

Delaware Department of Natural Resources and
Environmental Control

Air Contaminant Equipment Registration Form Instruction Booklet

*How to Register a Piece of Equipment Under
Regulation No. 2,
Section 2.1(a) and Section 9*

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**Delaware DNREC
Division of Air and Waste Management
Air Quality Management Section**

**715 Grantham Lane
New Castle, DE 19720
(302) 323-4542**

**Priscilla Building
156 S. State Street
Dover, DE 19901
(302) 739-4791**

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I. Introduction

The Air Contaminant Equipment Registration procedure described in this booklet was developed in response to recommendations from the 1994 Governor's Permitting Reform Task Force. It is established in Regulation No. 2 (Permits) of Delaware's "**Regulations Governing the Control of Air Pollution**," effective June 1, 1997.

The registration procedure replaces the Air Quality Management Section's previous exemption procedure. 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 booklet 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) 739-4791 in Dover for assistance.

II. Am I Eligible to Register?

The eligibility criteria for registration is stated in Regulation No. 2, 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. 25 (Requirements for Preconstruction 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.

Note that the presence of an air contaminant control device does not, in itself, prevent registration eligibility. The equipment may still be eligible for registration as long as the control device is not required to meet State and/or

Federal emission limitations and standards ("applicable requirements").

3. The equipment emits greater than or equal to 0.2 lb/day¹ and less than 10 lb/day² of total combined air contaminants, each and every day, to the atmosphere *before controls*.

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 the 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 first computing the maximum downwind concentration (MDC) of each air contaminant to be emitted using a computer program, and then comparing each concentration to available toxicological data (threshold limit values (TLVs)) for the air contaminant in question.

Examples on running the computer program and instructions on obtaining toxicological data are provided in Section VI and Section V of this booklet.

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 No.25 (Requirements for Preconstruction Review), then the equipment is exempt from the Regulation No. 2 registration and permit process (see Section 2.2 (a) and (b) of Reg. No.2).

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. No.2).

A demonstration that public health, safety, and welfare is not adversely affected is shown when the published TLV of each released air contaminant is at least 100 times greater than the computed MDC at the nearest property line and beyond.

A. Should I Self-Register?

1. Advantage:

Self-registration is quick. As soon as you complete and submit the registration form to the Department and all of the eligibility criteria have been met, construction, installation, modification, and/or operation of the equipment may begin.

2. Disadvantage:

You must fill out 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:

- an IBM-compatible personal computer with at least 265K of RAM (a math coprocessor chip is not required),
- the ability to accurately perform mathematical computations,
- the ability to execute the SCREEN air dispersion model program, and
- toxicological data on each identified contaminant to be emitted.

Details on how to obtain a copy of the SCREEN air dispersion model and toxicological data are described in Section IV and Section V(E). Examples of running the SCREEN model are provided in Section VI.

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

1. Advantages:

The registrant:

- does not have to apply any air dispersion model,
- does not have to obtain toxicological data (although the registrant will still be required to identify the air contaminants to be emitted and their

- emission rates), and
- does not have to 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.

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

Note: In order to expedite registration under this option, make sure the registration form is complete and accurate.

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. A copy of the EPA SCREEN air dispersion model and user's guide,
4. Toxicological data (i.e., threshold limit values or TLVs) on each identified air contaminant to be emitted.

Items 1-3 above are available at either of the Air Quality Management Section's offices (locations are provided on the front of this booklet) or at the DNREC website, <http://www.dnrec.state.de.us/>, by first selecting "Division of Air & Waste Management" and then "Air Quality Management." Instructions on how to obtain Item 4, TLVs, are discussed on page 9 of this booklet.

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. 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 must be entered on the registration form in metric units, as required by the EPA SCREEN air dispersion model. A conversion table to convert English units to metric units is provided below.

Table V.1 Conversion of English units to metric units.

