procedures must be used for those permit modifications that do not qualify as minor permit modifications under 9 VAC 5-80-210 or as administrative amendments under 9 VAC 5-80-200. Kingspan's proposal does not meet the requirements for an administrative amendment or a minor permit modification. The Regulations further list the type of permit changes that require use of significant modification procedures. The changes proposed by Kingspan meet the following criterion, stated in 9 VAC 5-80-230.A.2:

Significant modification procedures shall be used for those permit modifications that: ... Require or change a case-by-case determination of an emission limitation or other standard....

Kingspan's requested Title V permit modification requires the establishment of revised emission limitations and standards through the incorporation of the new applicable requirements in the minor NSR permit dated December 20, 2016, as amended June 1, 2017. Therefore, the requested changes to the existing Title V permit must be processed as a significant permit modification.

CHANGES TO THE EXISTING TITLE V OPERATING PERMIT

The changes made to the Title V permit are described below and include the requirements from the minor NSR permit dated December 20, 2016, as amended June 1, 2017. The condition numbers refer to the modified Title V permit unless otherwise noted.

Permit-wide: All citations to the previous NSR permit dated 12/21/15 are changed to the current NSR permit dated 12/20/16. References to specific condition numbers of the NSR permit are revised as necessary.

Emission Units: The Emission Units table is revised as necessary to reflect the units that have been removed (E-1), added (E-7), or that now serve different process lines (reclaim).

The E-1 Line (Underlayment)

Conditions 1-9 (existing): All conditions pertaining solely to the E-1 Line have been removed from the permit.

Conditions 10-33 (existing): All conditions previously included with E-1 that also apply to E-2 and E-4, such as CAM and Periodic Monitoring, have been relocated to the NIBR section of the permit.

The E-2 Line (Attic Vent/Roll Stock)

Conditions 2 and 3: The VOC emissions limit and the VOC emissions limit calculation conditions have been revised to apply only to E-

2 Process (i.e., foam extrusion) emissions. E-2 Reclaim emissions are now addressed in the NIBR section of the permit.

The E-4 Line (Underlayment)

Conditions 13 and 14:

The VOC emissions limit and the VOC emissions limit calculation conditions have been revised to apply only to E-4 Process (i.e., foam extrusion) emissions. E-4 Reclaim emissions are now addressed in the NIBR section of the permit.

The E-6 Line (Insulation Board)

Conditions 24 and 25:

The VOC emissions limit and the VOC emissions limit calculation conditions have been revised to apply only to E-6 Process (i.e., foam extrusion) emissions. E-6 Reclaim emissions are now addressed in the IBR section of the permit.

Conditions 90-92 (existing):

The periodic monitoring conditions for the fluff storage silos serving the E-6 line (and now also the new E-7 line) are moved to the IBR section of the permit (Conditions 51-53).

The New E-7 Line (Insulation Board)

Conditions 34-44:

A new section of conditions is added to the permit for the new E-7 line. Since the E-7 line will produce insulation board, similar to the existing E-6 line, these conditions mirror the conditions for the E-6 line.

Condition 43:

Instead of the generic requirement to conduct VOC retention testing once “during the term of this permit” that is specified for the three existing foam extrusion lines, the VOC retention testing requirement for the new E-7 line mirrors the Initial Performance Testing requirement for this line that is set forth in Condition 57 of the minor NSR permit. VOC retention testing must be performed on the new E-7 line within 180 days of startup of the E-7 line. When this permit is next renewed (which will be in the year 2020), this condition should be replaced with the same generic condition to repeat testing at least once every five years that applies to the E-2, E-4, and E-6 lines.

Insulation Board Reclaim (IBR)

Conditions 45-54:

There are two reclaim extruders (R-4 and R-7) that serve

the two insulation board manufacturing lines (the existing E-6 line and the new E-7 line), which collectively are referred to as the IBR process. All conditions pertaining to the IBR process are now set forth together, in Conditions 45 through 54. In the existing permit, emission limits and other conditions pertaining to the reclaim process were included with emission limits and other conditions pertaining to the foam extrusion and product storage processes.

Non-Insulation Board Reclaim (NIBR)

Conditions 55-80:

There are two reclaim extruders (R-2 and R-6) that serve the other two manufacturing lines in the facility, E-2 (attic vent/roll stock) and E-4 (underlayment), which collectively are referred to as the NIBR process. All conditions pertaining to the NIBR process are now set forth together, in Conditions 55 through 80. In the existing permit, emission limits and other conditions pertaining to the reclaim process were included with emission limits and other conditions pertaining to the foam extrusion and product storage processes.

Conditions 62-76, 78-80:

All conditions pertaining to the regenerative thermal oxidizer (RTO) (including CAM requirements for the RTO) and Periodic Monitoring for the NIBR fluff storage silos have been moved to the NIBR section of the permit.

Inside Warehouse Storage (IWS)

Condition 81:

A new condition provides a single emission limit for the IWS storage function.

Conditions 83-86:

The four existing conditions that provide throughput limits on the weight of product manufactured on each foam extrusion line that can be stored in the IWS have been moved to the IWS section of the permit.

Facility-Wide Conditions

Condition 97 (exist. permit):

The condition limiting the use of organic hazardous air pollutants for all of the facility's flexographic printers has been removed from the permit because this condition was recently removed from the facility's minor NSR permit (issued December 20, 2016) and included in the facility's new state operating permit (issued March 13, 2017).

Conditions 90-95: The conditions applicable to the flexographic printers have been revised to reflect the removal of the printer associated with the E-1 line (ES-115) and the addition of a new printer associated with the new E-7 line (ES-124).

Insignificant Units: The Insignificant Emission Units table has been updated as necessary to reflect the changes in the facility that have been authorized by the recent minor NSR and SOP permits.

General Conditions: The General Conditions have been updated to reflect recent changes to DEQ's boilerplate for Title V permits. Most notably, the four conditions entitled "Malfunction as an Affirmative Defense" (Conditions 147-150 of the existing permit) have been removed.

State-Only Enforceable Requirements

Conditions 145-146: The existing throughput and emission limits for methanol are increased to reflect the addition of the new E-7 line. The methanol emission limits are increasing from 13.8 lb/hr and 50.3 tpy to 21.2 lb/hr and 77.9 tpy.

The monitoring, testing, and recordkeeping requirements are not changed for the emission units that are not being modified. The monitoring, testing, and recordkeeping requirements for the modified emission units are similar to those in the existing permit for the unmodified emission units. The monitoring, testing, and recordkeeping requirements – which satisfy EPA's requirements for periodic monitoring – are described in detail in the Statement of Basis for the most recent renewal of this operating permit, which is dated May 20, 2015.

Attachment C summarizes the VOC emission limits that apply to the facility under the current minor NSR permit. The total allowable VOC emissions from the facility are 389.8 tpy. Prior to issuance of the modification to the facility's minor NSR permit dated December 20, 2016, which authorizes the construction of the new E-7 line and the removal of the existing E-1 line, the facility's VOC emission limits totaled 609.4 tpy. Therefore, these modifications, along with more recent VOC retention testing data, are resulting in a reduction of 219.6 tpy of permitted emissions of VOC from Kingspan's facility.

PUBLIC PARTICIPATION

The public participation requirements of 9 VAC 5-80-270 apply to significant permit modifications. EPA was sent a copy of the draft permit and notified of the public notice on May 9, 2017. West Virginia, Maryland, and Pennsylvania, the affected states, were sent a copy of the public notice in an e-mail dated May 10, 2017. All persons on the Title V mailing list were also sent a copy of the public notice via e-mail dated May 10, 2017.

A public notice regarding the draft permit was placed in The Winchester Star, Winchester, Virginia, on May 12, 2017. The public comment period extended from May 12, 2017 through June 12, 2017. No comments were received from affected states or the public.

EPA submitted one comment on June 2, 2017, which it characterized as a “suggestion for clarification,” to clarify on page 3 of the Statement of Basis the discussion regarding Condition 54. The public comment draft described the effect of the facility-wide throughput limit for HAP in printer ink as “avoid[ing] Subpart KK applicability.” This has been revised to state that the effect of this throughput limit is “to limit MACT Subpart KK applicability solely to recordkeeping requirements.”

PERMIT APPLICATION FEE

The correct permit application fee of \$3,721 was logged by DEQ’s financial office on May 8, 2017.

Date	Description	eBiz	Line Item Amount
Invoices			
03/09/2017 10:55 AM	Title V Permit Modification- App. Fee	03/09/2017 10:56 AM Title V Permit Modification- App. Fee	\$3,721.00
		05/08/2017 12:00 AM eBiz CL DC# 54402002	(\$3,721.00)
Payments			
05/08/2017 12:00 AM	Receipt DC #05440200		-\$3,721.00

Balance Due: \$0.00

ATTACHMENTS

Attachment A – Minor New Source Review Permit dated December 20, 2016, as amended June 1, 2017

Attachment B – Engineering Memorandum for the Minor New Source Review Permit Dated December 20, 2016

Attachment C – Table of Emission Limits

ATTACHMENT A

**Minor New Source Review Permit dated December 20, 2016,
as amended June 1, 2017**



COMMONWEALTH of VIRGINIA

DEPARTMENT OF ENVIRONMENTAL QUALITY

STATIONARY SOURCE PERMIT TO MODIFY AND OPERATE

This permit supersedes your permit dated December 20, 2016.

In compliance with the Federal Clean Air Act and the Commonwealth of Virginia Regulations for the Control and Abatement of Air Pollution,

Kingspan Insulation LLC
172 Pactiv Way
Winchester, Virginia 22603
Registration No.: 81095

is authorized to modify and operate

an extruded polystyrene foam production facility

located at

172 Pactiv Way
Winchester, Frederick County, Virginia

in accordance with the Conditions of this permit.

Approved on: December 20, 2016

Amended on: 6/1/17

BK Fowler

Deputy Regional Director, Valley Region

Permit consists of 30 pages.

Permit Conditions 1 to 76.

Source Testing Report Format, one page

INTRODUCTION

This permit approval is also based on, and combines permit terms and conditions in accordance with 9 VAC 5-80-1255, the following permit approvals and their respective permit applications:

Permit Approval Date	Application Signature Date	Application Amendment Date	Application Additional Information Received Date
June 1, 2017	May 3, 2017	--	--
December 20, 2016	June 30, 2016	Modeling Report dated August 15, 2016	October 5, 18, and 21, 2016; and November 29, 2016.
December 21, 2015	August 13, 2015, October 14, 2013, January 16, 2012, September 28, 2011, June 25, 2010, April 14, 2009, March 9, 2009, November 19, 2008, October 2, 2008, May 17, 2007, June 4, 2002, October 16, 2000, February 9, 2000, and August 7, 1997	November 19, 2013, Revised Modeling Report dated November 2013, August 18, 2010, October 8, 2004, and November 13, 2000	November 9, 2015, September 17, 2015, December 18, 2013, November 25, 2013, November 13, 2013, November 5, 2013, October 28, 2013, November 4, 2011, November 2, 2011, June 28, 2007, February 20, 2003, July 19, 2002, June 6, 2002, December 13, 2000, May 26, 2000, March 3, 1998, December 11, 1997, November 18, 1997, October 10, 1997, January 19, 1996, October 12, 1995, August 7, 1995, March 14, 1995, June 20, 1994, May 19, 1994, April 4, 1994, March 16, 1994, September 19, 1991, August 14, 1991, August 24, 1990, and April 4, 1990

Any changes in the permit application specifications or any existing facilities which alter the impact of the facility on air quality may require a permit. Failure to obtain such a permit prior to construction may result in enforcement action. In addition, this facility may be subject to additional applicable requirements not listed in this permit.

Words or terms used in this permit shall have meanings as provided in 9 VAC 5-10-20 of the State Air Pollution Control Board Regulations for the Control and Abatement of Air Pollution. The regulatory reference or authority for each condition is listed in parentheses () after each condition. The most recent effective date for a term or condition is listed in brackets []. When identical conditions on approval for an emission unit or units are combined, the effective date listed in this permit does not alter the prior effective date(s) for any such conditions as issued in a previous permit approval. In accordance with 9VAC5-80-1120F, any condition not marked as state-only enforceable is state and federally enforceable.

Annual requirements to fulfill legal obligations to maintain current stationary source emissions data will necessitate a prompt response by the permittee to requests by the DEQ or the Board for information to include, as appropriate: process and production data; changes in control equipment; and operating schedules. Such requests for information from the DEQ will either be in writing or by personal contact.

The availability of information submitted to the DEQ or the Board will be governed by applicable provisions of the Freedom of Information Act, §§ 2.2-3700 through 2.2-3714 of the

Code of Virginia, § 10.1-1314 (addressing information provided to the Board) of the Code of Virginia, and 9 VAC 5-170-60 of the State Air Pollution Control Board Regulations. Information provided to federal officials is subject to appropriate federal law and regulations governing confidentiality of such information.

Equipment to be installed at this facility consists of:

- **A new E-7 Line (Insulation Board)**, which consists of:
 - o E-7 primary foam extruder, with a rated capacity of 3,500 lb foam/hr (ES-129);
 - o E-7 secondary foam extruder (ES-129); and
 - o Vacuum transfer blower systems (ES-133 and ES-134).
- One new flexographic printer E-7 (ES-124).
- One new reclaim extruder R-7 (ES-130), which is part of the Insulation Board Reclaim (IBR) emissions unit;
- One new fluff storage silo and baghouse (ES-131), which is part of the IBR emissions unit.

Equipment to be modified at this facility consists of:

- The existing R-6 reclaim extruder (ES-53) will be moved from the IBR emissions unit to the Non-Insulation Board Reclaim (NIBR) emissions unit.

Equipment to be removed from this facility consists of:

- The existing E-1 Line (Underlayment), and
- The existing R-1 reclaim extruder (ES-54).

Equipment permitted prior to date of this permit:

- **E-2 Line (Attic Vent/Roll Stock)**, which includes blowing agent storage tanks (ES-110 (18,000 gallons, up to 3% VOC), and ES-114 (30,000 gallons, VOC)), vacuum transfer blower systems (ES-16 and ES-16a), E-2 foam extruder system (ES-21) with a maximum rated capacity of 1,250 lb/hr, extrusion laminator systems (ES-27, ES-28, and ES-28a), roll storage (ES-32), and thermoformers (ES-41 and ES-214).
- **E-4 Line (Underlayment)**, which includes blowing agent storage tanks ES-110 (18,000 gallons, up to 3% VOC), and ES-114 (30,000 gallons, VOC), vacuum transfer blower systems (ES-19 and ES-19a), E-4 foam extruder system (ES-22) with a maximum rated capacity of 1,700 lb/hr, extrusion laminator systems (ES-29, ES-29a, and ES-30), co-extruder (ES-30a), and thermoformers (ES-41 and ES-214).

