

Delaware Department of Natural Resources & Environmental Control

## **Air Contaminant Equipment Registration Instructions**

*How to Register a Piece of Equipment under Regulation 1102  
Section 2.1(a) and Section 9*

**DRAFT- October 2, 2008**

**Mail Registration to:**

**Delaware DNREC  
Division of Air Quality**

**655 South Bay Road  
Suite 5N  
Dover, DE 19901**

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## AIR CONTAMINANT EQUIPMENT REGISTRATION

### I. *Introduction*

The Air Contaminant Equipment Registration procedure described in this document was established pursuant to Regulation 2 (Permits) of Delaware's "**Regulations Governing the Control of Air Pollution**," effective June 1, 1997. The permits were revised to Regulation 1102 on June 11, 2005. It is designed to provide flexibility to industry by allowing the owner or operator of equipment to either choose to self-register or to register and request that the Department evaluate the fulfillment of all registration criteria.

This document describes the registration criteria, details the registration process, and presents three registration examples. If you have any questions regarding the registration of equipment, call the Air Quality Management Section at (302) 323-4542 in New Castle or (302) 739-9402 in Dover for assistance.

### II. *Am I Eligible to Register?*

The eligibility criteria for registration are stated in Regulation 1102, Section 2.1(a) of the State of Delaware "**Regulations Governing the Control of Air Pollution**." In short, equipment is eligible for registration if it meets the following three criteria:

1. The equipment to be registered is not considered a major modification to a major source as defined in Regulation No. 1125 (*Minor New Source Review, Requirements for Pre-construction Review*) of the State of Delaware "**Regulations Governing the Control of Air Pollution**."
2. The equipment meets all applicable State and Federal emission limitations and standards (commonly referred to as "applicable requirements") ***without an air contaminant control device***. Examples of air contaminant control devices include baghouses, cyclones, settling chambers, filters, scrubbers, condensers, and incinerators. The source may have an air contaminant control device but it must not be required.
3. The equipment emits greater than or equal to 0.2 lb/day<sup>1</sup> and less than 10 lb/day<sup>2</sup> of total combined air contaminants, each and every day, to the atmosphere ***before controls***.

#### *Footnotes*

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- 1 If the equipment emits less than 0.2 lb/day of air contaminants to the atmosphere before controls and is not subject to Regulation 1125 (*Minor New Source Review, Requirements for Pre-construction Review*), then the equipment is exempt from the Regulation 1102 registration and permit process (see Section 2.2(a) and (b) of Reg. 1102). Permitting/registration is not required for equipment listed in Appendix A of Reg. 1102.
- 2 If the equipment emits 10 or more lbs/day of air contaminants to the atmosphere before controls, then the equipment may not be registered. The owner and/or operator of the equipment must submit an air emissions permit application and secure a permit prior to any construction, installation, modification, or operation of the equipment (see Section 2.1(c) of Reg. 1102).

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### **III. *Two Options Available to Those Who Own or Operate Equipment that is Eligible for Registration***

Those who own or operate equipment that meet the above three criteria may either choose to (1) self-register, or (2) register and request that the Department evaluate the fulfillment of all registration criteria.

A main component of the registration process is a demonstration that shows the emissions from the equipment will not cause adverse effects to the public's health, safety, and welfare. If the registrant chooses the self-registration option, the registrant must perform this demonstration. If the registrant chooses to register and allow the Department to evaluate the fulfillment of the registration criteria, then the Department will perform the demonstration.

Public health, safety, and welfare effects are evaluated by computing the maximum downwind concentration (MDC) of each air contaminant to be emitted using a computer program developed by EPA called SCREEN3, and a TLV/MDC spreadsheet. TLV is defined as the Threshold Limit Value of the pollutant. The MDC is compared to available toxicological data (TLV) for each air contaminant in question. A demonstration that public health, safety, and welfare are not adversely affected is shown when the published TLV of each released air contaminant is at least 100 times greater than the MDC at the nearest property line and beyond.

#### **A. *Should I Self-Register?***

##### **1. *Advantage:***

Self-registration is quick. Immediately after you have completed and submitted the registration form and TLV/MDC spreadsheet to the Department, the Company may construct, install, modify, and/or operate the equipment.

##### **2. *Disadvantage:***

You must complete Part 5, "Toxicological Data and Dispersion Model Results," of the registration form to demonstrate that the air emissions from your equipment will not adversely affect public health, safety, and welfare. To do this requires:

- Toxicological data on each identified contaminant to be emitted.
- The ability to accurately perform mathematical calculations.
- The ability to execute the SCREEN3 air dispersion model program and complete the TLV/MDC spreadsheet.

#### **B. *Should I Register and Request that the Department Evaluate the Fulfillment of all Registration Criteria?***

##### **1. *Advantage:***

The registrant is not required to:

- Apply any air dispersion model,
- Obtain toxicological data or
- Complete Part 5 "Toxicological Data and Dispersion Model Results" of the registration form.

##### **2. *Disadvantage:***

The process takes longer, sometimes up to two months. The registrant will have to wait for written approval from the Department before commencing construction, installation, modification, and/or operation of the equipment.

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If there are no immediate time constraints and/or you do not feel comfortable applying the air dispersion model or performing the mathematical calculations, this option is best for you.

### **IV. *What Tools Do I Need to Register and How Can I Obtain Them?***

You will need the following to register:

1. The State of Delaware "**Regulations Governing the Control of Air Pollution**,"
2. A DNREC Air Contaminant Equipment Registration Form.