UNITS	CONVERSIONS
lb/hr	lb/hr × 0.126
feet ↓ meters	feet × 0.3048
ft ² ↓ m ²	ft ² × 0.0929
inches ↓ meters	inches × 0.0254
in ² ↓ m ²	in ² × 0.00065
ft/s ↓ m/s	ft/s × 0.3048
ft ³ /s ↓ m ³ /s	ft ³ /s × 0.028317
°F ↓ °K	[(°F-32)5/9] + 273.15
°C ↓ °K	°C + 273.15

A. PART 1 Site Information

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

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 on 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 emissions release point to the nearest property line.

3(B), (C), or (D)

To determine whether you are to 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.

- Point source** - air contaminant is released through a single, small opening. Examples include stacks, vents, and exhaust fans. If the equipment is best represented by this source description, complete Section 3(B).
- Area source** - air contaminant emanates 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 emanates from the surface area of the roof). If the equipment is best represented by this source description, complete Section 3(C).
- Volume source** - air contaminant radiates 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

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 to be used in computing the Maximum Emission Rate described below. Note that this value may be, but is not necessarily, the number of hours that the equipment operates.

4(C) Maximum Emission Rate -

- (1) **“lb/day”** Acceptable methods for determining maximum emission rates of air contaminants include actual measurements, calculated values obtained by using EPA’s Air Pollution Emission Factors (commonly referred to as “AP-42 Emission Factors”), values based on the maximum amount of volatile product used in a day from information on product labels or material safety data sheets (MSDS), and manufacturer’s information. Check with the Department prior to using any other quantification method.

EPA AP-42 Emission Factors are available at the EPA website, <http://www.epa.gov/ttn/chief/ap42etc.html>.

- (2) **“Point (g/s), Area (g/s-m²), or Volume (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. Convert the “lb/hr” value to “g/s” with the conversion provided in Table V.1 on page 6.

For point and volume sources, the “g/s” value is to be entered into 4(C)(2). For area sources, the “g/s” value must be divided by the area of the source (3(C)(2) × 3(C)(3)) to obtain an emissions rate per unit area or “g/s-m²,” which is to be entered into 4(C)(2). See Section VI, “Registration Examples” for more detail.

- (3) **“Basis”** Be sure to provide the basis for the maximum emission rate reported in Block 4(C)(1). For example, if the amount of volatile

product used in a day was used to determine the maximum emission rate, write "Volatile Product Used/Day" in Block 4(C)(3).

E. PART 5 Toxicological Data and Dispersion Model Results

This section is to be completed **only** if you are self-registering.

- 5(A) **Threshold Limit Value (TLV)** - For TLV, enter the TWA or time-weighted average value. The TWA represents safe concentrations for human exposure over an eight-hour day, 40-hour work week.

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 by writing or calling:

NIOSH Publications	ACGIH
4676 Columbia Parkway Mail Stop C-13 Cincinnati, OH 45226	Publications Department 1330 Kemper Meadow Drive Cincinnati, OH 45240-1634
Telephone: (800)-35-NIOSH	Telephone: (513) 742-2020
Fax: (513) 533-8573	Fax: (513) 742-3355
E-mail: pubstaf@cdc.gov	E-mail: acgih_pubs@pol.com
Website Address: http://www.cdc.gov/homepage.html	Website Address: http://www.acgih.org
Publication Name: "NIOSH Pocket Guide to Chemical Hazards"	Publication Name: "Threshold Limit Values (TLVs) and Biological Exposure Indices (BEIs)"

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 to be released 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 the SCREEN model. The results of the SCREEN model are expressed in *micrograms* per cubic meter, or $\mu\text{g}/\text{m}^3$. Enter the SCREEN output MDC in Block 5(B).
- 5(C) **Adjusted Maximum Downwind Concentration or Adjusted MDC** - Prior to comparing the SCREEN output MDC to the TLV, the MDC must be adjusted to represent an eight-hour exposure concentration in *milligrams* per cubic meter, or mg/m^3 (i.e., the same units and exposure duration as the TLV). To make this adjustment, multiply the SCREEN output MDC in Block 5(B) by 0.0007 and enter the result in Block 5(C).
- 5(D) **TLV:Adjusted MDC** - Divide the TLV in Block 5(A) by the adjusted MDC in Block 5(C). Enter the result in Block 5(D).