- **E-6 Line (Insulation Board)**, which includes blowing agent storage tanks (ES-110 (18,000 gallons, up to 3% VOC), ES-113 (30,000 gallons, non-VOC), ES-121 (6,000 gallons, VOC), and ES-122 (6,000 gallons, VOC)), vacuum transfer blower systems (ES-17 and ES-18), E-6 foam extruder system (ES-24) with a rated capacity of 5,500 lb/hr, and staging/warming area (ES-123).
- **Non-Insulation Board Reclaim (NIBR)**, which includes: roll and scrap grinders (ES-33a), fluff storage silos (ES-42, ES-43, ES-44, ES-45, ES-46, ES-48, ES-49, ES-64, ES-65, and ES-66), scrap storage bin (ES-56 and ES-57), and R-2 reclaim extruder (ES-55).
- **Insulation Board Reclaim (IBR)**, which includes: scrap grinders (ES-33a), fluff storage silos (ES-50, ES-128, and ES-131), R-4 reclaim extruder (ES-52),
- **Printing operations**, which include: the E-2 flexographic printer (ES-67), the E-4 flexographic printer (ES-117), the E-6 flexographic printer (ES-116), and the Housewrap flexographic printer (ES-76) and a natural gas-fired dryer, with a maximum heat input rating of 2.0 million Btu/hr (this dryer is exempt from permitting requirements per 9 VAC 5-80-1320 B.1.d.).
- **Polystyrene Resin Storage Silos** (that serve all four process lines): ES-1 through ES-14, ES-47, ES-60a, ES-60b, ES-61, ES-62, and ES-63.
- **Inside Warehouse Storage**: two storage warehouses (ES-34 and ES-58).
- **Outside Storage Pad** (ES-132).

Specifications included above are for informational purposes only and do not form enforceable terms or conditions of the permit.

PROCESS REQUIREMENTS

1. **Emission Controls** – Volatile Organic Compound (VOC) emissions from the fluff storage silos associated with Lines E-2 and E-4 (ES-42, ES-43, ES-44, ES-45, ES-46, ES-48, ES-49, ES-64, ES-65, and ES-66) and from reclaim extruders R-2 and R-6 (ES-55 and ES-53) shall be controlled by a regenerative thermal oxidizer (RTO) having a destruction efficiency of not less than 95.0 percent. The RTO shall be provided with adequate access for inspection. All scrap generated from the E-2 and E-4 lines shall be processed by the R-2 or R-6 reclaim extruders (ES-55 and ES-53).
(9 VAC 5-80-1180 and 9 VAC 5-50-260) [December 21, 2015]
2. **Emission Controls** – Each blowing agent storage tank containing VOCs (ES-121, ES-122 and ES-110) shall be equipped with a control method that will remove, destroy, or prevent the discharge into the atmosphere of at least 60 percent by weight of VOC emissions during the filling of the tanks. Achievement of this emission standard shall be demonstrated using control methods in Condition 3.

(9 VAC 5-80-1180 and 9 VAC 5-40-3430 A) [December 21, 2015]

3. **Emission Controls** – Each blowing agent storage tank containing VOCs (ES-121, ES-122 and ES-110) shall be a pressure tank maintaining working pressure sufficient at all times to prevent vapor loss to the atmosphere, or be designed and equipped with one of the following vapor control systems:
 - a. Filling of the storage tank through the use of a submerged fill pipe.
 - b. Any system of equal or greater control efficiency to the system in Condition 2.

(9 VAC 5-80-1180 and 9 VAC 5-40-3440 A) [December 21, 2015]

4. **Emission Controls** – Particulate emissions from each fluff storage silo (ES-50, ES-128, and ES-131) shall be controlled by a fabric filter. Each fabric filter shall be provided with adequate access for inspection.

(9 VAC 5-80-1180 and 9 VAC 5-50-260) [December 21, 2015]

5. **Emission Controls** – Particulate emissions from each fluff storage silo (ES-64, ES-65, and ES-66) shall be controlled by a fabric filter. Each fabric filter shall be provided with adequate access for inspection.

(9 VAC 5-80-1180 and 9 VAC 5-50-260) [December 21, 2015]

6. **Control Parameters** – The RTO operating temperature in the center of the gravel bed (designated as TE-3) shall not be less than the minimum temperature determined during the latest performance testing to correspond to a destruction efficiency of 95.0 percent or greater.

(9 VAC 5-80-1180) [December 21, 2015]

7. **Monitoring Devices** - The RTO shall be equipped with a device to continuously measure temperature at TE-3. The monitoring device for temperature shall be installed in an accessible location and calibrated, maintained and operated according to manufacturer's specifications. The calibration of the monitoring device shall be verified every six months.

(9 VAC 5-80-1180 D) [December 21, 2015]

8. **Monitoring Devices** – Each fabric filter shall be equipped with a device to continuously measure the differential pressure drop across the fabric filter. The monitoring device shall be installed, maintained, calibrated and operated in accordance with approved procedures which shall include, at a minimum, the manufacturer's written requirements or recommendations. The monitoring device shall be provided with adequate access for inspection and shall be in operation when the fabric filter is operating.

(9 VAC 5-80-1180 D) [December 21, 2015]

9. **Monitoring Device Observation** – Each monitoring device used to continuously measure the differential pressure drop across the fabric filter shall be observed by the permittee with

a frequency of not less than once per week. The permittee shall keep a log of the observations from the control monitoring device.

(9 VAC 5-80-1180 D) [December 21, 2015]

10. **Monitoring Devices** - The permittee shall install, calibrate, maintain, and operate a flow meter to continuously measure the blowing agent input rates to the E-2, E-4, E-6, and E-7 Lines. The permittee shall record the blowing agent input rate with a frequency of not less than once per 24-hour period. Each flow meter shall be provided with adequate access for inspection and shall be in operation when the corresponding line is operating.

(9 VAC 5-80-1180 D) [December 20, 2016]

E-6 LINE (INSULATION BOARD) OPERATING/EMISSION LIMITATIONS

11. **Throughput: E-6** - The throughput of VOC (blowing agent) to the E-6 Line shall not exceed 121.5 lb/hr and 226.7 tons per year. VOC throughput shall be calculated as:

$$E_t = \left(\sum_{i=1}^n C_i B_i \right)$$

Where:

E_t = VOC throughput rate (lb/time period)

C_i = percentage of VOC in each blowing agent utilized during the time period (expressed as a weight fraction)

B_i = weight of each blowing agent utilized during the time period (pounds/time period)

n = number of blowing agents

- a. Average hourly throughput shall be calculated once each 24-hour period.
- b. Annual throughput shall be calculated monthly as the sum of each consecutive 12-month period. Compliance for the consecutive 12-month period shall be demonstrated monthly by adding the total for the most recently completed calendar month to the individual monthly totals for the preceding 11 months.

(9 VAC 5-80-1180) [December 21, 2015]

12. **Emission Limits: E-6** – VOC emissions from the E-6 Line shall not exceed the following limits:

Process Emissions (E-6)

10.9 tons/yr

Annual emissions shall be calculated monthly as the sum of each consecutive 12-month period. These emissions are derived from the estimated overall emission contribution from operating limits. Exceedance of the operating limits may be considered credible evidence of

the exceedance of emission limits. Compliance with these emission limits may be determined as stated in Condition numbers 11 and 13.

(9 VAC 5-80-1180 and 9 VAC 5-50-260) [December 20, 2016]

13. **Emission Limits: E-6** – Process VOC emissions from the E-6 Line shall be calculated by mass balance as specified by the formula below:

$$V_{PR} = \sum_{i=1}^n \left[V_{TPUTi} - \left(v_i * G \right) \right]$$

Where:

V_{PR} = Process VOC emission rate (tons/month)

V_{TPUTi} = Amount of VOC (blowing agent) used (tons/month)

v_i = percentage of VOC retained in finished product expressed as a weight fraction; i = retention data for methanol and non-methanol VOC

G = Gross Extruded Foam (tons/month)

n = number of blowing agents

Annual emissions shall be calculated monthly as the sum of each consecutive 12-month period. Compliance for the consecutive 12-month period shall be demonstrated monthly by adding the total for the most recently completed calendar month to the individual monthly totals for the preceding 11 months. The percentage of VOC retained in finished products (v) shall be as established in the Source Test Report Insulation Board (IB) Line (E-6) Product Family VOC Retention and Warehouse Loss Rate Testing report dated June 7, 2016, and approved by DEQ on July 19, 2016, or as established in a more recent testing report that has been approved by DEQ.

(9 VAC 5-80-1180) [December 21, 2015]

14. **Throughput: Finished Product (E-6)** - The finished product sent to the inside warehouse storage area shall not exceed 10,030 tons per year of finished product from the E-6 Line. Annual throughput shall be calculated monthly as the sum of each consecutive 12-month period. Compliance for the consecutive 12-month period shall be demonstrated monthly by adding the total for the most recently completed calendar month to the individual monthly totals for the preceding 11 months.

(9 VAC 5-80-1180) [December 21, 2015]

15. **Throughput: E-6** - The throughput of virgin polystyrene resin to the E-6 Line shall not exceed 20,060 tons per year, calculated monthly as the sum of each consecutive 12-month period. Compliance for the consecutive 12-month period shall be demonstrated monthly by adding the total for the most recently completed calendar month to the individual monthly totals for the preceding 11 months.

(9 VAC 5-80-1180) [December 21, 2015]

16. **Emission Limits: E-6** – Particulate emissions from material handling including polystyrene storage silos (ES-1, ES-2, ES-3, ES-4, ES-9, ES-10, ES-14, ES-47, ES-59, ES-60a, and ES-60b) and vacuum transfer blower systems (ES-17 and ES-18) shall not exceed the following limits:

PM	0.68 lbs/hr	0.58 tons/yr
PM-10	0.06 lbs/hr	0.08 tons/yr

Annual emissions shall be calculated monthly as the sum of each consecutive 12-month period. These emissions are derived from the estimated overall emission contribution from operating limits. Exceedance of the operating limits may be considered credible evidence of the exceedance of emission limits. Compliance with these emission limits may be determined as stated in Condition numbers 4 and 15.

(9 VAC 5-80-1180 and 9 VAC 5-50-260) [December 20, 2016]

17. **Visible Emission Limit** – Visible emissions from the foam extruder (ES-24), extrusion laminator (S25), and reclaim extruder stack (S52) shall not exceed ten percent opacity as determined by 40 CFR 60, Appendix A, Method 9.

(9 VAC 5-80-1180) [December 21, 2015]

E-7 LINE (INSULATION BOARD) OPERATING/EMISSION LIMITATIONS

18. **Throughput: E-7** - The throughput of blowing agent VOC to the E-7 Line shall not exceed 105.0 lbs/hr and 74.4 tons per year, calculated monthly as the sum of each consecutive 12-month period. VOC throughput shall be calculated as:

$$E_t = \left(\sum_{i=1}^n C_i B_i \right)$$

Where:

E_t = VOC throughput rate (lb/time period)

C_i = percentage of VOC in each blowing agent utilized during the time period (expressed as a weight fraction)

B_i = weight of each blowing agent utilized during the time period (pounds/time)

n = number of blowing agents

Average hourly throughput shall be calculated once each 24-hour period. Compliance with the annual VOC throughput shall be demonstrated monthly by adding the total for the most recently completed calendar month to the individual monthly totals for the preceding 11 months.

(9 VAC 5-80-1180) [December 20, 2016]

19. Emission Limits: E-7 – VOC emissions from the E-7 Line shall not exceed the following limits:

Process Emissions (E-7) 7.0 tons/yr

Annual emissions shall be calculated monthly as the sum of each consecutive 12-month period. These emissions are derived from the estimated overall emission contribution from operating limits. Exceedance of the operating limits may be considered credible evidence of the exceedance of emission limits. Compliance with these emission limits may be determined as stated in Condition numbers 18 and, 20.

(9 VAC 5-80-1180 and 9 VAC 5-50-260) [December 20, 2016]

20. Emission Limits: E-7 – Process VOC emissions from the E-7 Line shall be calculated by mass balance as specified by the formulas below:

$$V_{PR} = \sum_{i=1}^n \left[V_{TPUTi} - \left(v_i * G \right) \right]$$

Where:

- V_{PR} = Process VOC emissions from the E-7 Line (tons/month)
- V_{TPUTi} = Amount of VOC (blowing agent) used (tons/month)
- v_i = percentage of VOC retained in finished product expressed as a weight fraction; i = retention data for methanol and non-methanol VOC
- G = Gross extruded foam (tons/month)
- n = number of blowing agents

Annual emissions shall be calculated monthly as the sum of each consecutive 12-month period. Compliance for the consecutive 12-month period shall be demonstrated monthly by adding the total for the most recently completed calendar month to the individual monthly totals for the preceding 11 months. The percentage of VOC retained in finished products (v) shall be established in the Source Test Report - Insulation Board (IB) Line (E6) Product Family - VOC Retention and Warehouse Loss Rate Testing, dated June 7, 2016, and approved by DEQ on July 19, 2016, until the initial compliance testing required by Condition 58 is completed and approved by DEQ, or as established in a more recent testing report that has been approved by DEQ.

(9 VAC 5-80-1180) [December 20, 2016]

21. Throughput: Finished Product (E-7) - The finished product sent to the inside warehouse storage area shall not exceed 9,547 tons per year of foam finished product from the E-7 Line, calculated monthly as the sum of each consecutive 12-month period. Compliance for the consecutive 12-month period shall be demonstrated monthly by adding the total for the

most recently completed calendar month to the individual monthly totals for the preceding 11 months.

(9 VAC 5-80-1180) [December 20, 2016]

22. **Throughput: E-7** - The throughput of virgin polystyrene resin to the E-7 line (ES-129) shall not exceed 13,638 tons per year, calculated monthly as the sum of each consecutive 12-month period. Compliance for the consecutive 12-month period shall be demonstrated monthly by adding the total for the most recently completed calendar month to the individual monthly totals for the preceding 11 months.

(9 VAC 5-80-1180) [December 20, 2016]

23. **Emission Limits: E-7** – Particulate emissions from material handling including polystyrene storage silos (ES-1, ES-2, ES-3, ES-4, ES-9, ES-10, ES-14, ES-47, ES-59, ES-60a, and ES-60b) and vacuum transfer blower systems (ES-133 and ES-134) shall not exceed the following limits:

PM	0.67 lbs/hr	0.44 tons/yr
PM-10	0.05 lbs/hr	0.06 tons/yr

Annual emissions shall be calculated monthly as the sum of each consecutive 12-month period. These emissions are derived from the estimated overall emission contribution from operating limits. Exceedance of the operating limits may be considered credible evidence of the exceedance of emission limits. Compliance with these emission limits may be determined as stated in Condition numbers 4 and 22.

(9 VAC 5-80-1180 and 9 VAC 5-50-260) [December 20, 2016]

24. **Visible Emission Limit** – Visible emissions from the foam extruder (ES-129), extrusion laminator (S25), and reclaim extruder stack (S130) shall not exceed ten percent opacity as determined by 40 CFR 60, Appendix A, Method 9.