*If you choose to self-register, you will also need the following:*

3. Toxicological data (i.e., threshold limit values or TLVs) on each identified air contaminant to be emitted.
4. SCREEN3 air dispersion model: The SCREEN3 program calculates the 1-hour maximum downwind concentration (MDC) of an air pollutant in  $\mu\text{g}/\text{m}^3$ .
5. A copy of the TLV/MDC spreadsheet. The TLV/MDC spreadsheet uses the MDC calculated from the SCREEN3 program and the TLV to determine the 8-hour TLV:MDC ratio. This ratio must be at least 100 to satisfy Department criteria that the pollutant will not adversely affect public health, safety, and welfare.

The State of Delaware "**Regulations Governing the Control of Air Pollution**" is available at the DNREC website, <http://www.dnrec.delaware.gov/Air/Pages/default.aspx>, by selecting "Rules, Regulations, and Laws" under "Information" and then choosing "Air Quality." Instructions on how to obtain TLVs, are discussed on page 5 of this document. This instruction manual, the registration form and TLV/MDC spreadsheet are located at <http://www.dnrec.delaware.gov/Air/Pages/Air-Contaminant-Equipment-Registration.aspx> A Windows 5.30 version of SCREEN3 can be purchased on-line.

A free DOS version of SCREEN3 is available from EPA at [http://www.epa.gov/scram001/dispersion\\_screening.htm#screen3](http://www.epa.gov/scram001/dispersion_screening.htm#screen3). The user guide for the DOS based SCREEN3 program is located at <http://www.epa.gov/scram001/userg/screen/screen3d.pdf>.

### **V. *Instructions for Completing the Delaware DNREC Air Contaminant Equipment Registration Form***

If you choose to self-register, complete Parts 1-7 of the registration form and the TLV/MDC spreadsheet. If you choose to register and request that the Department evaluate the fulfillment of the registration criteria, complete Parts 1-4 and 6-7, leaving Part 5 blank. **Be sure to sign and date the back of the registration form.**

Data may be entered in the SCREEN3 program in English or metric units. No conversions are necessary except for exit temperature. If you have an exit temperature in degrees Celsius, you must convert to degrees Kelvin using the following equation:

$$^{\circ}\text{C} + 273.15 = ^{\circ}\text{K}$$

#### **A. Part 1 Site Information**

The requested information in this section refers to the location of the equipment to be registered.

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### **B. Part 2 Emission Source Description**

Describe the type of equipment that you are registering. For example, if a reactor vessel under a laboratory fume hood is to be registered, indicate that the equipment is a reactor vessel, briefly describe the reaction that takes place within the vessel, and specify the building or the site where it is located. Place checks in the appropriate boxes indicating whether or not the reactor vessel or the fume hood is equipped with an air contaminant control device and whether or not other equipment or activities emit air contaminants to the exhaust system associated with the fume hood.

### **C. Part 3 Emission Source Information**

You must complete Section 3(A) **and** either Section 3(B), (C), **or** (D).

**3(A) Distance to Nearest Property Line (m)** the distance entered in this block is the distance from the emission release point to the nearest property line.

**3(B), (C), or (D)** To determine whether you should complete Section 3(B), 3(C), or 3(D), you must first determine whether your equipment is considered a point source, area source, or volume source.

1. **Point source-** air contaminant is released through a single, small opening by a forced airflow. Examples include stacks, vents, and exhaust fans. If the equipment is best represented by this source description, complete Section 3(B).
2. **Area source-** air contaminant emits from a flat, broad surface area. Examples include floating roof storage tanks and equipment that releases air contaminants in a building that disperses to the atmosphere passively through several roof vents (air contaminant emits from the surface area of the roof). If the equipment is best represented by this source description, complete Section 3(C).
3. **Volume source-** air contaminant emits outward from a three dimensional object. Examples include fugitive emissions in a building with windows and no singular emissions point, or equipment that releases air contaminants within a building with windows and no singular emissions point. If the equipment is best represented by this source description, complete Section 3(D).

Each specific input for Sections 3(B), 3(C), or 3(D) is described in Table 1 on the back of the registration form and also in the registration examples in Section VI of this document.

### **D. Part 4 Air Contaminant Information**

**4(A) Air Contaminant**- Identify the name of each air contaminant that will be emitted from the equipment you are registering. If more space is needed, attach additional information to the registration form, and note on the registration form that additional information is attached.

**4(B) Maximum Daily Hours of Emissions**- Specify the maximum number of hours that the equipment will emit air contaminants in one day. This value is used to calculate the Maximum Emission Rate described below. Note that this value may be, but is not necessarily, the number of hours that the equipment operates.

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### 4(C) Maximum Emission Rate

1. **"lb/day"** The maximum emission rate for uncontrolled sources is measured at the outlet to the atmosphere. The maximum emission rate for controlled sources is measured at the inlet to the air contaminant control device.
2. **"Point, Area, or Volume (lb/hr) or (g/s)"** To obtain this value, divide the "lb/day" value from 4(C)(1) by the "Maximum Daily Hours of Emissions" reported in 4(B); the result is a "lb/hr" value. You may also use "g/s." Enter the emission rate in 4(C)(2).
3. **"Basis"** Examples of the basis used to determine the maximum emission rate may be stack tests, manufacturer's information, mass balance, volatile product used per day, AP-42 emission factors, etc. EPA AP-42 Emission Factors are available at the EPA website, <http://www.epa.gov/ttn/chief/ap42/>. Enter the "Basis" in Block 4(C)(3).
4. **"Total"** Enter the sum of all air contaminant emission rates **or** the largest emission rate the source will emit (lb/day) in Block 4(D).