All values in column 5(D) (TLV:Adjusted MDC) must be greater than or equal to 100. If any value is less than 100, a Regulation No. 2 permit is required prior to construction, installation, modification, and/or operation of the equipment.

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 to the **Dover address** provided on the front of this booklet.

VI. *Registration 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.

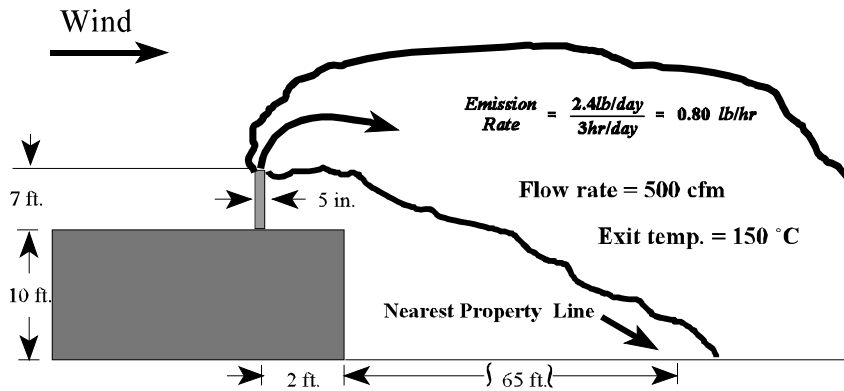


Figure A.1 Illustration of research laboratory air emissions.

Step One: Emissions Estimation

From a mass balance of the reactants and products of the chemical reaction to take place inside the reactor vessel, it is determined that 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 the registration eligibility criteria in Section 2.1(a), Regulation No. 2 (Permits) of Delaware's "Regulations Governing the Control of Air Pollution" are met. Below is the check list of registration eligibility criteria evaluated by the owner/operator:

- ✓ The emissions from the equipment do not trigger any requirements specified in Regulation No. 25 (Requirements for Preconstruction 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 and 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 booklet.

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 booklet. 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 illustrated in Figure 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.

Conversion of these values to metric units is shown in Table A.1. Formulas

to convert English units to metric units are provided in Table V.1 on page 6 of this booklet.

Table A.1 Unit Conversions of the Data to be Entered in Part 3, “Emission Source Information” of the Registration Form.

PART 3 EMISSION SOURCE INFORMATION	CONVERSION
Distance to nearest property line (Block 4(A))	67 ft × 0.3048 m/ft = 20.4 m
Stack Height (Block 4(B)(1))	17 ft × 0.3048 m/ft = 5.18 m
Stack Inside Diameter (Block 4(B)(2))	5 in × 0.0254 m/in = 0.127 m
Stack Exit Flow Rate or Velocity (Block 4(B)(3))	500 CFM (Enter as 500 with “ACFM” circled)
Stack Exit Temperature (Block 4(B)(4))	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 to be emitted. Table A.2 presents the data required in Part 4 and its conversion to metric units for ammonia, acetonitrile, and acrylonitrile. In this problem, the maximum emission rates for these three chemicals will be the same.

Table A.2 Unit Conversions and Input to be Entered in Part 4, “Air Contaminant Information” of the Registration Form.

Part 4 Air Contaminant Information	Conversion	Input
Maximum Daily Hours of Emissions (Block 4(B))	NA	3 hr/day
Maximum Emission Rate	lb/day (Block 4(C)(1))	NA
	g/s (Block 4(C)(2))	(1) Convert lb/day → lb/hr: $\frac{\text{lb/day}}{\text{hr/day}} = \frac{2.4 \text{ lb/day}}{3 \text{ hr/day}} = 0.80 \text{ lb/hr}$ (2) Convert lb/hr → g/s: $0.80 \text{ lb/hr} \times 0.126 \frac{\text{g/s}}{\text{lb/hr}} = 0.101 \text{ g/s}$
	Basis (Block 4(C)(3))	Mass balance of reactants and products

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 booklet. The owner of the research laboratory is required to wait for Department approval prior to installing and operating the reactor vessel.