(9 VAC 5-80-1180) [December 20, 2016]

E-2 LINE (ATTIC VENT/ROLL STOCK) OPERATING/EMISSION LIMITATIONS

25. **Throughput: E-2** - The throughput of VOC to the E-2 Line shall not exceed 66.25 lbs/hr and 69.1 tons per year, calculated monthly as the sum of each consecutive 12-month period. VOC throughput shall be calculated as:

$$E_t = \left(\sum_{i=1}^n C_i B_i \right)$$

Where:

E_t = VOC throughput rate (lb/time period)

C_i = percentage of VOC in each blowing agent utilized during the time period (expressed as a weight fraction)

B_i = weight of each blowing agent utilized during the time period (pounds/time)

n = number of blowing agents

Average hourly throughput shall be calculated once each 24-hour period. Compliance with the annual VOC throughput shall be demonstrated monthly by adding the total for the most recently completed calendar month to the individual monthly totals for the preceding 11 months.

(9 VAC 5-80-1180) [December 21, 2015]

26. **Emission Limits: E-2** – VOC emissions from each process listed below in the E-2 Line shall not exceed the following limits:

Process Emissions (E-2)	27.4 tons/yr
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Annual emissions shall be calculated monthly as the sum of each consecutive 12-month period. These emissions are derived from the estimated overall emission contribution from operating limits. Exceedance of the operating limits may be considered credible evidence of the exceedance of emission limits. Compliance with these emission limits may be determined as stated in Condition numbers 25 and 27.

(9 VAC 5-80-1180 and 9 VAC 5-50-260) [December 21, 2015]

27. **Emission Limits: E-2** – Annual Process VOC emissions from the E-2 Line shall be calculated by mass balance as specified in the formulas below:

$$V_{PR} = V_{PR1} + V_{PR2}$$

Where:

V_{PR} = Process VOC emission rate (tons/month) from the E-2 Line

V_{PR1} = VOC emissions from RTO (tons/month) from the E-2 Line

V_{PR2} = Uncontrolled VOC emission (tons/month) from the E-2 Line

$$V_{PR1} = (1 - OCE) \sum_{i=1}^n V_{TPUTRTO}$$

Where:

$V_{TPUTRTO}$ = VOC throughput to RTO (tons/month)

OCE = Control efficiency expressed in mass as a weight fraction

$$V_{TPUTRTO} = \left(\sum_{i=1}^n v * SP \right) - HE_{E2}$$

SP = Scrap production from the E-2 Line (extrusion and thermoforming)

(tons/month)

- v = percentage of VOC retained in finished product expressed as a weight fraction
- HE_{E2} = Hopper emissions from hoppers (ES-56 and ES-57) over R-6 and R-2 (ES-53 and ES-55) associated with Line E-2 scrap processing (tons/month) [calculated using VOC emission rate of 0.132 lb/hr multiplied by total run hours for Reclaim Extruders R-6 and R-2 during the month, and multiplied by the percent of scrap processed from Line E-2 during the month (as compared to the overall scrap processed on Reclaim Extruders R-6 and R-2)]
- n = number of product family types

$$V_{PR2} = \sum_{i=1}^n \left[V_{TPUT2} - (v * G) \right] + HE_{E2}$$

Where:

- V_{PR2} = Uncontrolled VOC emission from the E-2 Line (tons/month)
- V_{TPUT2} = VOC throughput that is not controlled by RTO (tons/month)
- v = percentage of VOC retained in finished product expressed as a weight fraction
- G = Finished product (tons/month)
- HE_{E2} = Hopper emissions from hoppers (ES-56 and ES-57) over R-6 and R-2 (ES-53 and ES-55) associated with Line E-2 scrap processing (tons/month) [calculated using VOC emission rate of 0.132 lb/hr multiplied by total run hours for Reclaim Extruders R-6 and R-2 during the month, and multiplied by the percent of scrap processed from Line E-2 during the month (as compared to the overall scrap processed on Reclaim Extruders R-6 and R-2)]
- n = number of product family types

Annual emissions shall be calculated monthly as the sum of each consecutive 12-month period. VOC throughput to the RTO shall be calculated using methods approved by DEQ. Hopper Emissions (HE) from the hoppers (ES-56 and ES-57) over R-6 and R-2 (ES-53 and ES-55) and the percentage of VOC retained in finished products (v) shall be established by methodology as approved by DEQ. The most recent DEQ-approved test results for HE and v shall be used in emission calculations.
 (9 VAC 5-80-1180) [December 21, 2015]

28. **Throughput: Finished Product (E-2)** - The finished product sent to the inside warehouse storage area shall not exceed 2,105 tons per year of foam finished product (excluding laminate/laminate weight) from the E-2 Line, calculated monthly as the sum of each consecutive 12-month period. Compliance for the consecutive 12-month period shall be demonstrated monthly by adding the total for the most recently completed calendar month to the individual monthly totals for the preceding 11 months.
(9 VAC 5-80-1180) [December 21, 2015]
29. **Throughput: Laminated Product (E-2)** - The production of laminated product shall not exceed 4,600 tons per year from extrusion laminator systems (ES-27, ES-28, and ES-28a), calculated monthly as the sum of each consecutive 12-month period. Compliance for the consecutive 12-month period shall be demonstrated monthly by adding the total for the most recently completed calendar month to the individual monthly totals for the preceding 11 months.
(9 VAC 5-80-1180) [December 21, 2015]
30. **Emission Limits: Extrusion Laminator (E-2)** - VOC emissions from the extrusion laminator systems (ES-27, ES-28, and ES-28a), shall not exceed 0.24 lbs/hr and 0.25 tons/yr, calculated monthly as the sum of each consecutive 12-month period. These emissions are derived from the estimated overall emission contribution from operating limits. Exceedance of the operating limits may be considered credible evidence of the exceedance of emission limits. Compliance with these emission limits may be determined as stated in Condition 29.
(9 VAC 5-80-1180) [December 21, 2015]

E-4 LINE (UNDERLAYMENT) OPERATING/EMISSION LIMITATIONS

31. **Throughput: E-4** - The throughput of VOC to the E-4 Line shall not exceed 119.0 lbs/hr and 195.9 tons per year, calculated monthly as the sum of each consecutive 12-month period. VOC throughput shall be calculated as:

$$E_t = \left(\sum_{i=1}^n C_i B_i \right)$$

Where:

- E_t = VOC throughput rate (lb/time period)
- C_i = percentage of VOC in each blowing agent utilized during the time period (expressed as a weight fraction)
- B_i = weight of each blowing agent utilized during the time period (pounds/time)
- n = number of blowing agents

Average hourly throughput shall be calculated once each 24-hour period. Compliance with the annual VOC throughput shall be demonstrated monthly by adding the total for the most

recently completed calendar month to the individual monthly totals for the preceding 11 months.

(9 VAC 5-80-1180) [December 21, 2015]

32. **Emission Limits: E-4** – VOC emissions from each process listed below in the E-4 Line shall not exceed the following limits:

Process Emissions (E-4) 49.0 tons/yr

Annual emissions shall be calculated monthly as the sum of each consecutive 12-month period. These emissions are derived from the estimated overall emission contribution from operating limits. Exceedance of the operating limits may be considered credible evidence of the exceedance of emission limits. Compliance with these emission limits may be determined as stated in Condition numbers 31 and 33.

(9 VAC 5-80-1180 and 9 VAC 5-50-260) [December 21, 2015]

33. **Emission Limits: E-4** – Annual Process VOC emissions from the E-4 Line shall be calculated by mass balance as specified in the formulas below:

$$V_{PR} = V_{PR1} + V_{PR2}$$

Where:

V_{PR} = Process VOC emission rate (tons/month) from the E-4 Line

V_{PR1} = VOC emissions from RTO (tons/month) from the E-4 Line

V_{PR2} = Uncontrolled VOC emission (tons/month) from the E-4 Line

$$V_{PR1} = (1 - OCE) \sum_{i=1}^n V_{TPUTRTO}$$

Where:

$V_{TPUTRTO}$ = VOC throughput to RTO (tons/month)

OCE = Control efficiency expressed in mass as a weight fraction

$$V_{TPUTRTO} = \left(\sum_{i=1}^n v * SP \right) - HE_{E4}$$

SP = Scrap production from the E-4 Line (tons/month)

v = percentage of VOC retained in finished product expressed as a weight fraction

HE_{E4} = Hopper emissions from hoppers (ES-56 and ES-57) over R-6 and R-2 (ES-53 and ES-55) associated with Line E-4 scrap processing (tons/month) [calculated using VOC emission rate of 0.132 lb/hr]

multiplied by total run hours for Reclaim Extruders R-6 and R-2 during the month, and multiplied by the percent of scrap processed from Line E-4 during the month (as compared to the overall scrap processed on Reclaim Extruders R-6 and R-2)]

n = number of product family types

$$V_{PR2} = \sum_{i=1}^n \left[V_{TPUT2} - (v * G) \right] + HE_{E4}$$

Where:

V_{PR2} = Uncontrolled VOC emission from the E-4 Line (tons/month)

V_{TPUT2} = VOC throughput that is not controlled by RTO (tons/month)

v = percentage of VOC retained in finished product expressed as a weight fraction

G = Finished product (tons/month)

HE_{E4} = Hopper emissions from hoppers (ES-56 and ES-57) over R-6 and R-2 (ES-53 and ES-55) associated with Line E-4 scrap processing (tons/month) [calculated using VOC emission rate of 0.132 lb/hr multiplied by total run hours for Reclaim Extruders R-6 and R-2 during the month, and multiplied by the percent of scrap processed from Line E-4 during the month (as compared to the overall scrap processed on Reclaim Extruders R-6 and R-2)]

n = number of product family types

Annual emissions shall be calculated monthly as the sum of each consecutive 12-month period. VOC throughput to the RTO shall be calculated using methods approved by DEQ. Hopper Emissions (HE) from the hoppers (ES-56 and ES-57) over R-6 and R-2 (ES-53 and ES-55) and the percentage of VOC retained in finished products (v) shall be established by methodology as approved by DEQ. The most recent DEQ-approved test results for HE and v shall be used in emission calculations.

(9 VAC 5-80-1180) [December 21, 2015]

34. **Throughput: Finished Product (E-4)** - The finished product sent to the inside warehouse storage area shall not exceed 4,600 tons per year of foam finished product (excluding laminate/laminate weight) from the E-4 Line, calculated monthly as the sum of each consecutive 12-month period. Compliance for the consecutive 12-month period shall be demonstrated monthly by adding the total for the most recently completed calendar month to the individual monthly totals for the preceding 11 months.

(9 VAC 5-80-1180) [December 21, 2015]

35. **Throughput: Laminated Product (E-4)** - The production of laminated product shall not exceed 4,600 tons per year from extrusion laminator systems (ES-29, ES-29a, ES-30, and ES-30a), calculated monthly as the sum of each consecutive 12-month period. Compliance for the consecutive 12-month period shall be demonstrated monthly by adding the total for the most recently completed calendar month to the individual monthly totals for the preceding 11 months.
(9 VAC 5-80-1180) [December 21, 2015]
36. **Emission Limits: Extrusion Laminator (E-4)** – VOC emissions from the extrusion laminator systems (ES-29, ES-29a, ES-30, and ES-30a), shall not exceed 0.26 lbs/hr and 0.48 tons/yr, calculated monthly as the sum of each consecutive 12-month period. These emissions are derived from the estimated overall emission contribution from operating limits. Exceedance of the operating limits may be considered credible evidence of the exceedance of emission limits. Compliance with these emission limits may be determined as stated in Condition 35.
(9 VAC 5-80-1180) [December 21, 2015]

INSULATION BOARD RECLAIM (IBR, R-4/R-7) OPERATING/EMISSION LIMITATIONS

37. **Throughput: Insulation Board Reclaim Extruders (R-4/R-7)** - The production of reclaim polystyrene pellets (RPP) shall not exceed 19,272 tons per year from the two reclaim extruders serving the E-6 and E-7 Lines (R-4 and R-7) (ES-52 and ES-130), calculated monthly as the sum of each consecutive 12-month period. Compliance for the consecutive 12-month period shall be demonstrated monthly by adding the total for the most recently completed calendar month to the individual monthly totals for the preceding 11 months.
(9 VAC 5-80-1180) [December 20, 2016]
38. **Emission Limits: Insulation Board Reclaim Extruders (R-4/R-7)** – Blowing agent VOC emissions from the IBR process shall not exceed the following limits:
- | | |
|-----|---------------|
| VOC | 102.7 tons/yr |
|-----|---------------|
- Annual emissions shall be calculated monthly as the sum of each consecutive 12-month period. These emissions are derived from the estimated overall emission contribution from operating limits. Exceedance of the operating limits may be considered credible evidence of the exceedance of emission limits. Compliance with these emission limits may be determined as stated in Condition numbers 37 and 39.
(9 VAC 5-80-1180 and 9 VAC 5-50-260) [December 20, 2016]
39. **Emission Limits: Insulation Board Reclaim Extruders (R-4/R-7)** – Blowing agent VOC emissions from the IBR process shall be calculated by mass balance as specified by the formula below:

$$V_{REC} = \sum_{i=1}^n \left[V_{TPUTi} - \left(v_i * G \right) \right]$$

Where:

- V_{REC} = Reclaim VOC emission rate (tons/month)
- V_{TPUTi} = Amount of VOC (blowing agent) used (tons/month)
- v_i = percentage of VOC retained in finished product expressed as a weight fraction; i = retention data for methanol and non-methanol VOC
- G = Gross extruded foam (tons/month)
- n = number of blowing agents

Annual emissions shall be calculated monthly as the sum of each consecutive 12-month period. Compliance for the consecutive 12-month period shall be demonstrated monthly by adding the total for the most recently completed calendar month to the individual monthly totals for the preceding 11 months. The percentage of VOC retained in finished products (v) shall be as established in the Source Test Report - Insulation Board (IB) Line (E6) Product Family - VOC Retention and Warehouse Loss Rate Testing, dated June 7, 2016, and approved by DEQ on July 19, 2016, or as established in a more recent testing report that has been approved by DEQ.

(9 VAC 5-80-1180) [December 20, 2016]

40. Emission Limits: Insulation Board Reclaim Extruders (R-4/R-7) – Non-blowing agent VOC emissions from reclaim extruders R-4 and R-7 (ES-52 and ES-130) shall not exceed 0.46 lbs/hr and 2.02 tons/yr, calculated monthly as the sum of each consecutive 12-month period. These emissions are derived from the estimated overall emission contribution from operating limits. Exceedance of the operating limits may be considered credible evidence of the exceedance of emission limits. Compliance with these emission limits may be determined as stated in Condition 37.

(9 VAC 5-80-1180) [December 20, 2016]

41. Visible Emission Limit – Visible emissions from the fluff storage silos (ES-50, ES-128, and ES-131) shall not exceed five percent opacity as determined by 40 CFR 60, Appendix A, Method 9.