### E. Part 5 Toxicological Data and Dispersion Model Results

This section is completed **only** if you are self-registering. The SCREEN3 program and the TLV/MDC spreadsheet must be completed before you can enter the values in Part 5 of the registration form.

Enter the maximum emission rate (Block 4(C)(2)) in the TLV/MDC spreadsheet.

- 5(A) Threshold Limit Value (TLV)**- For TLV, enter the 8-hour time-weighted average (TWA) value in mg/m<sup>3</sup> in Block 5(A) on the registration form and in the TLV/MDC spreadsheet. Units of ppm may be converted to mg/m<sup>3</sup> by using the following equation:

$$(X \text{ ppm} \times MW) / 24.45 = Y \text{ mg/m}^3$$

TLVs are published by the National Institute for Occupational Safety and Health (NIOSH) and the American Council of Governmental Industrial Hygienists (ACGIH). Publications can be obtained using the following contacts:

<b>NIOSH Publications</b>	<b>ACGIH</b>
Publication Name: "NIOSH Pocket Guide to Chemical Hazards" Order Publication No. 2005-151 CD-ROM version <a href="http://wwwn.cdc.gov/pubs/niosh.aspx">http://wwwn.cdc.gov/pubs/niosh.aspx</a> Telephone: (800) 232 4636 Email: <a href="mailto:cdcinfo@cdc.gov">cdcinfo@cdc.gov</a> Website Address: <a href="http://www.cdc.gov">www.cdc.gov</a>	Publication Name: "Threshold Limit Values (TLVs) and Biological Exposure Indices (BEIs)" Publications Department 1330 Kemper Meadow Drive Cincinnati, OH 45240-4148 Telephone: (513) 742 2020 FAX: (513) 742 3355 Email: <a href="mailto:acgih_pubs@pol.com">acgih_pubs@pol.com</a> Website Address: <a href="http://www.acgih.org">www.acgih.org</a>

Registrants are welcome to review the Department's copy of these publications at our Dover and New Castle offices. If a TLV has not been published for any air contaminant that is emitted from the equipment, please call the Air Quality Management Section for guidance.

- 5(B) Maximum Downwind Concentration (MDC)**- This value represents the maximum downwind concentration for a one-hour exposure period at ground level for each of the air contaminants identified in Part 4(A). This value is computed by SCREEN3. The results of the SCREEN3 model

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are expressed in micrograms per cubic meter, or  $\mu\text{g}/\text{m}^3$ . Enter the SCREEN3 output MDC in Block 5(B) and in the TLV/MDC spreadsheet.

**5(C) Adjusted Maximum Downwind Concentration or Adjusted MDC**- Prior to comparing the SCREEN3 output MDC to the TLV, the MDC is adjusted to represent an eight hour exposure concentration in milligrams per cubic meter, or  $\text{mg}/\text{m}^3$  (i.e., the same units and exposure duration as the TLV). Enter the 8-hr MDC value computed by the TLV/MDC spreadsheet in Block 5(C).

**5(D) TLV:MDC**- Enter the TLV/MDC ratio from the TLV/MDC spreadsheet in Block 5(D). All values in column 5(D) (TLV:MDC) must be greater than or equal to 100. If any value is less than 100, assistance from the Department is required prior to construction, installation, modification, and/or operation of the equipment. A Regulation 1102 permit may be required.

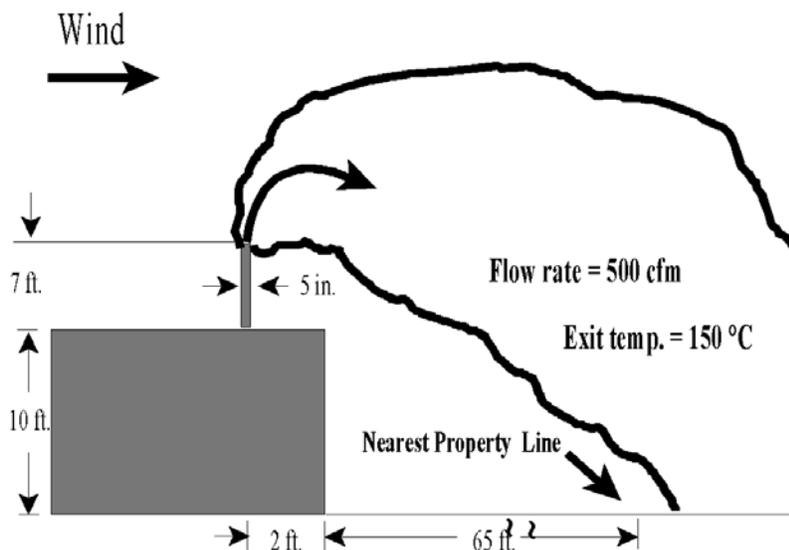
### F. Part 6 Conditions of Registration and Part 7 Certification

These sections are on the back of the form. They explain the conditions of registration and state the obligations of the registrant. Carefully read the requirements of Parts 6 and 7, and sign and date Part 7. If the Registrant's mailing address and phone number is different than the site address and phone number provided in Part 1, provide the registrant address and phone number in the space provided in Part 7. Send your completed registration form, SCREEN3 output, and TLV/MDC spreadsheet to the **Dover address** provided on the front of this document.