Step Seven (if self-registering): Run SCREEN 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 EPA SCREEN air dispersion model. Table A.3 below presents the series of inputs requested by the SCREEN air dispersion model for the point source example.

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

Parameter	Input
Enter title	FumeP
Enter source type	p (for point)
Enter emission rate (g/s)	0.101 g/s (Block 4(C)(2))
Enter stack height (m)	5.18 m (Block 3(B)(1))
Enter stack inside diameter (m)	0.127 m (Block 3(B)(2))
Enter stack gas exit flow rate (3 options)	vf=500 cfm (Block 3(B)(3)) with ACFM units circled)
Enter stack exit temperature (°K)	423.15°K (Block 3(B)(4))
Enter ambient air temperature	293°K (default)
Enter receptor height	0 m (default)
Enter rural or urban option	r (for rural) (default)
Consider building downwash?	n (for no) (default)
Use complex terrain...?	n (for no) (default)
Use simple terrain with terrain above stack base?	n (for no) (default)

Parameter	Input
Enter choice of meteorology	1 (for full meteorology) (default)
Use automated distance array?	y (for yes) (default)
Enter min. and max. distances (in meters)	20.4, 5000 (Use distance to the nearest property line (Block 3(A)) for min. distance and 5000 m for max. distance)
Use discrete distances?	n (for no) (default)

Step Eight: Complete Part 5, “Toxicological Data and Dispersion Model Results”

When all of the data in Table A.3 is entered into the SCREEN model, the model will compute downwind concentrations of air emissions at incremental distances. The maximum downwind concentration (MDC) will be provided at the end of the SCREEN output in micrograms per cubic meter ($\mu\text{g}/\text{m}^3$). This value is entered in Block 5(B) of the registration form.

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

In this example the MDC is identical for each contaminant because the emission rates are assumed to be the same. The MDC for each contaminant is adjusted to represent the same exposure duration and units as the TLV by multiplying the SCREEN computed MDC in Block 5(B) by 0.0007 and entering the result in Block 5(C). The TLV (Block 5(A)) is divided by the adjusted MDC (Block 5(C)), and the result is entered in Block 5(D). This information is summarized in Table A.4 below.

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), mg/m ³ (Block 5(A))	MDC, µg/m ³ (Block 5(B))	Adjusted MDC (units and exposure duration) MDC × 0.0007 (Block 5(C))	TLV: Adjusted MDC (TLV divided by Adjusted MDC) (Block 5(D))
Ammonia	17	97.12	0.0680	250
Acetonitrile	67	97.12	0.0680	985
Acrylonitrile	4.3	97.12	0.0680	63

The TLV:Adjusted MDC for acrylonitrile is less than 100. This example does not meet the demonstration requirements that show the emissions will not adversely affect the public’s health, welfare, and safety. For this reason, *this equipment may not be registered*. The owner or operator of the equipment would be required to complete and submit an “AQM-4 Regulation No. 2 Permit Application for Process Equipment Form.” Installation and operation of this piece of equipment could not begin until an air emissions permit for process equipment is issued by the Department.

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, air contaminant equipment registration, or if it is exempt from the requirements of Regulation No. 2.

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 ventilates the air emissions. The skylights will allow the air emissions to emanate from the flat 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.

$$\text{Emission Rate of MEK} = \frac{7 \text{ lb/day}}{4 \text{ hr/day}} = 1.75 \text{ lb/hr}$$

$$\text{Emission Rate of Toluene} = \frac{1.5 \text{ lb/day}}{4 \text{ hr/day}} = 0.375 \text{ lb/hr}$$