(9 VAC 5-80-1180 and 9 VAC 5-50-260) [December 21, 2015]

NON-INSULATION BOARD RECLAIM (NIBR, R-2/R-6) OPERATING/EMISSION LIMITATIONS

42. Throughput: NIBR Reclaim Extruders (R-2/R-6) - The production of reclaim polystyrene pellets (RPP) from scrap produced on the E-2 and E-4 Lines shall not exceed 6,570 tons per year from reclaim extruders R-6 and R-2 (ES-53 and ES-55), calculated

monthly as the sum of each consecutive 12-month period. Compliance for the consecutive 12-month period shall be demonstrated monthly by adding the total for the most recently completed calendar month to the individual monthly totals for the preceding 11 months. (9 VAC 5-80-1180) [December 20, 2016]

43. **Emission Limits: NIBR Reclaim Extruders (R-2/R-6)** – Blowing agent VOC emissions from the NIBR process shall not exceed the following limits:

VOC 2.0 tons/yr

Annual emissions shall be calculated monthly as the sum of each consecutive 12-month period. These emissions are derived from the estimated overall emission contribution from operating limits. Exceedance of the operating limits may be considered credible evidence of the exceedance of emission limits. Compliance with these emission limits may be determined as stated in Condition numbers 42 and 44. (9 VAC 5-80-1180 and 9 VAC 5-50-260) [December 20, 2016]

44. **Emission Limits: NIBR Reclaim Extruders (R-2/R-6)** – Blowing agent VOC emissions from the NIBR process shall be calculated by mass balance as specified by the formulas below:

$$V_{RECE2E4} = (1 - OCE) \sum_{i=1}^n V_{TPUTRTOE2E4}$$

Where:

$V_{REC E2E4}$ = VOC emissions from RTO (tons/month) from scrap associated with the E-2 and E-4 Lines

$V_{TPUTRTO E2E4}$ = VOC throughput to RTO from scrap associated with the E-2 and E-4 Lines (tons/month)

OCE = Control efficiency expressed in mass as a weight fraction

$$V_{TPUTRTO} = \left(\sum_{i=1}^n v * SP \right)$$

Where:

SP = Scrap production from the E-2 and E-4 Lines (tons/month)

v = percentage of VOC retained in finished product expressed as a weight fraction

n = number of product family types

Annual emissions shall be calculated monthly as the sum of each consecutive 12-month period. Compliance for the consecutive 12-month period shall be demonstrated monthly by adding the total for the most recently completed calendar month to the individual monthly

totals for the preceding 11 months. The percentage of VOC retained in finished products (v) shall be as established in the Source Test Report – Project ECO - VOC Retention and Warehouse Loss Rate Testing, dated August 12, 2011, and approved by DEQ on August 26, 2011, or as established in a more recent testing report that has been approved by DEQ. (9 VAC 5-80-1180) [December 20, 2016]

45. **Emission Limits: Reclaim Extruders (R-2/R-6)** – Non-blowing agent VOC emissions from reclaim extruders R-6 and R-2 (ES-53 and ES-55) processing of scrap produced on Lines E-2 and E-4 shall not exceed 0.16 lbs/hr and 0.69 tons/yr, calculated monthly as the sum of each consecutive 12-month period. These emissions are derived from the estimated overall emission contribution from operating limits. Exceedance of the operating limits may be considered credible evidence of the exceedance of emission limits. Compliance with these emission limits may be determined as stated in Condition 42. (9 VAC 5-80-1180) [December 20, 2016]

RTO OPERATING LIMITATIONS

46. **Fuel: RTO** – The approved fuels for combustion in the RTO is natural gas. A change in the fuel may require a permit to modify and operate. (9 VAC 5-80-1180) [December 21, 2015]
47. **Visible Emission Limit: RTO** – Visible emissions from the RTO shall not exceed five percent opacity except during periods of scheduled maintenance (such as bake-out periods) for the RTO, when visible emissions shall not exceed 20 percent opacity. This condition applies at all times except during startup, shutdown, and malfunction. Opacity shall be determined by 40 CFR 60, Appendix A, Method 9. (9 VAC 5-80-1180) [December 21, 2015]
48. **Visible Emission Limit** – Visible emissions from the each fluff storage silo (ES-64, ES-65 and ES-66) shall not exceed five percent opacity as determined by 40 CFR 60, Appendix A, Method 9. (9 VAC 5-80-1180 and 9 VAC 5-50-260) [December 21, 2015]

PRINTERS OPERATING/EMISSION LIMITATIONS

49. **Emission Controls** - VOC emissions from the flexographic printers (Ref. ES-67, ES-124, ES-116, ES-117, and ES-76) shall be controlled by the use of inks which meet the definition of low solvent ink, as applied and as stated in 9 VAC 5-40-5070 C. (9 VAC 5-50-260) [December 20, 2016]
50. **Emission Controls** - VOC emissions controls from cleanup, washup, and disposal shall include the following, or equivalent, as a minimum:
- a. VOC shall not be intentionally spilled, discarded to sewers, stored in open containers, or handled in any other manner that would result in evaporation beyond that consistent with air pollution control practices for minimizing emissions.

- b. All VOC containing receptacles shall be closed at all times except during loading and unloading.
- c. VOC emissions shall be controlled by storing cleaning solutions and applicators in covered containers or machines with remote reservoirs when not in use.

(9 VAC 5-50-260 and 9 VAC 5-50-20 F) [December 21, 2015]

51. Throughput - The throughput of VOC to the flexographic printers shall be no more than the following amounts:

E-2 (ES-67)	1.0 tons/yr
E-4 (ES-117)	1.0 tons/yr
E-6 (ES-116)	1.0 tons/yr
Housewrap (ES-76)	1.5 tons/yr

These throughputs shall be calculated monthly as the sum of each consecutive 12 month period.

(9 VAC 5-80-1180) [December 21, 2015]

52. Throughput - The throughput of VOC to the flexographic printer for the E-7 line shall be no more than the following amounts:

E-7 (ES-124)	0.8 tons/yr
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This throughput shall be calculated monthly as the sum of each consecutive 12 month period.

(9 VAC 5-80-1180) [December 20, 2016]

53. Emission Limit - Emissions of Volatile Organic Compounds from the operation of the flexographic printers shall not exceed the limits specified below:

E-2 (ES-67)	1.0 tons/yr
E-4 (ES-117)	1.0 tons/yr
E-6 (ES-116)	1.0 tons/yr
Housewrap (ES-76)	1.5 tons/yr

Annual emissions shall be calculated monthly as the sum of each consecutive 12 month period. Compliance with this emission limit may be determined as stated in Condition 51.

(9 VAC 5-50-260) [December 20, 2016]

54. Emission Limit - Emissions of Volatile Organic Compounds from the operation of the flexographic printer for the E-7 line shall not exceed the limits specified below:

E-7 (ES-124)	0.8 tons/yr
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Annual emissions shall be calculated monthly as the sum of each consecutive 12 month period. Compliance with this emission limit may be determined as stated in Condition 52. (9 VAC 5-50-260) [December 20, 2016]

55. **Visible Emission Limit** - Visible emissions from the flexographic printers (Ref. ES-67, , ES-117, ES-116, ES-76, and ES-124) shall not exceed 10 percent opacity as determined by 40 CFR 60, Appendix A, Method 9. (9 VAC 5-50-80 and 9 VAC 5-50-260) [December 20, 2016]

INSIDE WAREHOUSE STORAGE OPERATING/EMISSION LIMITATIONS

56. **Emission Limits: Inside Warehouse Storage** – Emissions from the Inside Warehouse Storage (ES-34 and ES-58) shall not exceed the following limits:

VOC 182.1 tons/yr

Annual emissions shall be calculated monthly as the sum of each consecutive 12-month period. These emissions are derived from the estimated overall emission contribution from operating limits. Exceedance of the operating limits may be considered credible evidence of the exceedance of emission limits. Compliance with these emission limits may be determined as stated in Condition numbers 14, 21, 28, 34, and 57. (9 VAC 5-80-1180 and 9 VAC 5-50-260) [December 20, 2016]

57. **Emission Limits: Inside Warehouse Storage** – VOC emissions from the Inside Warehouse Storage (ES-34 and ES-58) shall be calculated by mass balance as specified by the formula below:

$$V_{WH} = \sum_{i=1}^n v * G_w * V_{WRE} * T^{1/2}$$

Where:

- V_{WH} = Inside Warehouse Storage VOC emissions rate (tons/month)
- v = percentage of VOC retained in finished product expressed as a weight fraction
- G_w = Finished product sent to the Inside Warehouse Storage (tons/month)
- V_{WRE} = Warehouse VOC Loss Rate expressed as [(lb of VOC)/(lb of VOC in Foam)]/(days)^{1/2}
- T = Finished product inside warehouse storage time (days)
- n = number of product family types

Annual emissions shall be calculated monthly as the sum of each consecutive 12-month period. Compliance for the consecutive 12-month period shall be demonstrated monthly by

adding the total for the most recently completed calendar month to the individual monthly totals for the preceding 11 months. The percentage of VOC retained in finished products (v) and Warehouse VOC Loss Rate (V_{WRE}) for each type of product family shall be as established in the Source Test Report – Project ECO – VOC Retention and Warehouse Loss Rate Testing, dated August 12, 2011 and approved by DEQ on August 26, 2011, and the Source Test Report - Insulation Board (IB) Line (E6) Product Family - VOC Retention and Warehouse Loss Rate Testing, dated June 7, 2016, and approved by DEQ on July 19, 2016, or as established in a more recent testing report that has been approved by DEQ. (9 VAC 5-80-1180) [December 20, 2016]

INITIAL COMPLIANCE DETERMINATION

58. **Initial Performance Testing** – Initial performance tests shall be conducted on the E-7 line to determine the percentage of methanol and non-methanol VOC retained in the finished product (v) and the Warehouse VOC Loss Rate (V_{WRE}) for each product family type. The tests shall be performed and reported within 90 days after achieving the maximum production rate at which the E-7 line will be operated, but in no event later than 180 days after start-up of the E-7 line. The testing protocol must be approved by DEQ before conducting the testing. (9 VAC 5-50-30 G) [December 20, 2016]

CONTINUING COMPLIANCE DETERMINATION

59. **Ink Tests** - The facility shall test, at the request of the DEQ, to determine if inks used at the facility meet the definition of compliant ink as stated in 9 VAC 5-40-5070. (9 VAC 5-50-260) [December 21, 2015]
60. **Performance Test** – Upon request by the DEQ, the permittee shall conduct additional performance tests (to determine the percentage of methanol and non-methanol VOC retained in the finished product (v) and the Warehouse VOC Loss Rate (V_{WRE}) for each product family type) and/or visible emissions evaluations to demonstrate compliance with the emission limits and control efficiency requirements contained in this permit. The details of the tests shall be arranged with DEQ. (9 VAC 5-50-30 G) [December 21, 2015]

RECORDS

61. **On Site Records** - The permittee shall maintain records of emission data and operating parameters as necessary to demonstrate compliance with this permit. The content and format of such records shall be arranged with DEQ. These records shall include, but are not limited to:
- a. MSDS or VOC Data Sheets showing VOC and hazardous air pollutant (HAP) content of each blowing agent used.

- b. Results of performance testing of the percentage of methanol and non-methanol VOC retained in finished product (v) and Warehouse VOC Loss rate (V_{WRE}) for each product family type.
- c. Monthly and annual throughput of blowing agent VOC (in tons) for each of the following lines: E-2, E-4, E-6, and E-7.
- d. Average hourly throughput of blowing agent VOC (in tons) for each of the following lines: E-2, E-4, E-6, and E-7. Average hourly throughput shall be calculated once each 24-hour period.
- e. Monthly and annual Process VOC emissions (in tons) from each of the following lines: E-2, E-4, E-6, and E-7.
- f. Monthly and annual Inside Warehouse Storage VOC emissions (in tons).
- g. Monthly and annual uncontrolled VOC emissions (in tons) from the E-2 and E-4 Lines.
- h. Monthly and annual VOC emissions from the RTO controlling the E-2 and E-4 Lines.
- i. Monthly and annual VOC input to the RTO controlling the E-2 and E-4 Lines. VOC input to RTO shall be calculated using methods approved by DEQ.
- j. Monthly and annual finished product (tons) from each of the following lines: E-2, E-4, E-6, and E-7.
- k. Monthly and annual finished product sent to the inside warehouse storage area (ES-34 and ES-58) (in tons) from each of the following lines: E-2, E-4, E-6, and E-7.
- l. Monthly and annual finished product sent to the outside storage pad (ES-132) (in tons) from each of the following lines: E-2, E-4, E-6, and E-7.
- m. Inside warehouse storage time for the finished product (in days) for each product family type from each of the following lines: E-2, E-4, E-6, and E-7. Storage time shall be calculated using methods approved by DEQ.
- n. Monthly and annual scrap production (tons) from the E-2 and E-4 Lines (extrusion and thermoforming).
- o. Monthly and annual throughput of virgin polystyrene resin to the E-6 and E-7 Lines.
- p. Monthly and annual throughput of reclaim polystyrene pellets (RPP) from IBR reclaim extruders (R-4 and R-7) (ES-52 and ES-130).
- q. Monthly and annual VOC emissions (in tons) from IBR reclaim extruders R-4 and R-7 (ES-52 and ES-130).

- r. Monthly and annual throughput of reclaim polystyrene pellets (RPP) from NIBR reclaim extruders R-6 and R-2 (ES-53 and ES-55).
- s. Monthly and annual VOC emissions (in tons) from NIBR reclaim extruders R-6 and R-2 (ES-53 and ES-55).
- t. Monthly and annual throughput of laminate products from extrusion laminator systems (ES-27, ES-28, ES-28a, ES-29, ES-29a, ES-30, and ES-30a).
- u. Monthly and annual VOC emissions (in tons) from extrusion laminator systems (ES-27, ES-28, ES-28a, ES-29, ES-29a, ES-30, and ES-30a).
- v. Particulate emission calculations from the E-6 and E-7 Lines material handling including polystyrene storage silos (ES-1, ES-2, ES-3, ES-4, ES-9, ES-10, ES-14, ES-47, ES-59, ES-60a, and ES-60b), and vacuum transfer blower systems (ES-17, ES-18, ES-133, and ES-134), using methods approved by DEQ to verify compliance with the lbs/hr and ton/yr emissions limitations in Condition 16.
- w. RTO natural gas consumption, calculated as the sum of each consecutive 12-month period.
- x. Monthly log of RTO operations indicating the number of operating hours in which the RTO did not operate along with the reason for not operating. The annual number of operating hours shall be calculated as the sum of each consecutive 12-month period.
- y. Continuous measurement of temperature at TE-3 as required in Condition 7.
- z. Calibration of the monitoring devices for temperatures as required in Condition 7.
- aa. Calibration of the monitoring device for the flow meter as required in Condition 10.
- bb. Operation and control device monitoring records for each fabric filter as required by Condition 9.
- cc. Records of DEQ-approved test results for Hopper Emissions (HE) from the hopper over R-2 (ES-57).
- dd. Records certifying, including DEQ approval as appropriate, that the design and/or control method for each blowing agent storage tank containing VOCs (ES-121, ES-122 and ES-110) meets the emission standard specified in Condition 2.
- ee. Results of all stack tests, visible emission evaluations, VOC product retention tests and the Warehouse VOC loss performance tests.
- ff. Annual throughput of VOC (in tons) to the flexographic printers as follows: E-2 (ES-67), E-4 (ES-117), E-6 (ES-116), E-7 (ES-124), and Housewrap (ES-76).

