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DEPARTMENT OF ENVIRONMENTAL PROTECTION

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BUREAU OF AIR QUALITY CONTROL

CHAPTER 132: GRAPHIC ARTS-ROTOGRAVURE AND FLEXOGRAPHY

Summary: This regulation restricts the volatile organic compounds emissions from graphic arts operations.

1. Applicability.

A. This regulation shall be applicable in all air quality control regions in the State of Maine.

B. This entire regulation shall apply to any packaging rotogravure, publication rotogravure, or flexographic printing press at any facility whose maximum theoretical emissions of volatile organic compounds (VOC) (including solvents used to clean each of these printing presses) from all printing presses are greater than or equal to 50 tons per year.

C. An owner or operator of a facility whose maximum theoretical emissions are less than 50 tons per year shall comply only with the certification, recordkeeping, and reporting requirements in Section (7)(A) of this Chapter.

D. Any facility that becomes or is currently subject to these provisions because its maximum theoretical emissions equal or exceed 50 tons per year will remain subject to these provisions even if its emissions later fall below the emission threshold.

2. Definitions.

A. Control device. "Control device" means equipment used to reduce, by destruction or removal, the amount of air pollutant(s) in an air stream prior to discharge to the ambient air.

B. Day. "Day" means a period of 24 consecutive hours beginning at midnight local time, or beginning at a time consistent with a facility's operating schedule.

C. Flexographic printing press. "Flexographic printing press" means a printing press that uses a roll printing technique in which the pattern to be applied is raised above the printing roll and the image carrier is made of rubber or other elastomeric materials.

D. Maximum theoretical emissions. "Maximum theoretical emissions" means the quantity of VOC that theoretically could be emitted by a source without control devices based on the design capacity or maximum production capacity of the source and 8760 hours of operation per year. The design capacity or maximum production capacity includes use of coatings and inks with the highest VOC content used in practice by the source for the two years preceding the effective date of this regulation.

E. Packaging rotogravure printing press. "Packaging rotogravure printing press" means a rotogravure printing press used to print on paper, paper board, metal foil, plastic film, and other substrates that are, in subsequent operations, formed into packaging products and labels, and other nonpublication products.

F. Printing press. "Printing press" means equipment used to apply words, pictures, or graphic designs to either a continuous substrate or a sheet. A continuous substrate consists of paper, plastic, or other material that is unwound from a roll, passed through coating or ink applicators and any associated drying areas. The press includes all coating and ink applicators and drying areas between unwind and rewind of the continuous substrate. A sheet consists of paper, plastic, or other material that is carried through the process on a moving belt. The press includes all coating and ink applicators and drying operations between the time that the sheet is put on the moving belt until it is taken off.

G. Publication rotogravure printing press. "Publication rotogravure printing press" means a rotogravure printing press on which the following paper products are printed:

1. Catalogues, including mail order and premium;
2. Direct mail advertisements, including circulars, letters, pamphlets, cards, and printed envelopes;
3. Display advertisements, including general posters, outdoor advertisements, car cards, window posters; counter and floor displays; points-of-purchase and other printed display material;
4. Magazines and books;
5. Miscellaneous advertisements, including brochures, pamphlets, catalogue sheets, circular folders, announcements, package inserts, book jackets, market circulars magazine inserts, and shopping news;
6. Newspapers, magazine and comic supplements for newspapers, and preprinted newspaper inserts, including hi-fi and spectacular rolls and sections;
7. Periodicals; or

8. Telephone and other directories, including business reference services.

H. Roll printing. "Roll printing" means the application of words, designs, and pictures to a substrate, usually by means of a series of rolls each with only partial coverage.

I. Rotogravure coating. "Rotogravure coating" means the application of a coating material to a substrate by means of a roll coating technique in which the pattern to be applied is recessed relative to the non-image area, and the coating material is picked up in these recessed areas and is transferred to the substrate.

J. Rotogravure printing press. "Rotogravure printing press" means any printing press designed to print on a substrate using a gravure cylinder.

K. Substrate. "Substrate" means the surface to which a coating is applied.

3. Standards.

A. The owner or operator of a packaging rotogravure, publication rotogravure, or flexographic printing press shall comply with the standards in this section or with the standards or operational methods required under either section 4 (daily-weighted average limitations) or section 5 (compliance by means of control devices) of this Chapter.

B. The owner or operator of a packaging rotogravure or flexographic printing press subject to this section shall not apply any coating or ink unless the VOC content is equal to or less than one of the following:

1. 40 percent VOC by volume of the coating or ink, excluding water and exempt compounds, as applied;
2. 25 percent VOC by volume of the volatile content in the coating or ink, as applied; or
3. 0.5 kilogram (kg) VOC per kg (0.5 pound [lb] VOC per lb) coating solids, as applied.