### VI. *Registration Examples (Please note the Windows 5.30 Version of SCREEN3 was used in the examples.)*

#### A. Point Source Example

A small research laboratory plans to operate a new reactor vessel under an existing fume hood exhaust system. The reactor vessel will emit small amounts of ammonia, acetonitrile, and acrylonitrile to the fume hood for a maximum of three hours a day. The owner of the research laboratory believes that this piece of equipment may not need an air emissions permit and may be eligible for DNREC's Air Contaminant Equipment Registration.



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### Step One: Emissions Estimation

From a mass balance of the reactants and products of the chemical reaction to take place inside the reactor vessel, a maximum of 2.4 lb/day each of ammonia, acetonitrile, and acrylonitrile will be emitted. Total combined daily emissions are estimated to be 7.2 lb/day.

### Step Two: Registration Eligibility

Once the emissions are estimated, the owner/operator uses this information to determine whether all of the registration eligibility criteria in Section 2.1(a), Regulation 1102 (Permits) of Delaware's "**Regulations Governing the Control of Air Pollution**" are met. Below is a check list of registration eligibility criteria evaluated by the owner/operator:

- ✓ The emissions from the equipment do not trigger any requirements specified in Regulation 1125 (Minor New Source Review, Requirements for Pre-construction Review) of Delaware's "**Regulations Governing the Control of Air Pollution**."
- ✓ No Federal and/or State emission limitation or standard requires the reactor vessel to be equipped with an air contaminant control device.
- ✓ Total combined air emissions are greater than or equal to 0.2 lb/day but less than 10 lb/day (maximum daily emissions are estimated to be about 7.2 lb/day).

All three of the above registration eligibility criteria are met. The owner/operator of the equipment may begin the registration process.

### Step Three: Site Information and Source Description

The owner/operator of the equipment next completes Part 1, "Site Information" and Part 2, "Emission Source Description" of the DNREC Air Contaminant Equipment Registration Form following the instructions provided in sections V(A) and V(B) of this document.

### Step Four: Source Type

The registrant must determine whether the emissions from the equipment are best represented as a point source, area source, or volume source as described in Section V(C) of this document. Because the equipment will emit air contaminants to a fume hood equipped with an exhaust fan that directs fumes to a *single stack* on the roof of the building, the emissions are best represented as a point source. Parts 3(A) and 3(B) of the registration form must be completed.

### Step Five: Emission Source Information

The information required in Parts 3(A) and 3(B) include the location of the nearest property line, the stack's dimensions, the stack exit flow rate or velocity, and the stack exit temperature. All of these parameters are shown in Table A.1.

The exhaust fan's flow rate of 500 cubic feet per minute (cfm) is provided by the manufacturer and used for the stack exit flow rate. The exit temperature of these contaminants is determined to be 150°C from the reaction specifications that will occur within the reactor vessel.

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**Table A.1 Data to be Entered in Part 3, "Emission Source Information" of the Registration Form**

<b>PART 3 EMISSION SOURCE INFORMATION</b>	<b>INPUT</b>
Distance to nearest property line <i>(Block 3(a))</i>	67 ft
Stack Height <i>(Block 3(B)(1))</i>	17 ft
Stack Inside Diameter <i>(Block 3(B)(2))</i>	5 in/(12 in/ft)= 0.42 ft
Stack Exit Flow Rate or Velocity <i>(Block 3(B)(3))</i>	500 CFM (Circle "ACFM" on Registration Form)
Stack Exit Temperature <i>(Block 3(B)(4))</i>	150°C + 273.15= 423.15°K

### Step Six: Air Contaminant Information

Part 4, "Air Contaminant Information" identifies the contaminants and the rate at which they are emitted. Table A.2 presents the data required in Part 4 for ammonia, acetonitrile, and acrylonitrile. In this problem, the maximum emission rates for these three chemicals will be the same.

**Table A.2 Data to be Entered in Part 4, "Air Contaminant Information" of the Registration Form**

<b>Part 4 Air Contaminant Information</b>	<b>Calculations</b>	<b>Input</b>
Maximum daily hours of emissions <i>(Block 4(B))</i>	N/A	3 hr/day
Lb/day <i>(Block 4(C)(1))</i>	N/A	2.4 lb/day
Lb/hr <i>(Block 4(C)(2))</i>	$(2.4 \text{ lb/day}) / (3 \text{ hr/day})$	0.80 lb/hr (Circle "lb/hr" on Registration Form)
Basis <i>(Block 4(C)(3))</i>	N/A	Mass balance of reactants and products
Lb/day Total <i>(Block 4(D))</i>	$2.4 \text{ lb/day} \times 3$	7.2 lb/day

### Step Seven (and Final Step if registering with Department assistance): Sign and date back of form

If the registrant is registering with Department assistance, the final step will be to sign and date the back of the registration form and mail the form to the **Dover address** on the front of this document. The owner or the research laboratory is then required to wait for Department approval prior to installing and operating the reactor vessel.

### Step Seven (if self-registering): Run SCREEN3 air dispersion model

The owner of the research laboratory uses the data entered in Parts 3 and 4 of the registration form to run the SCREEN3 air dispersion model. Table A.3 below presents the series of inputs requested by the SCREEN3 air dispersion model for the point source example. The block designation for the registration form is also shown. (Please note that only the listed parameters should be entered in the Options and Source SCREEN3 Tabs.)