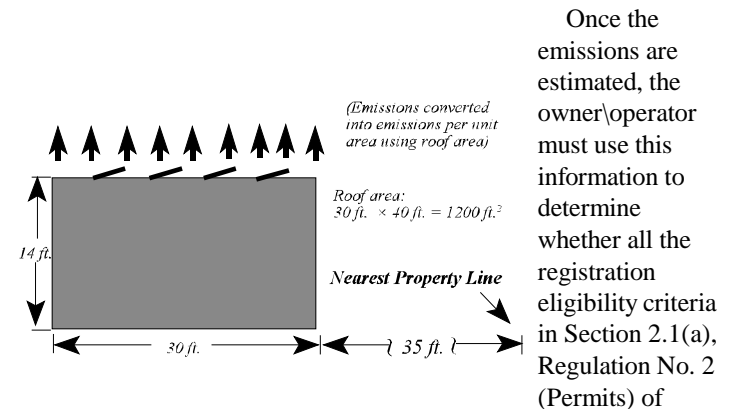
Source height

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



Delaware’s “Regulations Governing the Control of Air Pollution” are met. Below is the check list of registration eligibility criteria evaluated by the owner/operator:

- ✓ The emissions do not trigger any requirements specified in Regulation No. 25 (Requirements for Preconstruction Review) of Delaware’s “Regulations 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).

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 booklet.

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 booklet. Because the emissions are ventilated through a series of skylights on the roof, the emissions are best represented as an area source (roof area) as described in Section V(C) on page 7 of this booklet. 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 and includes the conversions from English to metric units.

Table B.1 Unit Conversions of the Data to be Entered in Part 3, “Emission Source Information” of the Registration Form.

PART 3 EMISSION SOURCE INFORMATION	CONVERSION
Distance to nearest property line (Block 4(A))	35 ft × 0.3048 m/ft = 10.7 m
Source Release Height (Block 4(C)(1))	14 ft × 0.3048 m/ft = 4.3 m
Length of Larger Side (Block 4(C)(2))	40 ft × 0.3048 m/ft = 12.2 m
Length of Smaller Side (Block 4(C)(3))	30 ft × 0.3048 m/ft = 9.1 m

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 and its conversion to metric units that is to be entered into Part 4 of the registration form for methyl ethyl ketone (MEK) and toluene. Be sure to convert the emission rate to the emission rate per unit area for area sources as shown in Table B.2.

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

Part 4 Air Contaminant Information		Conversion	Input
Maximum Daily Hours of Emissions <i>(Block 4(B))</i>		NA	4 hr/day
Maximum Emission Rate	“lb/day” <i>(Block 4(C)(1))</i>	MEK	7.0 lb/day
		Toluene	1.5 lb/day

Part 4 Air Contaminant Information		Conversion	Input
Maximum Emission Rate (cont.)	“g/(s-m ²)” <i>(Block 4(C)(2))</i>	MEK	<p>(1) Convert lb/day → lb/hr:</p> $\frac{\text{lb/day}}{\text{hr/day}} = \frac{7.0 \text{ lb/day}}{4 \text{ hr/day}} = 1.75 \text{ lb/hr}$ <p>(2) Convert lb/hr → g/s:</p> $1.75 \text{ lb/hr} \times 0.126 \frac{\text{g/s}}{\text{lb/hr}} = 0.22 \text{ g/s}$ <p>(3) Convert emission rate to emission rate per unit area:</p> $\frac{0.22 \text{ g/s}}{(30 \text{ ft} \times 40 \text{ ft}) 0.0929 \text{ m}^2/\text{ft}^2} = 0.00197 \text{ g/(s-m}^2\text{)}$
		Toluene	<p>(1) Convert lb/day → lb/hr:</p> $\frac{\text{lb/day}}{\text{hr/day}} = \frac{1.5 \text{ lb/day}}{4 \text{ hr/day}} = 0.375 \text{ lb/hr}$ <p>(2) Convert lb/hr → g/s:</p> $0.375 \text{ lb/hr} \times 0.126 \frac{\text{g/s}}{\text{lb/hr}} = 0.05 \text{ g/s}$ <p>(3) Convert emission rate to emission rate per unit area:</p> $\frac{0.05 \text{ g/s}}{(30 \text{ ft} \times 40 \text{ ft}) 0.0929 \text{ m}^2/\text{ft}^2} = 0.00045 \text{ g/(s-m}^2\text{)}$
		Basis <i>(Block 4(C)(3))</i>	Amount of volatile product used

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 booklet. 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 SCREEN 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 EPA SCREEN air dispersion model. Tables B.3 and B.4 below present the series of inputs requested by the SCREEN air dispersion model for the area source example. Because methyl ethyl ketone (MEK) and toluene are emitted at different rates, two separate SCREEN air dispersion model runs are necessary to compute the corresponding maximum downwind concentrations.