C. The owner or operator of a publication rotogravure printing press subject to this section shall not apply any coating or ink unless the VOC content is equal to or less than one of the following:

1. 40 percent VOC by volume of the coating or ink, excluding water and exempt compounds, as applied; or

2. 25 percent VOC by volume of the volatile content in the coating or ink, as applied.

4. Daily-weighted average limitations.

A. The owner or operator of a packaging rotogravure, publication rotogravure, or flexographic printing press shall not apply, during any day, coatings or inks on the subject printing press unless the daily-weighted average, by volume, of VOC content of all coatings and inks, as applied, each day on the subject printing press is equal to or less than the limitation in Section (3)(B) and (3)(C) of this Chapter.

B. An owner or operator may comply with the daily-weighted average limitation by grouping coatings or inks used on a printing press into two categories that meet conditions 1 and 2 of this section. Any use of averaging between the two categories of coatings or inks used on a packaging rotogravure press or on a flexographic press requires compliance with the emission standard in Section (3)(B)(3).

1. The daily-weighted average VOC content for the first category shall comply with Section (3)(B)(1) or (3)(C)(1); or

2. The daily-weighted average VOC content for the second category shall comply with Section (3)(B)(2) or (3)(C)(2).

C. Compliance with this section shall be demonstrated through the applicable coating or ink analysis test methods and procedures specified in Appendix A, Procedure B and the recordkeeping and reporting requirements specified in Section (7)(C).

D. The following equation shall be used to determine if the weighted average VOC content of all coatings and inks, as applied, each day on the subject printing press exceeds the limitation specified in Section (3)(B)(1) or (3)(C)(1):

$$\text{VOC}_{(i)(A)} = \frac{\sum_{i=1}^n L_i V_{\text{voci}}}{n} \times 100$$

$$\sum_{i=1}^n L_i (V_{si} + V_{voci})$$

where:

VOC(i)(A) = The weighted average VOC content in units of percent VOC by volume of all coatings and inks (excluding water and exempt compounds) used each day;

i = Subscript denoting a specific coating or ink, as applied;

n = The number of different coatings and/or inks, as applied, each day on a printing press;

Li = The liquid volume of each coating or ink, as applied, used that day in units of liters (l) or (gallons [gal]);

Vsi = The volume fraction of solids in each coating or ink, as applied; and

VVOCi = The volume fraction of VOC in each coating or ink, as applied.

E. The following equation shall be used to determine if the weighted average VOC content of all coatings and inks, as applied, each day on the subject printing press exceeds the limitation specified in Section (3)(B)(2) or (3)(C)(2):

$$\text{VOC}_{(i)(B)} = \frac{\sum_{i=1}^n L_i V_{voci}}{100 \sum_{i=1}^n L_i V_{vci}} \times$$

where:

VOC(i)(B) = The weighted average VOC content in units of percent VOC by volume of the volatile content of all coatings and inks used each day;

i = Subscript denoting a specific coating or ink as applied;

n = The number of different coatings and/or inks, as applied, each day on each printing press;

L_i = The liquid volume of each coating or ink, as applied, in units of (l) or (gal);

$VVOC_i$ = The volume fraction of VOC in each coating or ink, as applied; and

VVC_i = The volume fraction of volatile matter in each coating or ink, as applied.

F. The following equation shall be used to determine if the weighted average VOC content of all coatings and inks, as applied, each day on the subject printing press exceeds the limitation specified in Section (3)(B)(3):

$$VOC_{(i)(C)} = \frac{\sum_{i=1}^n L_i D_i W_{VOCi}}{\sum_{i=1}^n L_i D_i W_{Si}}$$

where:

VOC(i)(C) = The weighted average VOC content in units of mass of VOC per mass of coating solids;

i = Subscript denoting a specific coating or ink, as applied;

n = The number of different coatings and/or inks, as applied, each day on a printing press;

L_i = The liquid volume of each coating or ink, as applied, used on the day in units of (l) or (gal);

D_i = The density of each coating or ink, as applied, in units of mass of coating or ink per unit volume of coating or ink;

$WVOC_i$ = The weight fraction of VOC in each coating or ink, as applied; and

W_{si} = The weight fraction of solids in each coating or ink, as applied.

5. Control devices.

A. The owner or operator of a packaging rotogravure, publication rotogravure, or flexographic printing press equipped with a control system shall not operate the printing press unless:

1. The control device reduces VOC emissions delivered from the capture system to the control device by at least 90 percent by weight; and
2. The printing press is equipped with a capture system and control device that provides an overall emission reduction efficiency of at least:
 - a. 75 percent for a publication rotogravure printing press;
 - b. 65 percent for a packaging rotogravure printing press; or
 - c. 60 percent for a flexographic printing press.