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**Table A.3 Input parameters to the SCREEN3 air dispersion model in the point source example**

SCREEN3 Tab	Parameter	Input
Options	Choose urban option	urban
	Enter source type	point
Source	Enter emission rate (lb/hr)	0.80 lb/hr
	Enter stack height (ft)	17 ft
	Enter stack inside diameter (ft)	0.42 ft
	Enter stack gas exit flow rate (3 options)	500 cfm
	Enter stack exit temperature (°K)	423.15°K

### Step Eight: Complete Part 5, "Toxicological Data and Dispersion Model Results"

When all of the data in Table A.3 is entered into the SCREEN3 program, the model will compute the maximum downwind concentration (MDC) in micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ) (1-hour conc.) and the distance to the MDC. Print the "output text" in the SCREEN3 program. The one-hour value is entered in Block 5(B) of the registration form and in the TLV/MDC spreadsheet. The distance (m) to the maximum downwind concentration is entered in the TLV/MDC spreadsheet.

The registrant must identify the time-weighted average TLV (or TWA) of each emitted contaminant from an ACGIH or NIOSH publication, and these values are entered in Block 5(A) of the registration form and in the TLV/MDC spreadsheet.

In this example, the MDC is identical for each contaminant because the emission rates are assumed to be the same. The adjusted 8-hr MDC ( $\text{mg}/\text{m}^3$ ) and the TLV/MDC values from the TLV/MDC spreadsheet are entered in Blocks 5(C) and 5(D) respectively.

**Table A.4 Data to be Entered in Part 5 (Toxicological Data and Dispersion Model Results of the Registration Form by the Research Laboratory:**

Air Contaminant (Block 4(A))	TLV (TWA) $\text{mg}/\text{m}^3$ (8-hr) (Block 5(A))	MDC $\mu\text{g}/\text{m}^3$ (1-hr) (Block 5(B))	Adjusted MDC $\text{mg}/\text{m}^3$ (8-hr) (Block 5(C))	TLV:MDC (Block 5(D))
Ammonia	17	148.16	0.1037	164
Acetonitrile	34	148.16	0.1037	328
Acrylonitrile	4.3	148.16	0.1037	41

The TLV:MDC for acrylonitrile is less than 100. This example does not demonstrate that the emissions will not adversely affect the public's health, welfare, and safety. For this reason, assistance from the Department is required prior to installation and operation of this piece of equipment. A Regulation 1102 permit may be required.

### B. Area Source Example

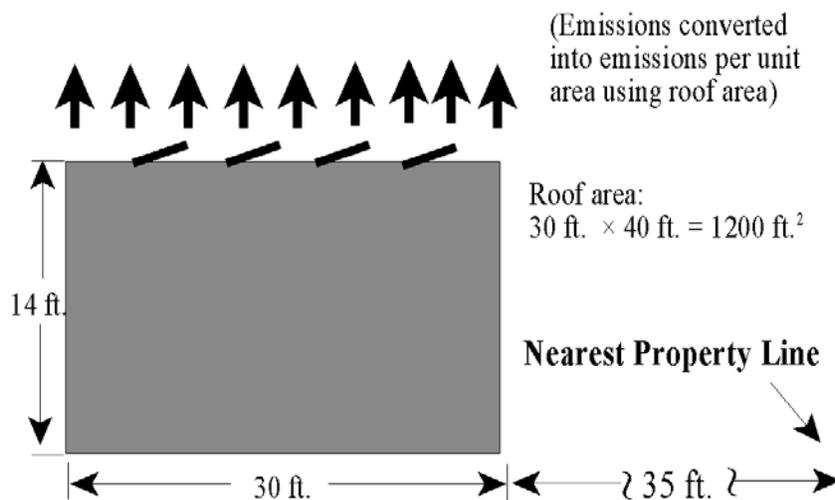
A food packaging manufacturer is proposing to move into an existing building where they intend to install and operate one food packaging manufacturing line. The food manufacturing line will emit small amounts of methyl ethyl ketone (MEK) and toluene. The owner/operator evaluates the emissions from this piece of equipment to determine whether it requires an air emissions permit, an air contaminant equipment registration, or if it is exempt from the requirements of Regulation 1102.

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The food packaging manufacturing line does not have a specific emissions point out of the building. The building that will house the equipment does not have windows but does have a series of skylights on the roof that ventilate the surface area of the roof. The building is 40 feet long, 30 feet wide, and 14 feet tall. The nearest property line to the building is 35 feet away. This information is summarized in Figure B.1.



**Figure B.1 Illustration of methyl ethyl ketone and toluene emissions from the food packaging manufacturing line operated in a building ventilated by a series of skylights.**

### Step One: Emissions Estimation

Based on the maximum amount of volatile product to be used in this process equipment in one day, the Company has estimated that the maximum emission rates of methyl ethyl ketone (MEK) and toluene are 7 lb/day and 1.5 lb/day, respectively. The emissions will occur during the 4 hours that the equipment will operate each day. Total maximum daily emissions of air contaminants are estimated to be 8.5 lb/day.