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

Parameter	Input
Enter title	FumeA1
Enter source type	a (for area)
Enter emission rate (per unit area) (g/s-m ²)	0.00197 g/s-m ² (Block 4(C)(2))
Enter source release height (m)	4.3 m (Block 3(C)(1))
Enter length of larger side of area (m)	12.2 m (Block 3(C)(2))
Enter length of smaller side of area (m)	9.1 m (Block 3(C)(3))

Parameter	Input
Enter receptor height above ground (m)	0 m (default)
Enter urban/rural option	r (for rural) (default)
Search through range of distances to find max. concentration?	y (for yes) (default)
Enter choice of meteorology	Enter "1" for full meteorology (default)
Use automated distance array?	y (for yes) (default)
Enter min. and max. distances to be used (m)	10.7, 5000 (Use distance to the nearest property line (Block 3(A)) for min. distance and 5000 m for max. distance)
Use discrete distances?	n (for no) (default)

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

Parameter	Input
Enter title	FumeA2
Enter source type	a (for area)
Enter emission rate (per unit area) (g/(s-m ²))	0.00045 g/(s-m ²) (Block 4(C))
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 SCREEN model, the model will compute downwind concentrations of air emissions at incremental distances. The maximum downwind concentration (MDC) will be provided at the end of the SCREEN output in micrograms per cubic meter ($\mu\text{g}/\text{m}^3$). This value is entered in Block 5(B) of the registration form.

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

The MDC for each contaminant is adjusted to represent the same exposure duration and units as the TLV by multiplying the SCREEN computed MDC in Block 5(B) by 0.0007 and entering the result in Block 5(C). The TLV (Block 5(A)) is divided by the adjusted MDC (Block 5(C)), and the result is entered in Block 5 (D). This information is summarized in Table B.5 below.

Table B.5 Data to be Entered in Part 5 (Toxicological Data and Dispersion Model Results) of the Registration Form by the Food Packaging Manufacturing Facility:

Air Contaminant <i>(Block 4(A))</i>	TLV (TWA), mg/m^3 <i>(Block 5(A))</i>	MDC, $\mu\text{g}/\text{m}^3$ <i>(Block 5(B))</i>	Adjusted MDC (units and exposure duration) $\text{MDC} \times 0.0007$ <i>(Block 5(C))</i>	TLV: Adjusted MDC (TLV divided by Adjusted MDC) <i>(Block 5(D))</i>
Methyl Ethyl Ketone	590	1,437	1.006	586
Toluene	188	328.4	0.230	817

The values in the final column of the above table are all above 100 which satisfies the criteria for demonstrating no adverse effects to the public’s health, safety, and welfare. When the Registration Form is completed, signed, SCREEN model output attached, and submitted to the DNREC, installation and subsequent operation of the food package manufacturing line may commence.

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 will not have a single emissions point and are released from the building from windows and roof vents. These emissions are best represented as a volume source as discussed in Section V(C) of this booklet. Building dimensions are 30 ft. \times 40 ft. \times 16 ft. Chemicals in the aerosol cans to be recycled at this facility include: toluene, ethylbenzene, and methyl isobutyl ketone. The nearest property line to the building is 35 ft. away. This information is illustrated below in Figure C.1.

about 4.125 lb/day).