- gg. Annual VOC emissions (in tons) for the flexographic printers as follows: E-2 (ES-67), E-4 (ES-117), E-6 (ES-116), E-7 (ES-124), and Housewrap (ES-76).
- hh. The total mass (in pounds) and organic hazardous air pollutants content of each material applied on the flexographic printers (Ref. ES-67, ES-124, ES-116, ES-117, and ES-76) during each month.
- ii. Material Safety Data Sheets (MSDS) or other vendor information showing VOC content, HAP content, water content, and solids content of each material applied on the flexographic printers (Ref. ES-67, ES-124, ES-116, ES-117, and ES-76).
- jj. Records demonstrating inks used in the flexographic printers (Ref. ES-67, ES-124, ES-116, ES-117, and ES-76) meet the definition of compliant ink in 9 VAC 5-40-5070.
- kk. Maintenance schedule, records of all scheduled and unscheduled maintenance, and inventory of spare parts, as required by Condition 67.
- ll. Records of malfunctions and notifications of malfunctions, as required by Conditions 68 and 69.
- mm. Documentation of VOC emissions from the IBR emission unit that are attributed to insulation board that was manufactured on the E-6 foam extruder (ES-24), in accordance with 9 VAC 5-80-1785 B, as follows:
 - i. A description of the project;
 - ii. Identification of the emissions units whose emissions of VOC could be affected by the project;
 - iii. A description of the applicability test used to determine that the project is not a major modification for VOC, including the baseline actual emissions, the projected actual emissions, the amount of emissions excluded under subdivision c of the definition of “projected actual emissions”, and an explanation for why such amount was excluded;
 - iv. Calculate and maintain records of the annual emissions, in tons per year on a calendar basis, for a period of 10 years following resumption of regular operations after implementation of the project.

These records shall be available for inspection by the DEQ and shall be current for the most recent five years.

(9 VAC 5-80-1180 and 9 VAC 5-50-50) [December 20, 2016]

NOTIFICATIONS

62. Initial Notifications – The permittee shall furnish written notification to DEQ of:

- a. The actual date on which installation of the new E-7 line (ES-129) commences, within 30 days after such date.

- b. The actual start-up date of the new E-7 line (ES-129), within 15 days after such date.
- c. Availability of the information set out in Condition 61mm(i-iii), no less than 30 days before beginning actual construction on the new E-7 line.

(9 VAC 5-50-50, 9 VAC 5-80-1180, and 9 VAC 5-80-1875 B) [December 20, 2016]

REPORTING

63. **Reporting** – The permittee shall submit a report to DEQ if the annual emissions from the project, as identified as required in Condition 61mm(iv), exceed the baseline actual emissions by a significant amount for VOC, and if such emissions differ from the preconstruction projection as documented and maintained as required in Condition 61mm(i-iii). This report shall include: (a) the name, address, and telephone number of the permittee; (b) the annual emissions as calculated pursuant to 9 VAC 5-80-1785 B3; and (c) any other information that the permittee wishes to include in the report, such as an explanation as to why the emissions differ from the preconstruction projection. This report shall be submitted to DEQ within 60 days of the end of such calendar year.

(9 VAC 5-80-1180 and 9 VAC 5-80-1875 B) [December 20, 2016]

GENERAL CONDITIONS

64. **Permit Invalidation** – This permit to install the new E-7 line shall become invalid, unless an extension is granted by DEQ, if:
- a. A program of continuous modification is not commenced within 18 months from the date of this permit.
 - b. A program of modification is discontinued for a period of 18 months or more, or is not completed within a reasonable time, except for a DEQ-approved period between phases of a phased construction project.

(9 VAC 5-80-1210) [December 20, 2016]

65. **Permit Suspension/Revocation** - This permit may be suspended or revoked if the permittee:
- a. Knowingly makes material misstatements in the permit application or any amendments to it;
 - b. Fails to comply with the conditions of this permit;
 - c. Fails to comply with any emission standards applicable to a permitted emissions unit;
 - d. Causes emissions from the stationary source which result in violations of, or interfere with the attainment and maintenance of, any ambient air quality standard; or

- e. Fails to operate in conformance with any applicable control strategy, including any emission standards or emission limitations, in the State Implementation Plan in effect at the time an application for this permit is submitted.

(9 VAC 5-80-1210 F)

66. Right of Entry - The permittee shall allow authorized local, state, and federal representatives, upon the presentation of credentials:

- a. To enter upon the permittee's premises on which the facility is located or in which any records are required to be kept under the terms and conditions of this permit;
- b. To have access to and copy at reasonable times any records required to be kept under the terms and conditions of this permit or the State Air Pollution Control Board Regulations;
- c. To inspect at reasonable times any facility, equipment, or process subject to the terms and conditions of this permit or the State Air Pollution Control Board Regulations; and
- d. To sample or test at reasonable times.

For purposes of this condition, the time for inspection shall be deemed reasonable during regular business hours or whenever the facility is in operation. Nothing contained herein shall make an inspection time unreasonable during an emergency.

(9 VAC 5-170-130 and 9 VAC 5-80-1180)

67. Maintenance/Operating Procedures - At all times, including periods of start-up, shutdown and malfunction, the permittee shall, to the extent practicable, maintain and operate the affected source, including associated air pollution control equipment, in a manner consistent with good air pollution control practices for minimizing emissions.

The permittee shall take the following measures in order to minimize the duration and frequency of excess emissions, with respect to air pollution control equipment and process equipment which affect such emissions:

- a. Develop a maintenance schedule and maintain records of all scheduled and non-scheduled maintenance.
- b. Maintain an inventory of spare parts.

(9 VAC 5-50-20 E and 9 VAC 5-80-1180 D)

68. Record of Malfunctions - The permittee shall maintain records of the occurrence and duration of any bypass, malfunction, shutdown or failure of the facility or its associated air pollution control equipment that results in excess emissions for more than one hour. Records shall include the date, time, duration, description (emission unit, pollutant affected, cause),

corrective action, preventive measures taken and name of person generating the record.
(9 VAC 5-20-180 J and 9 VAC 5-80-1180 D)

69. Notification for Facility or Control Equipment Malfunction - The permittee shall furnish notification to DEQ, of malfunctions of the affected facility or related air pollution control equipment that may cause excess emissions for more than one hour, by facsimile transmission, telephone or telegraph. Such notification shall be made as soon as practicable but no later than four daytime business hours after the malfunction is discovered. The permittee shall provide a written statement giving all pertinent facts, including the estimated duration of the breakdown, within two weeks of discovery of the malfunction. When the condition causing the failure or malfunction has been corrected and the equipment is again in operation, the permittee shall notify DEQ.
(9 VAC 5-20-180 C and 9 VAC 5-80-1180)

70. Violation of Ambient Air Quality Standard - The permittee shall, upon request of the DEQ, reduce the level of operation or shut down a facility, as necessary to avoid violating any primary ambient air quality standard and shall not return to normal operation until such time as the ambient air quality standard will not be violated.
(9 VAC 5-20-180 I and 9 VAC 5-80-1180)

71. Change of Ownership - In the case of a transfer of ownership of a stationary source, the new owner shall abide by any current permit issued to the previous owner. The new owner shall notify DEQ, of the change of ownership within 30 days of the transfer.
(9 VAC 5-80-1240)

72. Permit Copy - The permittee shall keep a copy of this permit on the premises of the facility to which it applies.
(9 VAC 5-80-1180)

STATE-ONLY ENFORCEABLE REQUIREMENTS

The following terms and conditions are included in this permit to implement the requirements of 9 VAC 5-60-300, *et. seq.* Neither their inclusion in this permit nor any resulting public comment period make these terms federally enforceable.

73. Throughput: Methanol – The throughput of methanol to the facility shall not exceed 21.2 lbs/hr and 77.9 tons/yr, calculated monthly as the sum of each consecutive 12-month period. Methanol throughput shall be calculated as:

$$M = \left(\sum_{i=1}^n C_i B_i \right)$$

Where:

M = Methanol throughput rate (lb/time period)

C_i = content of methanol in the blowing agent utilized during the time period

(lb of methanol/lb of blowing agent)

B_i = weight of each blowing agent utilized during the time period
(pounds/time period)

n = number of blowing agents

Average hourly methanol throughput shall be calculated once each 24-hour period. Compliance with the annual methanol throughput shall be demonstrated monthly by adding the total for the most recently completed calendar month to the individual monthly totals for the preceding 11 months.

(9 VAC 5-60-320) [December 20, 2016]

74. **Emission Limits: Methanol** – Methanol emissions from the facility shall not exceed 21.2 lbs/hr and 77.9 tons/yr. Annual emissions shall be calculated monthly as the sum of each consecutive 12-month period. These emissions are derived from the estimated overall emission contribution from operating limits. Exceedance of the operating limits may be considered credible evidence of the exceedance of emission limits. Compliance with these emission limits may be determined as stated in Condition numbers 73 and 75.

(9 VAC 5-60-320) [December 20, 2016]

75. **Emission Limits: Methanol** – Methanol emissions from the facility shall be calculated for each process line by mass balance as specified by the formula below:

$$M = \left(\sum_{i=1}^n C_i B_i \right)$$

Where:

M = Methanol Emission (lb/time period)

C = content of methanol in the blowing agent utilized during the time period
(lb of methanol/lb of blowing agent)

B = amount of blowing agent utilized during the time period (lb/time period)

Average hourly methanol emissions shall be calculated once each 24-hour period. Annual emissions shall be calculated monthly as the sum of each consecutive 12-month period.

(9 VAC 5-60-320) [December 21, 2015]

76. **On Site Records** – The permittee shall maintain records of emission data and operating parameters as necessary to demonstrate compliance with this permit. The content and format of such records shall be arranged with DEQ. These records shall include, but are not limited to:

- a. Average hourly, monthly and annual throughput (in tons) of methanol used for each process line with methanol emissions and facility-wide. Average hourly methanol throughput shall be calculated once each 24-hour period.
- b. Facility-wide average hourly, monthly and annual emissions (in tons) of methanol. Methanol emissions shall be calculated as shown in Condition 75.
- c. Material Safety Data Sheets (MSDS) or other vendor information showing the methanol content for each blowing agent used.

These records shall be available for inspection by the DEQ and shall be current for at least the most recent five years.

(9 VAC 5-60-50) [December 21, 2015]

ATTACHMENT B

**Engineering Memorandum for the Minor New Source Review
Permit Dated December 20, 2016**

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

Valley Regional Office

INTRA-AGENCY MEMORANDUM

4411 Early Road - P. O. Box 3000

Harrisonburg, VA 22801-3000

Permit Writer	Kevin Covington <i>KBC</i>	Date	12/20/16	
Air Permit Manager	Janardan Pandey <i>JRP</i>	Date	12/20/16	
Memo To	Air Permit File			
Facility Name	Kingspan Insulation, LLC			
Registration Number	81095			
County	Frederick			
UTM Coordinates (Zone 17)	746.7	Easting (km)	4344.0	Northing (km)
Elevation (feet)	700			
Distance to Nearest Class I Area (select one)	>25	SNP (km)		JRF (km)
FLM Notification Required (Y/N)	N			
AIRS Classification (A, SM, SM80, B)	A	Before permit action	A	After permit action
Pollutants for Which the Source is Title V Major	VOC, Methanol, GHGs	Before permit action	VOC, Methanol, GHGs	After permit action
PSD Major Source (Y/N)	Y	Before permit action	Y	After permit action
Pollutants for Which the Source is PSD Major	VOC, GHGs	Before permit action	VOC, GHGs	After permit action

I. Introduction

Kingspan Insulation, LLC (Kingspan) operates an extruded polystyrene foam production facility located at 172 Pactiv Way in Winchester, Virginia. This is the former Pactiv-Winchester facility, which Kingspan purchased in November 2014. The facility produces foam products for building underlayment and insulation. The products currently manufactured at this facility on its various process lines are as follows:

- E-1: Underlayment;
- E-2: Attic Vent/Roll Stock;
- E-4: Underlayment; and
- E-6: Insulation Board.

The basic operations at the facility include raw material receiving and handling, foam extrusion, roll storage, thermoforming, reclaim of off-specification product, and finished goods storage.

Kingspan currently operates under the following air permits issued by DEQ:

- Minor new source review (NSR) permit dated December 21, 2015, to operate and modify an extruded polystyrene foam production facility; and
- Title V operating permit that became effective on June 7, 2015.

The facility is classified as a PSD major source for volatile organic compounds (VOC) and greenhouse gases (GHG), and it is also a Title V major source for VOC, GHG, and for the hazardous air pollutant (HAP) methanol. Methanol is also a VOC.

II. Emission Unit(s) / Process Description(s)

Summary of Proposed Operations: Kingspan proposes to construct a new production line at its Winchester facility. The proposed new E-7 line would produce insulation board, similar to the existing E-6 line, although the board to be produced on the E-7 line will generally be thinner than the board produced on the E-6 line. The blowing agents proposed for the E-7 line are the same as those currently permitted and used on the E-6 line.

The production process on the proposed E-7 line will be the same as on the existing E-6 line, which is as follows. Virgin polystyrene resin pellets are received by the facility from rail cars. The virgin pellets are pneumatically conveyed, via a two-step vacuum blower/pressure blower process, to the virgin pellet storage silos. Virgin pellets are also periodically unloaded directly from trucks to the storage silos. Feed materials, which include virgin polystyrene resin pellets, reclaimed polystyrene pellets (RPP), and other additives, are vacuum conveyed from storage silos or small gaylord boxes to material feed hoppers located above the primary extruder. VOC and non-VOC blowing agents are pressurized and fed into the primary extruder. The feed materials and blowing agents are

heated, mixed, and extruded in the primary extruder and then cooled in the secondary extruder, producing the insulation board. The edges of the board are trimmed, and the board is aged for a short period of time. Afterward, the board is further trimmed to a uniform size and then passed through an in-line flexographic printer where the board is printed with water-based inks. The finished product is then cut, stacked, and bundled, then transported to either the inside warehouse storage area or an outside storage pad, prior to off-site shipment to customers. During colder winter months, the product is stored for 1-2 days in a staging/warming area prior to transport to the inside warehouse or outside pad. The edge trimmings and scrap or reject product are ground into fine material known as fluff, then fed pneumatically to storage silos prior to processing in one of the two insulation board reclaim extruders, where the ground material is recycled into RPP for later reuse in the process.

The emissions unit for the proposed E-7 line consists of the primary and secondary extruders. The other distinct activities in the production process that are described above (printing, storage, and reclaim) are characterized as separate emissions units.