### Step Two: Registration Eligibility

Once the emissions are estimated, the owner/operator must use this information to determine whether all registration eligibility criteria in Section 2.1(a) Regulation 1102 (Permits) of Delaware's "**Regulation Governing the Control of Air Pollution**" are met. Below is the checklist of registration eligibility criteria evaluated by the owner/operator:

- ✓ The emissions do not trigger any requirements specified in Regulation 1125 (Minor New Source Review, Requirements for Pre-construction Review) of Delaware's "**Regulation Governing the Control of Air Pollution.**"
- ✓ No Federal and/or State emission limitation or standard requires the food packaging manufacturing line to be equipped with an air contaminant control device.
- ✓ Total combined air emissions are greater than or equal to 0.2 lb/day and less than 10 lb/day (maximum daily emissions are estimated to be 8.5 lb/day).

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### Step Three: Site Information and Source Description

The owner/operator of the equipment next completes Part 1, "Site Information" and Part 2, "Emission Source Description" of the DNREC Air Contaminant Equipment Registration Form following the instructions provided in Section V of this document.

### Step Four: Determination of Emission Source Type

The registrant must determine whether the emissions from the equipment are best represented as a point source, area source, or volume source as described in Section V(C) of this document. Because the emissions are ventilated through a series of skylights of the roof, the emissions are best represented as an area source (roof area). Parts 3(A) and (C) of the registration form must be completed.

### Step Five: Emission Source Information

The distance to the nearest property line, Part 3(A), is given in the problem description as 35 ft. Part 3(C) requires the source height and the lengths of larger and smaller sides of the source. The source height refers to the air contaminant release height. Because the air contaminants are released from the roof, the source height is equivalent to the height of the building. The lengths of the larger and smaller sides of the source are required to obtain the total surface area of the emissions. These dimensions refer to the roof area or length and width of the building which are given as 40 ft. and 30 ft., respectively. Table B.1 presents the information requested in Part 3.

**Table B.1 Data to be Entered in Part 3, "Emission Source Information" of the Registration Form**

Part 3 Emission Source Information	Entry
Distance to nearest property line <i>(Block 3(A))</i>	35 ft
Source release height <i>(Block 3(C)(1))</i>	14 ft
Length of longer side <i>(Block 3(C)(2))</i>	40 ft
Length of shorter side <i>(Block 3(C)(3))</i>	30 ft

### Step Six: Air Contaminant Information

Part 4, "Air Contaminant Information" identifies the contaminants to be emitted from the equipment and the rate at which they are to be emitted. Table B.2 presents the data to be entered in Part 4 of the registration form for methyl ethyl ketone (MEK) and toluene.

**Table B.2 Input to be Entered in Part 4, "Air Contaminant Information" of the Registration Form**

Part 4 Air Contaminant Information	Calculations	Input
Maximum Daily Hours of Emissions <i>(Block 4(B))</i>	N/A	4 hr/day
lb/day <i>(Block 4(C)(1))</i>	MEK	7.0 lb/day
	Toluene	1.5 lb/day
lb/hr <i>(Block 4(C)(2))</i>	MEK	$(7.0 \text{ lb/day}) / (4 \text{ hr/day})$ 1.75 lb/hr (Circle "lb/hr" on Registration Form)
	Toluene	$(1.5 \text{ lb/day}) / (4 \text{ hr/day})$ 0.375 lb/hr
lb/day Total <i>(Block 4(D))</i>	$(7.0 + 1.5) \text{ lb/day}$	8.5 lb/day
Basis <i>(Block 4(C)(3))</i>	N/A	Amount of volatile product used

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### Step Seven (and Final Step if registering with Department assistance): Sign and date back of form.

If the registrant is registering with Department assistance, the final step will be to sign and date the back of the registration form and mail the form to the **Dover address** on the front of this document. The owner of the food packaging manufacturing line is required to wait for Department approval prior to installing and operating this piece of equipment.

### Step Seven (if self-registering): Run SCREEN3 air dispersion model.

The owner of the food packaging manufacturer line uses the data entered in Parts 3 and 4 of the registration form to run the SCREEN3 air dispersion model. Tables B.3 and B.4 below present the series of inputs requested by the SCREEN3 air dispersion model for the area source example. Because methyl ethyl ketone (MEK) and toluene are emitted at different rates, two separate SCREEN3 air dispersion model runs are necessary to compute the corresponding maximum downwind concentrations. (Please note that only the listed parameters should be entered in the Options and Source SCREEN3 Tabs.)

**Table B.3 Input parameters to the SCREEN3 air dispersion model in the area source example for methyl ethyl ketone (MEK).**

SCREEN3 Tab	Parameter	Input
Options	Choose urban option	urban
	Enter source type	area
Source	Enter emission rate	1.75 lb/hr
	Enter source release height	14 ft
	Enter longer side length	40 ft
	Enter shorter side length	30 ft

**Table B.4 Input parameters to the SCREEN3 air dispersion model in the area source example for toluene.**

SCREEN3 Tab	Parameter	Input
Options	Choose urban option	urban
	Enter source type	area
Source	Enter emission rate	0.375 lb/hr

All other input parameters for toluene are identical to the remaining input parameters shown for methyl ethyl ketone in Table B.3.

### Step Eight: Complete Part 5, "Toxicological Data and Dispersion Model Results"

When all of the data in Tables B.3 and B.4 are entered into the SCREEN3 model, the model will compute the maximum downwind concentration (MDC) in micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ) (1-hour conc.) and the distance to the MDC. Print the "output text" in the SCREEN3 program. The one-hour value is entered in Block 5(B) of the registration form and in the TLV/MDC spreadsheet. The distance (m) to the maximum downwind concentration is entered in the TLV/MDC spreadsheet.