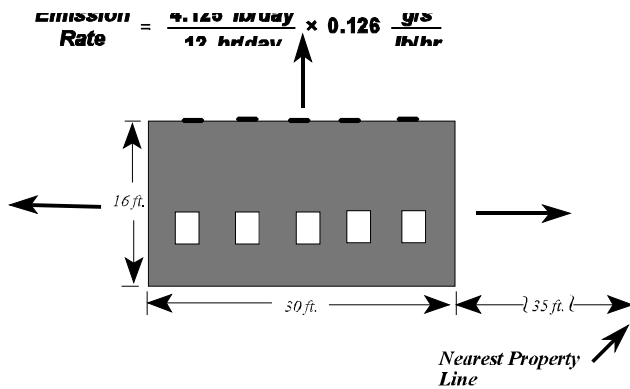


Figure C.1 Illustration of emissions from the aerosol can puncturing machine operated within a building with no single emission point (volume source).

Step Two: Registration Eligibility

Once the emissions are estimated, the owner/operator must use this information to determine whether all the registration eligibility criteria in Section 2.1(a), Regulation No. 2 (Permits) of Delaware’s “**Regulations Governing the Control of Air Pollution**” are met. Below is the check list of registration eligibility criteria evaluated by the owner/operator:

- ✓ The emissions do not trigger any requirements specified in Regulation No. 25 (Requirements for Preconstruction Review) of Delaware’s “**Regulations 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

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 booklet.

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 booklet. Because the emissions are ventilated through windows and roof vents throughout the building, the emissions are best represented as an volume source radiating out from the building in three dimensions as described in Section V(C) on page 7 of this booklet. 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. Part 3(D) requires half of the source height and the initial and vertical dimensions of the source to be entered.

Half of the source height is half of the building height, and the initial lateral and vertical dimensions are computed by using the formulas supplied in Table 1 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, and it also provides its unit conversions to metric units.

Table C.1 Computed Values and Unit Conversions to be Entered in Part 3, “Emission Source Information” of the Registration Form.

PART 3 EMISSION SOURCE INFORMATION	CONVERSION
Distance to nearest property line (Block 4(A))	$35 \text{ ft} \times 0.3048 \text{ m/ft} = 10.7 \text{ m}$

PART 3 EMISSION SOURCE INFORMATION	CONVERSION
Half of Source Release Height (Block 4(D)(1))	$\frac{1}{2} (16 \text{ ft}) \times 0.3048 \frac{\text{m}}{\text{ft}} = 2.4 \text{ m}$
Initial Lateral Dimension ³ (Block 4(D)(2))	$\frac{(30 \text{ ft} \times 0.3048 \text{ m/ft})}{4.3} = 2.1 \text{ m}$
Initial Vertical Dimension ⁴ (Block 4(D)(3))	$\frac{(16 \text{ ft} \times 0.3048 \text{ m/ft})}{2.15} = 2.3 \text{ m}$

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 and its conversion to metric units that is to be entered into Part 4 of the registration form for toluene, ethylbenzene, and methyl isobutyl ketone.

Table C.2 Unit Conversions and Input to be Entered in Part 4, “Air Contaminant Information” of the Registration Form.

Part 4 Air Contaminant Information	Conversion	Input
Maximum Daily Hours of Emissions (Block 4(B))	NA	12 hr/day

³ The 4.3 constant adjusts the concentrations to represent dispersion beyond the building (or volume) width. The SCREEN air dispersion model is unable to compute concentrations within the building (or volume) being modeled.

⁴ 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-half of the 4.3 constant). The SCREEN air dispersion model is unable to compute concentrations within the building (or volume) being modeled.

Part 4 Air Contaminant Information	Conversion	Input	
Maximum Emission Rate	lb/day (Block 4(C)(1))	NA	4.125 lb/day
	g/s (Block 4(C)(2))	(1) Convert lb/day → lb/hr: $\frac{\text{lb/day}}{\text{hr/day}} = \frac{4.125 \text{ lb/day}}{12 \text{ hr/day}} = 0.34 \text{ lb/hr}$ (2) Convert lb/hr → g/s: $0.34 \text{ lb/hr} \times 0.126 \frac{\text{g/s}}{\text{lb/hr}} = 0.04 \text{ g/s}$	0.04 g/s
	Basis (Block 4(C)(3))	Amount of volatile product remaining in cans	

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 booklet. 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 SCREEN air dispersion model.