Impact on Existing Operations: Due in part to space limitations within the facility, the existing E-1 process line (which currently manufactures underlayment) will be removed in order to make room for the new E-7 line. Currently, the E-1, E-2, and E-4 lines use similar blowing agent mixes (which do not include the hydrofluorocarbon HFC-134a), so the scrap material produced on these three lines are processed interchangeably with the R-1 and R-2 reclaim extruders. The E-6 line is currently the only process line using HFC-134a, and its scrap material is processed by the R-4 and R-6 reclaim extruders. See Table 1 below for a summary of the current operations of the facility.

Table 1: Overview of Current Operations

Production Line	Blowing Agent Differences	Reclaim Extruders
<i>E-1, E-2, E-4</i>	No HFC-134a	<i>R-1, R-2</i>
E-6	Uses HFC-134a	R-4, R-6

Emission units in italics above are proposed to be removed from the facility or moved to another process line. The use of HFC-134a (or not) as a blowing agent is relevant to controlling VOC emissions, as described in section IV below.

The project involves the removal of the existing E-1 process line and the construction of a new E-7 process line. Also, the existing R-1 reclaim extruder will be removed because it is the smallest and oldest of the four existing reclaim extruders at the facility. The existing R-6 reclaim extruder will be moved to replace the R-1 reclaim extruder, and a new R-7 reclaim extruder will replace the existing R-6 reclaim extruder. The proposed changes to the facility are shown in Table 2 below.

Once the project is completed, the facility's production lines will be as follows:

- E-2: Attic Vent/Roll Stock;
- E-4: Underlayment;
- E-6: Insulation Board; and
- E-7: Insulation Board

Upon completion of the project, the facility's reclaim operations will be divided into two groups:

- Insulation Board Reclaim (IBR), consisting of R-4 and R-7, which will serve production lines E-6 and E-7 interchangeably; and
- Non-Insulation Board Reclaim (NIBR), consisting of R-2 and R-6, which will serve production lines E-2 and E-4 interchangeably.

Table 2: Overview of Proposed Operations After Implementation of Project

Production Line	Blowing Agent	Reclaim Extruders
E-2, E-4	No HFC-134a	NIBR: R-2, <i>R-6</i>
E-6, <i>E-7</i>	Uses HFC-134a	IBR: R-4, <i>R-7</i>

Emission units in italics above are proposed new units or will be moved from an existing line.

The pollutants of primary concern from the proposed new E-7 line are VOC and the HAP methanol. The sources of VOC and methanol emissions from the E-7 line are the blowing agents. The three blowing agents that are proposed to be used on the E-7 line (which are the same as currently permitted and used on the E-6 line) can be generally characterized as follows:

- One blowing agent is 100% VOC, which is used for proper board formation;
- One blowing agent contains the VOC-HAP methanol as an impurity; and is used as the primary expanding agent; and
- One is HFC-134a, which is used to improve the insulating properties of the foam. (HFC-134a is a common hydrofluorcarbon refrigerant, which is neither a VOC nor a HAP, but it is a greenhouse gas (GHG)).

The identity of the first two blowing agents has been maintained confidential by DEQ since they were first used at this facility in approximately 2009. In its current application, Kingspan requested the same confidentiality considerations for the proposed E-7 line, which DEQ agreed to via letter dated September 9, 2016.

VOC emissions occur during the foam extrusion process (i.e., from the primary foam extruder), from the lithographic ink printer, during the scrap/reclaiming processes, and

from off-gassing of the blowing agents from the finished products during storage within the facility prior to shipment to customers.¹

Emissions of PM, PM-10, and PM-2.5 from the materials handling operations within the proposed new E-7 line are relatively low, and are quantified in section III.A. below.

While the project triggers minor new source review permitting for VOC (Article 6), it will not result in major source permitting for VOC or GHGs (Article 8) or for HAP (Article 7), as is discussed in detail in section III below.

III. Regulatory Review

A. 9 VAC 5-80-1100 et seq. (Article 6) – Minor New Source Review

1. Criteria Pollutants:

Minor new source review (NSR) permitting applicability under Article 6 is based on the uncontrolled emission rate increase (UEI) of criteria pollutants for the project, as defined in the Regulations. The UEI for criteria pollutants is evaluated as the sum of the new uncontrolled emissions (NUE) minus the sum of the current uncontrolled emissions (CUE) for the emission units involved in the proposed project ($UEI = NUE - CUE$). The UEI is then compared to the criteria pollutant exemptions levels in 9 VAC 5-80-1105. If the UEI exceeds the exemption level for any one criteria pollutant, the source is subject to the permitting requirements of 9 VAC 5 Chapter 80, Article 6.

In this case, the project involves the construction of a new E-7 process line, the installation of a new reclaim extruder (R-7) that will serve the new E-7 line (as well as the existing E-6 line), and a new flexographic printer for the new E-7 line. Since all of these are new units, there are no current emissions, so $CUE = 0$. Therefore, $UEI = NUE$. For this project, VOC emissions increases consist of:

$$\begin{aligned} UEI &= NUE = E-7 \text{ Process VOC} + E-7 \text{ Reclaim VOC}^2 + E-7 \text{ Printer VOC}^3 \\ UEI &= 7.0 \text{ tpy} + 145.5 \text{ tpy} + 0.8 \text{ tpy} \\ UEI &= 153.3 \text{ tpy} \end{aligned}$$

¹ Some of the finished product from the E-7 process line may be stored on an outside storage pad. The off-gassing of VOC that occurs on the outside pad is considered fugitive emissions, which are not limited in the permit, but which are quantified and reported by Kingspan.

² Although R-7 is part of the emission unit IBR, the increase in uncontrolled emission rate in IBR is equal to the uncontrolled emission rate from reclaiming E-7 production, and for simplicity just that portion is included in this calculation. The uncontrolled emission rate that E-6 contributes to IBR will not change as a result of this project.

³ VOC emissions from the inside warehouse storage emission units (ES-34 and ES-58) and the outside storage pad (ES-132) that originate from insulation board produced by the proposed new E-7 extruder (ES-129) are also relevant to Article 6 applicability, but they are not quantified here because Article 6 is triggered without counting them.

See Attachment A and the application for detailed VOC emissions calculations.

The project will also result in PM/PM-10/PM-2.5 emissions. These particulate matter pollutants are generated by the materials handling operations associated with the IBR reclaim process, including both the new R-7 reclaim extruder and the potential increased utilization of the existing R-4 reclaim extruder. See Tables C-7 and C-8 in the application for PM/PM-10/PM-2.5 emissions values.

As shown in the Table 3 below, the facility's UEI exceeds the exemption threshold for VOC, but is below the exemption thresholds for all particulate matter pollutants. Accordingly, the proposed project is subject to permitting for VOC under Article 6.

Table 3: Uncontrolled Emission Rate (UEI) (tpy)

Pollutant	UEI	Exemption Threshold*	Subject to Permitting?
VOC	153.3	10	YES
PM	2.7	15	NO
PM-10	2.7	10	NO
PM-2.5	2.7	6	NO

*Exemption thresholds are from 9 VAC 5-80-1105 D for projects at existing sources.

Article 6 permitting is triggered for the following emissions units: the new E-7 line (ES-129, which consists of the primary and secondary extruders); the IBR reclaim (which includes the new R-7 reclaim extruder (ES-130) and the existing R-4 reclaim extruder (ES-52)); and the new E-7 printer (ES-124). See section IV below for the state BACT analysis for each of these emissions units. A separate Article 6 permitting applicability analysis is not being conducted for the NIBR reclaim emissions unit even though the R-1 reclaim extruder is being replaced by the larger, existing R-6 reclaim extruder. Even if permitting is applicable to this change, the NIBR emission unit is already controlled by an RTO, which would still constitute BACT under a current state BACT analysis.

2. Toxic Pollutants:

Since Article 6 permitting is already triggered for criteria pollutant (VOC) emissions, toxic pollutant (HAP) emissions do not need to be evaluated for Article 6 purposes. However, as described in section VI.B. below, modeling is required for methanol because the facility-wide emissions currently exceed the exemption thresholds, and

methanol emissions will increase as a result of this project. See Attachment B for calculations of methanol emissions.

B. 9 VAC 5 Chapter 80, Article 5 – State Operating Permit (SOP)

The proposed minor NSR permit does not implicate SOP. However, as described in section III.G. below, a separate SOP is being processed concurrently in order to directly limit methanol emissions from the proposed new E-7 line.

C. 9 VAC 5 Chapter 80, Article 8 – PSD Major New Source Review

The facility is a PSD major source for VOC. There is a two-part test for PSD applicability. Step One of the PSD applicability analysis is whether there is a “significant emissions increase” exceeding the applicable major source permitting thresholds in 9 VAC 5-80-1605 *et seq.* Whether a “significant emissions increase” will occur is determined by comparing the baseline actual emissions (BAE) from the impacted emissions units to the future potential emissions (FPE) from the impacted emissions units. For new emissions units, which for this project consist of the new E-7 line and the new E-7 printer, FPE is represented by the potential to emit (PTE) for each new unit. For modified existing units, which for this project consist of the IBR emissions unit (which in turn consists of the existing R-4 reclaim extruder and the new R-7 reclaim extruder), FPE is represented by the projected actual emissions (PAE) for the modified unit. For this project, Kingspan has elected to use PAE for the modified unit, in lieu of PTE as expressed by the emission limits in the proposed permit.

The BAE can utilize any 24-month period within the 10-year window preceding the submission of a complete application for the proposed project. In this case, the revised comprehensive application was received by DEQ on July 5, 2016, so the 10-year window extends from July 2006 through June 2016 (whole months are used because Kingspan’s emissions are recorded on a monthly basis). Kingspan has selected July 2006 through June 2008 for its 24-month BAE period.

The FPE is based on the proposed throughput limits, emission limits, and emissions calculations as described in the application. The Emission Increases are calculated as the Future Potential Emissions minus the Baseline Actual Emissions ($EI = FPE - BAE$). Note that for the two new emissions units (the E-7 line and the E-7 printer), $BAE = 0$.

PSD emissions increases are summarized in Table 4 below. See Attachment C and the application for detailed VOC emissions calculations for PSD applicability purposes.

Table 4 – Step One VOC Emissions Increase for PSD Applicability (tpy)

Emissions Unit (PSD characterization)	Baseline Actual Emissions	Future Potential Emissions	Emission Increases	Major Modification Threshold Level ¹	Is Emission Increase Significant?
E-7 Line (new)	0	6.03	6.03	--	--
E-7 Printer (new)	0	0.76	0.76	--	--
IBR – blowing agent VOC ² (modified)	72.79 ³	81.04	8.25	--	--
IBR – non-blowing agent VOC ² (modified)	0.29 ³	2.02	1.73	--	--
NIBR – blowing agent VOC ² (modified)	3.80 ⁴	3.80	0.00	--	--
NIBR – non-blowing agent VOC ² (modified)	0.17 ⁴	0.69	0.52	--	--
E-7 Inside Storage Warehouse (associated)	0 ⁵	20.63	20.63	--	--
Total			37.92	40	NO

¹ Per 9 VAC 5-80-1615, based on definitions of “major modification” and “significant”.

² The existing permit and the proposed permit separately limit VOCs emitted during the reclaim process based on their source – either from the blowing agents or from the melting of the plastic – because the methods for calculating these emissions are different.

³ Past actual emissions of blowing agent VOC from IBR are 74.56 tpy. This value is reduced to 72.79 because the emission limit in the existing permit for blowing agent VOC from IBR is lower than the corresponding limit that was in place during Kingspan’s selected BAE period. Past actual emissions of non-blowing agent VOC from IBR are not similarly reduced because this VOC originates from the plastic raw material, not the blowing agents, and that emission limit has not changed.

⁴ Past actual emissions of blowing agent VOC from NIBR are 34.4 tpy, and are reduced for the same reasons as for IBR, which is explained in note 3 above.

⁵ The ISW is an existing unit, and the emissions increases for PSD applicability purposes are only those related to products manufactured on the new E-7 line. No future emissions increases at the ISW from product manufactured on any of the existing process lines (E-2, E-4, E-6) can be attributed to the installation of the new E-7 line. Since only production from the E-7 line is being considered, and this is a new line, BAE for the ISW is 0.

As shown in Table 4 above, VOC emissions from the project will not result in a “significant emissions increase”. Since there is no “significant emissions increase” in Step 1, there is no need to continue to Step 2 of the PSD applicability analysis, which would determine whether there would be a “significant net emissions increase” exceeding the emissions increase threshold for a major modification (Step 2 is commonly referred to as “netting”). Accordingly, the proposed project is not subject to PSD permitting for VOC emissions.

The IBR emission unit will also emit PM, PM-10, and PM-2.5 from the reclaim process. However, since the calculated emissions for PM, PM-10, and PM-2.5 are 0.45 tpy, 0.07, and 0.07 tpy, respectively (low enough that emission limits are not necessary), the significance levels for these three pollutants (25 tpy, 15 tpy, and 10 tpy, respectively) will not be exceeded by this project. Accordingly, the project does not trigger PSD for PM, PM-10, or PM-2.5.

One of the blowing agents on the proposed new E-7 line, HFC-134a, has significant global warming potential, which potentially implicates PSD review for greenhouse gases (GHGs). However, since PSD is not triggered for any traditional pollutants, GHGs do not need to be included in the current PSD applicability determination, as recently directed by the U.S. Supreme Court in *Utility Air Regulatory Group V. Environmental Protection Agency* (June 23, 2014) and subsequent EPA and DEQ guidance (see DEQ guidance APG-311 (August 25, 2014)).

D. 9 VAC 5 Chapter 50, Part II, Article 5 – NSPS

No NSPS apply to the proposed project.

E. 9 VAC 5 Chapter 60, Part II, Article 1 – NESHAPS

No NESHAP apply to the proposed project.

F. 9 VAC 5 Chapter 60, Part II, Article 2 – MACT

No area source or major source MACT apply to the proposed project.

G. 9 VAC 5 Chapter 80, Article 7 – New and Reconstructed Major Sources of HAP

Article 7 applies to any facility that constructs or reconstructs a major source of HAP for which there are no promulgated MACT regulations. Reconstruction is considered to be any modification whose costs exceed 50% of the replacement cost of the modified emission unit. The project includes the construction of a new E-7 foam extrusion line, which will manufacture insulation board (similar to the existing E-6 primary foam extruder). As a new unit, the proposed new E-7 foam extrusion line would be subject to Article 7 if it would constitute a major source by itself. For all HAP purposes, including Article 7, a source is major if it emits at least 10 tpy of a single HAP or at least 25 tpy of all HAP combined.

Emissions of methanol from the new E-7 foam extrusion line (ES-129) are considered for Article 7 applicability. Emissions from the proposed new R-7 reclaim extruder (ES-130, which will become part of the existing IBR emission unit) are not considered for Article 7 purposes because IBR is not a new emissions unit and because the cost of the replacement of the existing R-6 reclaim extruder with the proposed new R-7 reclaim extruder do not constitute a “reconstruction” of the existing IBR emissions unit. As detailed in supplemental information received from the company on October 21, 2016, the cost of replacing the entire IBR emissions unit is approximately \$1,800,000, while the cost of the proposed replacement of the existing R-6 reclaim extruder with the new R-7 reclaim extruder is approximately \$750,000, which is less than the 50% threshold (which in this case would be \$900,000). In addition, emissions from the storage of insulation board that will be produced on the new E-7 foam extrusion line are not considered for Article 7 applicability because the Inside Storage Warehouse emission unit (ES-34 and ES-58) is not being constructed or reconstructed as part of this project. (In fact, the warehouse is not being modified in any way as part of this project.)