The registrant must identify the time-weighted average TLV (or TWA) of each emitted contaminant from an ACGIH or NIOSH publication, and these values are entered in Block 5(A) of the registration form and in the TLV/MDC spreadsheet.

The adjusted 8-hr MDC ( $\text{mg}/\text{m}^3$ ) and the TLV/MDC values from the TLV/MDC spreadsheet are entered in Blocks 5(C) and 5(D) respectively. This information is summarized in Table B.5 below:

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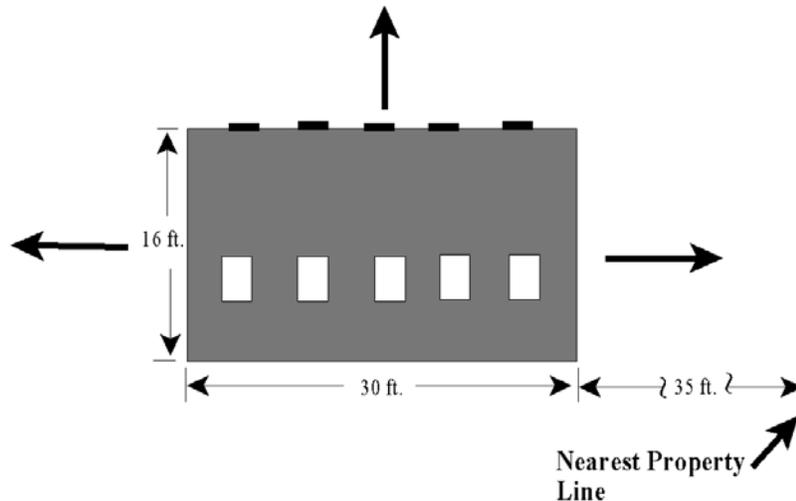
**Table B.5 Data to be entered in Part 5 (Toxicological Data and Dispersion Model Results) of the Registration Form:**

Air Contaminant (Block 4(A))	TLV (TWA) mg/m <sup>3</sup> (8-hr) (Block 5(A))	MDC µg/m <sup>3</sup> (1-hr) (Block 5(B))	Adjusted MDC mg/m <sup>3</sup> (8-hr) (Block 5(C))	TLV:MDC (Block 5(D))
Methyl Ethyl Ketone	590	1884.56	1.3192	447
Toluene	75	404.26	0.2830	265

The values in the final column of the above table are all above 100 and satisfy the Department's criteria that the public's health, safety, and welfare will not be adversely affected. Submit the completed Registration Form and TLV/MDC spreadsheet to DNREC. The Company is permitted to install and operate the food package manufacturing line.

### C. Volume Source Example

A facility proposes to recycle aerosol cans. As part of the process, they plan to purchase and operate an aerosol can puncturing machine inside one of their buildings on site. The emissions from the equipment do not have a single emissions point. Emissions are released from the building from windows and roof vents. Building dimensions are 30 ft x 40 ft x 16 ft. Chemicals in the aerosol cans to be recycled at this facility include: ethyl benzene and methyl isobutyl ketone. The nearest property line to the building is 35 ft away. This information is illustrated below in Figure C.1.



**Figure C.1 Illustration of emissions from the aerosol can puncturing machine operated within a building with no single emission point (volume source).**

#### Step One: Emissions Estimation

Ethylbenzene, and methyl isobutyl ketone are each conservatively assumed to be emitted at the maximum combined rate of 4.125 lb/day. Total combined daily emissions are estimated to be 4.125 lb/day.

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### Step Two: Registration Eligibility

Once the emissions are estimated, the owner/operator must use this information to determine whether all registration eligibility criteria in Section 2.1(a) Regulation 1102 (Permits) of Delaware's "**Regulation Governing the Control of Air Pollution**" are met. Below is the checklist of registration eligibility criteria evaluated by the owner/operator:

- ✓ The emissions do not trigger any requirements specified in Regulation 1125 (Minor New Source Review, Requirements for Pre-construction Review) of Delaware's "**Regulation Governing the Control of Air Pollution.**"
- ✓ No Federal and/or State emission limitation or standard requires the aerosol can puncturing machine to be equipped with an air contaminant control device.
- ✓ Total combined air emissions are greater than or equal to 0.2 lb/day and less than 10 lb/day (maximum daily emissions are estimated to be 4.125 lb/day).

### Step Three: Site Information and Source Description

The owner/operator of the equipment next completes Part 1, "Site Information" and Part 2, "Emission Source Description" of the DNREC Air Contaminant Equipment Registration Form following the instructions provided in Section V of this document.

### Step Four: Determination of Emission Source Type

The registrant must determine whether the emissions from the equipment are best represented as a point source, area source, or volume source as described in Section V(C) of this document. Because the emissions are ventilated through windows and roof vents throughout the building, the emissions are best represented as a volume source emitting from the building in three dimensions as described in Section V(C) of this document. Parts 3(A) and (D) of the registration form must be completed.

### Step Five: Emission Source Information

The distance to the nearest property line, Part 3(A), is given in the problem description as 35 ft. The release height in Part 3(D) is half of the source height, and the initial horizontal and vertical dimensions are computed by using the formulas supplied in Table C.1 (also found on the back of the registration form). Table C.1 below presents the data that will be entered into Part 3 of the registration form for the aerosol can puncturing machine.