The owner of the aerosol can puncturing machine uses the data entered in Parts 3 and 4 of the registration form to run the EPA SCREEN air dispersion model. Table C.3 below presents the series of inputs requested by the SCREEN air dispersion model for the volume source example. Because toluene, ethylbenzene, and methyl isobutyl ketone are each conservatively assumed to be emitted at the maximum combined rate, only one SCREEN air dispersion model run is necessary to compute the corresponding maximum downwind concentrations.

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

Parameter	Input
Enter title	FumeV
Enter source type	v (for volume)
Enter emission rate (g/s)	0.04 g/s <i>(Block 4(C)(2))</i>
Enter source release height (m)	2.4 m <i>(Block 3(D)(1))</i>
Enter initial lateral dimension (m)	2.1 m <i>(Block 3(D)(2))</i>
Enter initial vertical dimension (m)	2.3 m <i>(Block 3(D)(3))</i>
Enter receptor height	0 m <i>(default)</i>
Enter rural or urban option	r (for rural) <i>(default)</i>
Use complex terrain...?	n (for no) <i>(default)</i>
Use simple terrain with terrain above stack base?	n (for no) <i>(default)</i>
Enter choice of meteorology	1 (for full meteorology) <i>(default)</i>
Use automated distance array?	y (for yes) <i>(default)</i>
Enter min. and max. distances	10.7, 5000 <i>(Use distance to the nearest property line (Block 3(A)) for min. distance and 5000 m for max. distance)</i>
Use discrete distances?	n (for no) <i>(default)</i>

Step Eight: Complete Part 5, “Toxicological Data and Dispersion Model Results”

When all of the data in Table C.3 are entered into the SCREEN model, the model will compute downwind concentrations of air emissions at incremental distances. The maximum downwind concentration (MDC) will be provided at the end of the SCREEN output in micrograms per cubic meter ($\mu\text{g}/\text{m}^3$). This value is entered in Block 5(B) of the registration form.

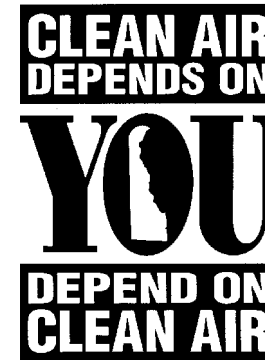
The registrant must identify the time-weighted average TLV (or TWA) of each emitted contaminant from a ACGIH or NIOSH publication, and these values will be entered in Block 5(A) of the registration form.

The MDC for each contaminant is adjusted to represent the same exposure duration and units as the TLV by multiplying the SCREEN computed MDC in Block 5(B) by 0.0007 and entering the result in Block 5(C). The TLV (Block 5(A)) is divided by the adjusted MDC (Block 5(C)), and the result is entered in Block 5 (D). 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 by the Company that Owns the Facility:

Air Contaminant <i>(Block 4(A))</i>	TLV (TWA), mg/m^3 <i>(Block 5(A))</i>	MDC, $\mu\text{g}/\text{m}^3$ <i>(Block 5(B))</i>	Adjusted MDC (units and exposure duration) $\text{MDC} \times 0.0007$ <i>(Block 5(C))</i>	TLV: Adjusted MDC (TLV divided by Adjusted MDC) <i>(Block 5(D))</i>
Toluene	188	1,286	0.900	209
Ethylbenzene	434	1,286	0.900	482
Methyl Isobutyl Ketone	205	1,286	0.900	228

The values in the final column of the above table are all well above 100 which satisfies the criteria for demonstrating no adverse effects to the public’s health, safety, and welfare. When the Registration Form is completed, signed, SCREEN model output attached, and submitted to the DNREC, installation and subsequent operation of the aerosol can puncturing machine may commence.



If you have any suggestions or comments on improving this instruction booklet, please call Joanna Austin at (302) 739-4791.