Table 5: Article 7 Applicability (tpy)

Pollutant	Emission Unit	Emissions	Exemption Threshold	Subject to Art.7 Permitting?
Methanol	E-7 foam extrusion	7.0	10	No

As shown in Table 3-1 of the application, which is reproduced in relevant part in Table 5 above, the proposed new E-7 foam extrusion line is not a major source of HAP because its maximum calculated methanol emissions of 7.0 tpy will not exceed the 10 tpy major source threshold under any of the potential operating scenarios.⁴

Since there is no regulatory authority for directly limiting HAP emissions in a minor NSR permit, a state operating permit (SOP) is being processed concurrently. The SOP will include a condition limiting methanol emissions from the new E-7 foam extrusion line to this 7.0 tpy value, which is less than the 10 tpy major source threshold that would trigger Article 7.

H. 9 VAC 5 Chapter 40, Part II, Existing Sources – Emission Standards

No existing source emission standards apply to the proposed project.

⁴

In Table C-1, this value is drawn from the “MeOH BA emitted” Minor NSR case, which is the second highest methanol emissions value shown in this row. The highest methanol emissions value is found under Scenario 6, but that scenario assumes that the VOC blowing agent is not used at all in the foam extrusion process; this was included in the permitting analysis simply as an extreme boundary case to demonstrate methanol emissions if the VOC blowing agent was not used at all. However, since Scenario 6 is not a realistic operating scenario because total production would exceed extruder capacity, the permit limits are instead based on the next-worse case values shown in Table C-1.

IV. Best Available Control Technology (BACT) Review (9 VAC 5-50-260 and/or 9 VAC-5-60-320)

A project shall apply BACT for each regulated pollutant for which there would be an increase in the uncontrolled emission rate equal to or greater than the levels in 9VAC5-80-1105 D. This requirement applies to each affected emissions unit in the project that emits the same pollutant. As shown in Table 3 above (Section III.A.), the project triggers minor NSR permitting for VOC; therefore, BACT applies to VOC emissions from the following new and modified units:

- The proposed new primary foam extruder for the new E-7 line (ES-129);
- The proposed new lithographic printer for the new E-7 lines (ES-124); and
- The IBR process, which consists of the new R-7 reclaim extruder (ES-130) and the existing R-4 reclaim extruder (ES-52).⁵

Due to the magnitude of Kingspan's facility-wide VOC emissions, DEQ requested a top-down BACT analysis to evaluate control options for the new E-7 line and for IBR. Kingspan provided this analysis in Section 5 of its application. Note that this BACT analysis builds on previous BACT determinations made for the E-6 line, which uses the same blowing agents as the proposed new E-7 line. For the most recent BACT determination for the E-6 line, please see the engineering memorandum prepared for the minor NSR permit dated December 20, 2013, in which eleven control options were evaluated in detail for proposed modifications to the E-6 production line.

Kingspan's BACT analysis for the proposed new E-7 line and the modified existing IBR process are summarized in Table 7 below. The base case is the use of the same three blowing agents as are currently authorized for the existing E-6 line, which manufactures the same product (insulation board) as the proposed E-7 line. The potential control scenarios that Kingspan evaluated include:

1. Installing one or more regenerative thermal oxidizers (RTOs) to control the E-7 extruder or the IBR process;
2. Installing one or more catalytic thermal oxidizers (CTOs) to control the E-7 extruder or the IBR process;
3. Installing carbon adsorption to control the E-7 extruder or the IBR process;
4. Installing a packed bed scrubber (PBS) to control the E-7 extruder or the IBR process;
5. Installing a refrigerated condenser to control the E-7 extruder or the IBR process;
6. Eliminating the VOC blowing agent;
7. Eliminating the HFC blowing agent; and

⁵

Although the project includes emissions from the inside storage warehouses (ES-34 and ES-58) and the outside storage pad (ES-132) that originate from insulation board produced by the proposed new E-7 extruder (ES-129), BACT is not considered for these three storage emission units because no physical modifications are being made to any of these storage units. Accordingly, the previous BACT analyses for these emission units, which concluded that no controls were technically and economically feasible, remain valid. See the engineering memorandum for the minor NSR permit dated December 20, 2013.

8. Filtering the HAP out of the blowing agent immediately prior to extrusion.
1. **RTO**: An RTO utilizes a bed of ceramic material to absorb heat from the exhaust stream. This captured heat is used to preheat the process gas stream and destroy air pollutants using high temperature incineration. However, incineration of the fluorinated blowing agent that will be used on the E-7 line forms acidic gases that fairly quickly corrode the control equipment. Consequently, the RTO must be constructed of stainless steel and other corrosion-resistant materials. Moreover, a caustic scrubber must be added downstream of the RTO in order to remove and neutralize the acid gases. While these challenges result in significantly higher costs for the RTO control options, they do not render an RTO technically infeasible, so costs are evaluated for this control option.
2. **CTO**: A CTO is similar to an RTO, but with two significant differences. A CTO uses a bed of precious metal catalysts to facilitate the destruction of pollutants at lower temperatures than with an RTO. The advantage of a CTO over an RTO is the use of less fuel (usually natural gas) because the catalyst allows destruction of the pollutants at lower temperatures. However, a CTO requires additional costs for the precious metal catalyst and its periodic replacement. As with an RTO, in this potential use, a CTO would need to be constructed of corrosion-resistant materials and must include an acid gas scrubber on the back end. While these challenges result in significantly higher costs for the CTO control options, they do not render a CTO technically infeasible, so costs are evaluated for this control option.
3. **Carbon Adsorption**: Carbon adsorption is commonly used to reduce VOC concentrations in a process gas stream where the VOC concentrations are not high enough to justify incineration by an RTO or a CTO. However, the VOC used by Kingspan has a low boiling point and high vapor pressure, and gases with these characteristics do not adsorb well to activated carbon. Moreover, it is unknown whether the presence of the other blowing agents in the gas stream (particularly the HFC) might further limit or inhibit the adsorption of the VOC blowing agent by the carbon. For purposes of this analysis, however, Kingspan aggressively assumed that 95% of the captured VOC emissions would be removed by a carbon adsorption system. A carbon adsorption system would require the installation of the following components: an enclosure around the extrusion and/or reclaim equipment to capture emissions; ductwork to convey emissions to the control equipment; multiple carbon adsorption vessels; a 2 MMBtu/hr boiler to provide process steam for the desorption cycle; and a 1,000 gallon tank to store the desorbed VOC prior to removal by a waste removal contractor.
4. **Packed Bed Scrubber**: A PBS is a column filled with packing materials that provide a large surface area to provide maximum contact between gas and liquid streams. A PBS transfers pollutants through absorption from a gas stream into a liquid stream, where it is easier to further collect and remove the pollutant. EPA's fact sheet for PBSs (EPA-452/F-03-015) provides a typical lower bound for pollutant loading in the gas stream of 250 ppm. However, Kingspan estimates that VOC concentrations for the E-7 line will not exceed 37 ppm. This conservative estimate uses the lowest air

flow rate with the highest potential gas concentration, and it still falls well below the threshold for using a PBS. Therefore, a PBS is not technically feasible for use on the E-7 line.

5. **Refrigerated Condenser:** Refrigerated condensation separates VOC from a gas stream by forcing a phase change from gas to liquid. The phase change is induced by a change in pressure and/or a change in temperature. EPA's Control Cost Manual recommends using the Antoine Equation to determine the condensation temperature of the constituents of concern. Applying Antoine's Equation to the process gas stream for the E-7 line shows that condensation is not feasible because the vapor pressures of the VOC constituents are too low (due to the relatively low maximum VOC concentrations). Consequently, refrigerated condensation is not technically feasible for the relatively dilute process gas stream for the E-7 line.
6. **Eliminate the VOC Blowing Agent:** If there were no VOC in the blowing agents to be used on the E-7 line, then there would not be any VOC emissions from the E-7 line. Kingspan states in its application that the base case scenario represents the maximum blowing agent VOC and HFC reduction that it can currently achieve on its existing E-6 line while producing foam insulation board with the properties required by its customers. Consequently, any further reduction of blowing agent VOC would degrade the quality of its products to the point that Kingspan would not be able to manufacture a saleable product. Consequently, either eliminating or further reducing the VOC blowing agent is not technically feasible.
7. **Eliminate the HFC Blowing Agent:** If there were no HFC in the blowing agents to be used on the E-7 line, then corrosive-resistant materials would not be necessary for an RTO or CTO; nor would a back-end caustic scrubber be necessary, both of which would significantly reduce the costs associated with either of these control options, rendering IBR susceptible to control by an RTO as NIBR is currently controlled. Kingspan states in its application that the base case scenario represents the maximum blowing agent VOC and HFC reduction that it can currently achieve on its existing E-6 line while producing foam insulation board with the properties required by its customers. Consequently, any further reduction of blowing agent HFC would degrade the quality of its products to the point that Kingspan would not be able to manufacture a saleable product. Consequently, eliminating the HFC blowing agent is not technically feasible at this time.⁶
8. **Filter the HAP out of the Blowing Agent:** Methanol is present in one of the blowing agents as an impurity. However, this impurity is present due to the disassociation of another constituent of the blowing agent that occurs at standard temperature and pressure. Since the blowing agent must exist at standard temperature

⁶ However, Kingspan must comply with an international mandate to phase out the HFC blowing agent by January 1, 2021. Consequently, at some point after the new E-7 line becomes operational, Kingspan will conduct a series of blowing agent trials on E-6 and/or E-7 as part of its research and development efforts to comply with this mandate. Having two extruders producing IB at the facility will facilitate this necessary research, since one line can remain in commercial production while trials are conducted on the other line.

and pressure immediately prior to being injected into the extrusion process, it is not possible to filter out the methanol because doing so would simply cause more disassociation to occur to reach equilibrium. Consequently, it is not technically feasible to filter the methanol from the blowing agent.

Table 6 below summarizes the nature and, if technically feasible, the costs associated with each of these potential control scenarios.

Table 6 – Summary of Potential BACT Control Scenarios

	Area	Control Scenario	VOC Removed (tpy)	Annualized Cost	Cost Per Ton
0	Blowing Agents	Use existing E-6 blowing agents (base case)	--	--	--
1a	E-7 Extrusion	RTO and caustic scrubber	5.9	\$1,702,000	\$288,500
2a	E-7 Extrusion	CTO and caustic scrubber	5.9	\$1,702,000	\$288,500
3a	E-7 Extrusion	Carbon adsorption	5.7	\$484,800	\$85,000
1b	IBR Reclaim	RTO and caustic scrubber	90.2	\$2,330,000	\$25,830
2b	IBR Reclaim	CTO and caustic scrubber	90.2	\$2,330,000	\$25,830
3b	IBR Reclaim	Carbon adsorption	87.5	\$2,081,000	\$23,785
4	E-7 Extrusion or IBR Reclaim	Packed Bed Scrubber	Up to 90%	Not Technically Feasible	n/a
5	E-7 Extrusion or IBR Reclaim	Refrigerated Condenser	Up to 90%	Not Technically Feasible	n/a
6	Blowing Agents	Eliminate VOC BA	Up to 100%	Not Technically Feasible	n/a
7	Blowing Agents	Eliminate HFC BA	Up to 100%	Not Technically Feasible	n/a
8	Blowing Agents	Filter out HAP prior to extrusion	Up to 100%	Not Technically Feasible	n/a

All of the control options evaluated by Kingspan and DEQ have costs that equal or exceed \$23,785 per ton. Control costs of this magnitude are too expensive for state

BACT. Since all VOC control options beyond the base case are either technically infeasible or economically infeasible, DEQ finds that the base case – the use of the same blowing agents that are currently authorized on the E-6 line – constitutes state BACT for the proposed project.

Accordingly, DEQ's BACT determination for the new E-7 line (ES-129) is the use of the same blowing agents that are currently authorized on the E-6 line and associated blowing agent VOC throughput and emission limits. See Conditions 18 and 19 of the proposed permit.

DEQ's BACT determination for the IBR reclaim emissions unit (which includes the new R-7 reclaim extruder (ES-130)) is a throughput limit on IBR's production of reclaim polystyrene pellets, as specified in Condition 36 of the proposed permit. This throughput limit will serve to restrict both sources of VOC emissions from the IBR process – blowing agent VOC and non-blowing agent VOC (which originates from the plastic that is shredded and melted down during the reclaim process) – and is the basis for the VOC emissions limits that apply to IBR (Conditions 37 and 39).

DEQ's BACT determination for the new E-7 flexographic printer (ES-124) is the use of low-VOC and low-HAP inks, which is consistent with the four existing flexographic printers at the facility. The new E-7 printer (ES-124) is included in the existing facility-wide throughput limit for HAPs for printers, which is 200 kg (440 lb) per month, and which has been in place to avoid triggering MACT Subpart KK (Printing and Publishing) applicability. Note, however, that this condition is being moved from this minor NSR permit to the proposed SOP (see Condition 4). The new E-7 printer is also subject to an annual VOC emission limit of 0.8 tpy, per Condition 53 of the proposed minor NSR permit.

V. Combination of Permit Program Requirements

This combined permit meets the requirements of 9 VAC 5-80-1255 D.1-3. Each permit condition includes all implementing program regulatory citations and the most recent respective permit effective date. Each permit condition is state and federally enforceable unless explicitly included the state-only enforceable requirements section of the permit. With the exception of changes associated with the new permit approval, all terms and conditions from the contributing permits are included in the combined permit without change in this combining action.

VI. Summary of Controlled Emissions Increases and Decreases

Table 7 below summarizes the permitted changes in VOC emissions for the facility as a result of this project. The emissions changes for each emission unit are simply the difference between the emission limits in the proposed permit minus the corresponding emission limits in the existing permit.

Table 7 – Changes in VOC Emission Limits (tpy)

Emissions Unit	Condition Number*	Existing Limit	New Limit	Difference
E-1 Process	24	57.0	--	-57.0
E-1 Reclaim	24	1.8	--	-1.8
E-1 Inside Warehouse	24	208.2	--	-208.2
NIBR Reclaim Extruders	42	2.0	2.0	0
E-1 Printer	52	1.0	--	-1.0
E-7 Process	19	--	6.0	+6.0
E-7 Reclaim	37	--	25.4	+25.4
E-7 Inside Warehouse	56	--	20.6	+20.6
IBR Reclaim Extruders	39	1.56	2.02	+0.5
E-7 Printer	54	--	0.8	+0.8
Total	--	--	--	-214.7

* For E-1 units, the Condition No. is from the existing permit; for E-7 units, the Condition No. is from the proposed permit.