**Table C.1 Computed Values to be Entered in Part 3, "Emission Source Information" of the Registration Form.**

Part 3 Emission Source Information	Calculations	Entry
Distance to nearest property line ( <i>Block 3(A)</i> )	N/A	35 ft
Release height ( <i>Block 3(D)(1)</i> )	$\frac{1}{2}$ (16 ft)	8 ft
Initial horizontal dimension <sup>1</sup> ( <i>Block 3(D)(2)</i> )	30 ft/4.3	7.0 ft
Initial vertical dimension <sup>2</sup> ( <i>Block 3(D)(3)</i> )	16 ft/2.15	7.4 ft

1 The 4.3 constant adjusts the concentrations to represent dispersion beyond the building (or volume) width. SCREEN3 is unable to compute concentrations within the building (or volume) being modeled.

2 The 2.15 constant adjusts the concentrations to represent dispersion beyond the building (or volume) height considering that dispersion cannot occur through the surface of the ground (one-

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half of the 4.3 constant). SCREEN3 is unable to compute concentrations within the building (or volume) being modeled.

### Step Six: Air Contaminant Information

Part 4, "Air Contaminant Information" identifies the contaminants to be emitted from the equipment and the rate at which they are to be emitted. Table C.2 presents the data that is to be entered into Part 4 of the registration form for ethylbenzene, and methyl isobutyl ketone.

**Table C.2 Input to be Entered in Part 4, "Air Contaminant Information" of the Registration Form.**

Part 4 Air Contaminant Information	Calculations	Input
Maximum daily hours of emissions ( <i>Block 4(B)</i> )	N/A	12 hr/day
Lb/day ( <i>Block 4(C)(1)</i> )	N/A	4.125 lb/day
Lb/hr ( <i>Block 4(C)(2)</i> )	$(4.125 \text{ lb/day}) / (12 \text{ hr/day})$	0.34 lb/hr (Circle "lb/hr" on Registration Form)
Basis ( <i>Block 4(C)(3)</i> )	N/A	Amount of volatile product remaining in cans
Lb/day Total ( <i>Block 4(D)</i> )	N/A	4.125 lb/day

### Step Seven (and Final Step if registering with Department assistance): Sign and date back of form.

If the registrant is registering with Department assistance, the final step will be to sign and date the back of the registration form and mail the form to the **Dover address** on the front of this document. The owner of the aerosol can puncturing machine is required to wait for Department approval prior to installing and operating this piece of equipment.

### Step Seven (if self-registering): Run SCREEN3 air dispersion model.

The owner of the aerosol can puncturing machine uses the data entered in Parts 3 and 5 of the registration form to run the SCREEN3 air dispersion model. Table C.3 below presents the series of inputs requested by the SCREEN3 air dispersion model for the volume source example. Because ethylbenzene and methyl isobutyl ketone are each conservatively assumed to be emitted at the maximum combined rate, only one SCREEN3 air dispersion model run is necessary to compute the corresponding maximum downwind concentration. (Please note that only the listed parameters should be entered in the Options and Source SCREEN3 Tabs.)

**Table C.3 Input parameters to the SCREEN3 air dispersion model in the volume source example for ethylbenzene, and methyl isobutyl ketone.**

SCREEN3 Tab	Parameter	Input
Options	Choose urban or rural option	urban
	Enter source type	volume
Source	Enter emission rate	0.34 lb/hr
	Enter source release height	8 ft
	Enter initial horizontal dim.	7.0 ft
	Enter initial vertical dim.	7.4 ft

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### Step Eight: Complete Part 5, "Toxicological Data and Dispersion Model Results"

When all of the data in Table C.3 are entered into the SCREEN3 model, the program will compute the maximum downwind concentration (MDC) in micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ) (1-hour conc.) and the distance to the MDC. Print the "output text" in the SCREEN3 program. The one-hour value is entered in Block 5(B) of the registration form and in the TLV/MDC spreadsheet. The distance (m) to the maximum downwind concentration is entered in the TLV/MDC spreadsheet.

The registrant must identify the time-weighted average TLV (or TWA) of each emitted contaminant from an ACGIH or NIOSH publication, and these values are entered in Block 5(A) of the registration form and in the TLV/MDC spreadsheet.

The adjusted 8-hr MDC ( $\text{mg}/\text{m}^3$ ) and the TLV/MDC values from the TLV/MDC spreadsheet are entered in Blocks 5(C) and 5(D) respectively. This information is summarized in Table C.4 below:

**Table C.4 Data to be entered in Part 5 (Toxicological Data and Dispersion Model Results) of the Registration Form:**

Air Contaminant (Block 4(A))	TLV (TWA) $\text{mg}/\text{m}^3$ (8-hr) (Block 5(A))	MDC $\mu\text{g}/\text{m}^3$ (1-hr) (Block 5(B))	Adjusted MDC $\text{mg}/\text{m}^3$ (8-hr) (Block 5(C))	TLV:MDC (Block 5(D))
Ethylbenzene	434	1202.70	0.8419	516
Methyl Isobutyl Ketone	205	1202.70	0.8419	243

The values in the final column of the above table are above 100 and satisfy the Department's criteria that the public's health, safety, and welfare will not be adversely affected. Submit the completed Registration Form and TLV/MDC spreadsheet to DNREC. The Company is permitted to install and operate the aerosol can puncturing machine.