As shown in Table 7 above, upon issuance of this permit modification, Kingspan will be authorized to emit approximately 215 tpy less VOC facility-wide as compared to the existing permit. This reduction is the result of the existing E-1 line, which will be removed, having significantly greater VOC emissions than the proposed E-7 line.

The other notable change in emissions from this project is for the HAP methanol (which is also a VOC). Under the existing permit, methanol emissions are authorized for the E-2, E-4, and E-6 lines, and the proposed permit expands use of methanol to the new E-7 line as well. As shown in Condition 73 of the proposed permit, facility-wide methanol use can increase by 27.6 tpy (from 50.3 tpy to 77.9 tpy). In contrast to facility-wide VOC emissions, the removal of the E-1 line will not reduce the facility's methanol emissions because E-1 does not emit methanol.

The permit also includes emission limits for PM and PM-10 emissions resulting from the materials handling activities that are part of the E-6 and E-7 production processes, specifically the storage and transfer of the polystyrene pellets (both virgin and reclaimed) that are the primary raw material in these extrusion processes. PM and PM-10 emissions were also evaluated for the IBR process, but since the maximum values are well below 0.5 tpy, no emission limits for PM or PM-10 are included for the IBR process.

VII. Dispersion Modeling

A. Criteria Pollutants

As discussed in section III.A. above, the only criteria pollutant that triggers Article 6 minor NSR permitting is VOC. However, generally VOC is not subject to dispersion modeling regardless of the magnitude of the increase in emissions.

B. Toxic Pollutants

Facility-wide emissions of methanol already exceed both the hourly and annual exemption levels for methanol (see the engineering memorandum for the minor NSR permit dated December 20, 2013). The proposed E-7 line will be a source of additional methanol emissions. Since emissions of methanol already exceed exemption levels and will be increasing (see Table 8 below), facility-wide dispersion modeling is required for methanol to determine compliance with the short-term and annual Significant Ambient Air Concentration (SAAC) for methanol, which are 8,200 ug/m³ (hourly) and 524 ug/m³ (annual).

Table 8: Facility-wide Potential to Emit – Toxic Pollutants

Pollutant	Current PTE		Proposed PTE		Modeling Thresholds ¹	
	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr
Methanol (67561)	13.8	50.3	21.1	77.9	10.8	37.99

¹ Modeling thresholds are the same as the exemption levels for toxic pollutants, which are calculated using the formula specified in 9 VAC 5-60-300 C.1.b.

Kingspan submitted a modeling protocol to DEQ’s Office of Air Quality Assessments (AQA) on March 21, 2016, and AQA provided comments on the protocol on March 29, 2016. Kingspan submitted a revised modeling protocol to AQA on August 2, 2016, which AQA approved on August 4, 2016.

Kingspan submitted its initial modeling report on August 15, 2016, and AQA provided comments shortly afterward. Kingspan submitted a revised modeling report that is dated September 2016. AQA approved the modeling via memorandum from Robert Lute (AQA) to Janardan Pandey (VRO) dated September 27, 2016, which is included as Attachment D to this memorandum. Kingspan’s revised modeling report and modeling files will be included in the permitting file as part of the application for this project.

As stated in AQA’s report, the modeling analysis was performed in a manner consistent with the EPA Guideline on Air Quality Models (Appendix W of 40 CFR 51 – EPA-450/2-78-027R). As shown in Table 9 below, the modeling results

demonstrate compliance with the SAAC for methanol. The maximum modeled concentrations from the facility are 36% of the 1-hour SAAC and 34% of the annual SAAC.

Table 9 – Modeling Results

Toxic Pollutant	Averaging Period	Maximum Modeled Concentration From Facility ($\mu\text{g}/\text{m}^3$)	SAAC ($\mu\text{g}/\text{m}^3$)	Percentage of SAAC
Methanol	1-hour	2,981	8,200	36%
	Annual	177.1	524	34%

Upon reviewing Kingspan’s draft modeling results, DEQ inquired as to why the modeled concentrations are so far below the impacts that were modeled in 2013, even though methanol emissions will increase substantially with the proposed project. Kingspan responded via memorandum dated October 5, 2016, which explains that this difference results from the most recent VOC retention testing (performed earlier in 2016), which for the first time analyzed and quantified methanol emissions separately from total VOC. During the 2013 modeling, in the absence of methanol-specific data, Kingspan conservatively assumed that all of the methanol is emitted at the primary foam extruder (in other words, it was assumed that no methanol is retained in the insulation board for any appreciable amount of time). The 2016 retention testing data, however, shows that this assumption was not correct, because a significant amount of the methanol is retained in the insulation board after extrusion, and then some of that methanol is released either during storage at the facility or during the reclaim process. This new data resulted in apportioning methanol emissions throughout the facility – primary extrusion, reclaim, inside storage, and outside storage – rather than concentrating all methanol emissions in one location (the vents exhausting air from around the primary extruder). This more accurate apportionment resulted in significantly lower impacts at the facility’s property line, even though overall methanol emissions will be increasing.

VIII. Boilerplate Deviations / Changes from Existing Permit

The existing permit was used as the basis for the proposed permit modification. No deviations from boilerplate conditions or procedures are reflected in the proposed permit modification.

The primary changes from the existing permit involve the deletion of all conditions pertaining solely to the E-1 process line, which will be removed from the facility⁷, and the addition of conditions pertaining to the new E-7 process line, which will be

⁷ Certain equipment that serves E-1 and one or more other process lines, such as various fluff storage silos, will remain in operation at the facility and thus will also remain in the minor NSR permit.

constructed at the facility upon issuance of the proposed permit modification. Other significant changes include separating process VOC emission limits from reclaim VOC emission limits, and establishing single VOC emission limits for the IBR process and for the NIBR process.

See section V above for a detailed description of permit changes that impact VOC emissions. Consistent with new DEQ procedures, permit dates are added to each condition.

The other additional significant changes from the existing permit are:

- Condition 15, which established a throughput limit on HFC-134a use on the E-6 line, has been removed from the proposed permit. This condition was created to avoid PSD applicability for GHG, but as recently directed by the U.S. Supreme Court in *Utility Air Regulatory Group V. Environmental Protection Agency* (June 23, 2014) and subsequent EPA and DEQ guidance (see DEQ guidance APG-311 (August 25, 2014)), DEQ no longer has the authority to regulate GHG emissions in a minor NSR permit. Accordingly, there is no limitation on HFC-134a use on the proposed new E-7 line either.
- Condition 54, which establishes a throughput limit for HAPs for all of the flexographic printers at the facility in order to avoid MACT Subpart KK applicability, is removed from this minor NSR permit and is being added to the proposed SOP because an SOP is the appropriate permit for a condition pertaining only to HAPs.

IX. Compliance Demonstration

The compliance requirements for the proposed new E-7 line reflect the compliance requirements for the three existing process lines. Significant features include:

- Hourly and annual blowing agent VOC throughput limits (Condition 18);
- Annual VOC emission limit for E-7 Process Emissions (Condition 19);
- Annual throughput limit for the storage of finished insulation boards within the inside warehouse storage area (Condition 21);
- Annual throughput limit for the use of virgin polystyrene resin to the E-7 line (Condition 22);
- Annual PM and PM-10 emission limits for the materials handling operations association with the E-7 line (Condition 23);
- Initial performance testing for the E-7 line, specifically product retention testing for methanol and non-methanol VOC (Condition 57);

- Recordkeeping requirements for the above conditions (Condition 60); and
- Recordkeeping, notification, and reporting requirements, pursuant to 9 VAC 5-80-1785 B, pertaining to the use of projected actual emissions in the PSD applicability calculation for the contribution to VOC emissions from the IBR emissions unit that are attributed to insulation board that is manufactured on the E-6 extruder (Conditions 60mm, 61c, and 62).

X. Title V Review - 9 VAC 5 Chapter 80, Article 1

This permit action does not affect Kingspan's Title V status. The facility will still be classified as a major source and subject to the permitting requirements of 9 VAC 5 Chapter 80, Article 1. As soon as is practicable after issuance of this minor NSR permit modification, Kingspan intends to submit a Form 805 application requesting a significant modification to its Title V permit that will mirror the changes being made to its minor NSR permit (as described in this memorandum). 9 VAC 5-80-80 C.2 requires such an application to be submitted no later than 12 months after the modified equipment commences operation.

XI. Site Suitability

Since this is a project at an existing facility, site suitability considerations are not necessary.

XII. Public Participation Requirements

There are no public participation requirements for the proposed minor NSR permit.

XIII. Permit Fee

The correct application fee of \$1,577.00 for a minor NSR permit at a major source was received by DEQ and deposited on March 28, 2016.

Date	Description	eBiz	Line Item Amount
Invoices			
02/05/2016 8:23 AM	Minor NSR Permit at TV Source- App. Fee	02/05/2016 8:25 AM Minor NSR Permit at TV Source- App. Fee	\$1,577.00
		03/28/2016 12:00 AM eBiz CL DC# 54401704 receipt# 001271	(\$1,577.00)
			eBiz Transaction Id 291412
			\$1,577.00
Payments			
03/28/2016 12:00 AM	Receipt DC #54401704		-\$1,577.00

Balance Due: \$0.00

XIV. Other Considerations

A. State Only Enforceable (SOE) Requirements:

As described in Section VI above, facility-wide emissions of methanol, the only toxic pollutant, exceed the hourly and annual exemption levels for methanol set forth in 9 VAC 5-60-300 C. Methanol emission limitations and associated requirements are included in the permit as SOE requirements to implement the provisions of 9 VAC 5-60-300, *et. seq.* See Conditions 72 through 75 of the proposed permit. The inclusion of SOE requirements in this permit does not make these terms federally enforceable.

In contrast, since the methanol emissions limit for the proposed new E-7 line must be federally enforceable – because it ensures that Article 7 major HAP review is not triggered by this project – that limit must be implemented through an SOP, as described in section III.G. above.

B. Confidential Information in the Permit Application:

Kingspan asserts that not all portions of the permit application are suitable for public review. Kingspan's application includes a request for confidentiality on some portions of the application, in accordance with 9 VAC 5-170-60 B, including a confidential copy and a public copy of the application. DEQ agreed via letter dated September 9, 2016, to maintain as confidential information certain data and details of the emission calculations for the proposed new E-7 process line. However, emissions limits and data are available to the public without exception.

C. Previous CEDS Actions:

Since the proposed E-7 process line is new, there are no previous CEDS actions that involve this emissions unit.

D. Compliance Status:

A complete Full Compliance Evaluation (FCE) including an onsite visit, was conducted by DEQ-VRO air compliance specialist Barry Brandon on January 20, 2016. On March 8, 2016, the FCE was approved and the facility was found to be in compliance.

XV. Recommendations

Recommend approval of the permit modification.

Attachments

Attachment A – Minor NSR Permitting Applicability Calculations – Criteria Pollutants

Attachment B – Emissions Calculations – Toxic Pollutants

Attachment C – PSD Permitting Applicability Calculations

Attachment D – DEQ-AQA's Modeling Analysis

ATTACHMENT C

Table of Emission Limits

Emission Unit ID	Emission Unit Description	Size/Rated Capacity	Pollution Control Device Description	Condition No.	VOC Emission Limit & Comments
ES-21	Foam Extruder E-2	1250 lbs of foam/hr	-		27.4 tpy E-2 Process (no controls)
ES-27, ES-28, ES-28a	E-2 Laminators and Co-Extruder	-	-		0.25 tpy (no controls)
ES-32	E-2 Roll Storage Area	-	-	-	included in E-2 Process limit (no controls)
ES-41 and ES-214	E-2 Thermoformers	-	-	-	included in E-2 Process limit (no controls)
ES-22	Foam Extruder E-4	1700 lbs of foam/hr	-		49.0 tpy E-4 Process (no controls)
ES-29, ES-29a, ES-30, ES-30a	E-4 Laminators and Co-Extruders	-	-		0.48 tpy (no controls)
ES-24	Foam Extruder E-6	5500 lbs of foam/hr	-		10.9 tpy E-6 Process (no controls)
ES-129	Foam Extruder E-7	3500 lbs of foam/hr	-		7.0 tpy E-7 Process (no controls)
ES-52 and ES-130	IBR Reclaim (R-4/R-7), Blowing Agent emissions	-	-		102.7 tpy (no controls)
ES-52 and ES-130	IBR Reclaim (R-4/R-7), non-BA emissions	-	-		2.02 tpy (no controls)
ES-33a	IBR Roll and Scrap Grinders including Storage Area	1000 lbs of product/hr annual avg	-	-	Emissions included in IBR limits (no controls)
ES-50	IBR Fluff (Ground Scrap) Storage Silos	2513 ft ³	-	-	Emissions included in IBR limits (no controls)
ES-128, ES-131	IBR Fluff (Ground Scrap) Storage Silos	4000 ft ³ each	-	-	Emissions included in IBR limits (no controls)

Emission Unit ID	Emission Unit Description	Size/Rated Capacity	Pollution Control Device Description	Condition No.	VOC Emission Limit & Comments
ES-53 and ES-55	NIBR Reclaim (R-2/R-6), Blowing Agent emissions	-	16.7 R95NG1 Regenerative Thermal Oxidizer		2.0 tpy
ES-53 and ES-55	NIBR Reclaim (R-2/R-6), non-BA emissions	-	16.7 R95NG1 Regenerative Thermal Oxidizer		0.69 tpy
ES-33	NIBR Roll and Scrap Grinders including Storage Area	1000 lbs of product/hr annual avg	16.7 R95NG1 Regenerative Thermal Oxidizer	-	Emissions included in the NIBR limits
ES-42 to -46, -48, -49, -64 to -66	NIBR Fluff (Ground Scrap) Storage Silos	2513 ft ³ each	16.7 R95NG1 Regenerative Thermal Oxidizer	-	Emissions included in the NIBR limits
ES-34, ES-58	Inside Finished Goods Storage Warehouses	-	-		182.1 tpy (no controls)
ES-114	VOC Blowing Agent Tank (serves E-2 and E-4)	30,000 gallons	Pressure tank with inherent controls	-	de minimis – no limits
ES-110	Blowing Agent Tank (up to 3 percent methanol) (serves E-2, E-4, E-6, E-7)	18,000 gallons	Pressure tank with inherent controls	-	de minimis – no limits
ES-121	VOC Blowing Agent Storage Tank (E-6 and E-7)	6000 gallons	Pressure tank with inherent controls	-	de minimis – no limits
ES-122	VOC Blowing Agent Storage Tank (E-6 and E-7)	6000 gallons	Pressure tank with inherent controls	-	de minimis – no limits
ES-67	E-2 Flexographic Printer	-	Low-solvent ink		1.0 tpy
ES-117	E-4 Flexographic Printer	-	Low-solvent ink		1.0 tpy
ES-116	E-6 Flexographic Printer	-	Low-solvent ink		1.0 tpy
ES-124	E-7 Flexographic Printer	-	Low-solvent ink		0.8 tpy
ES-76	Housewrap Flexographic Printer	7000 yards of Housewrap/hr	Low-solvent ink		1.5 tpy