B. An owner or operator of a packaging rotogravure, publication rotogravure, or flexographic printing press equipped with a control system shall ensure that:

1. The capture system and control device are operated at all times that the printing press is in operation, and
2. The control device is equipped with the applicable monitoring equipment specified in Appendix A, Procedure (E)(b), and the monitoring equipment is installed, calibrated, operated, and maintained according to the manufacturer's specifications at all times the control device is in use.

C. The owner or operator shall demonstrate compliance with this section through the applicable coating analysis and test methods specified in Appendix A, Procedure B, E, and F and in accordance with the capture efficiency test methods in Chapter 126.

6. Test methods.

The VOC content of each coating and ink and the efficiency of each capture system and control device shall be determined by the applicable test methods and procedures specified in Appendix A, Procedures A,B,C,E to establish the records required under Section 7.

7. Recordkeeping and reporting

A. Requirements for less than 50 ton sources. By January 1, 1995 any owner or operator of a printing press that is less than 50 tons shall comply with the following:

1. Initial certification. The owner or operator shall certify to the Department that the facility is exempt under the provisions of Section 1. Such certification shall include:

a. The name and location of the facility;

b. The address and telephone number of the person responsible for the facility;

c. A declaration that the facility is exempt from this section because of the criteria in Section 1; and

d. Calculations demonstrating that the potential emissions of VOC from all flexographic and rotogravure printing presses at the facility are and will be less than 50 tons per calendar year before the application of capture systems and control devices. Total potential emissions of VOC for a flexographic or rotogravure printing facility is the sum of potential emissions of VOC from each flexographic and rotogravure printing press at the facility. The following equation shall be used to calculate total potential emissions of VOC per calendar year before the application of capture systems and control devices for each flexographic and rotogravure printing press at the facility:

$$E_p = A \times B$$

where:

E_p = Total potential emissions of VOC from one flexographic or rotogravure

printing press in units of pounds per year (lb/yr).

A = Weight of VOC per volume of solids of the coating or ink with the highest VOC content, as applied, each year on the printing press in units of pounds of VOC per gallon (lb VOC/gal) of coating or ink solids.

B = Total volume of solids for all coatings and inks that can potentially be applied each year on the printing press in units of gallons per year (gal/yr.). The instrument and/or method by which the owner or operator accurately measured or calculated the volume of coating and ink solids applied and the amount that can potentially be applied each year on the printing press shall be described in the certification to the Department.

2. Recordkeeping. The owner or operator shall collect and record all of the following information each year for each printing press:

a. The name and identification number of each coating and ink, as applied, on each printing press;

b. The weight of VOC per volume of coating solids and the volume of solids of each coating and ink, as applied, on each printing press; and

c. The total potential emissions as calculated in Section (7)(A)(1)(d) using VOC content for that year.

3. Reporting. If the owner or operator of any source determines that the potential emissions of VOC from all printing presses exceed 50 tons in any calendar year, the owner or operator shall report the information in writing to the Department within 30 days after such exceedance occurs.

B. Requirements for sources using complying coatings or inks. Any owner or operator of a printing press subject to this section and complying by means of use of complying coatings or inks, shall comply with the following:

1. Initial certification. By January 1, 1995, or upon initial startup of a new printing press, or upon changing the method of compliance for an existing subject printing press from daily-weighted averaging or control devices to use of complying coatings or inks, the owner or operator of a subject printing press shall certify to the Department that the printing press will be in compliance with Section (3)(B) and(3)(C) on and after January 1, 1995, or on and after the initial startup date. Such certification shall include:

- a. The name and location of the facility;
- b. The address and telephone number of the person responsible for the facility;
- c. Identification of subject sources;
- d. The name and identification number of each coating and ink, as applied; and
- e. The VOC content of all coatings and inks, as applied.

2. Recordkeeping. By January 1, 1995, or on and after the initial startup date, the owner or operator of a printing press subject to the limitations of this section and complying by means of Section (3)(B)(1) or (3)(C)(1) shall collect and record all of the following information each day for each printing press (except in the case of a facility which demonstrates that all of the inks and coatings used at that facility are complying inks and coatings):

- a. The name and identification number of each coating and ink, as applied; and
- b. The VOC content of each coating and ink, as applied, expressed in units necessary to determine compliance.

In the case of a facility which demonstrates that all of the inks and coatings used at the facility are complying inks and coatings, the information in (a) and (b) shall be recorded each month for each printing press.

3. Reporting.

- a. Any use of noncomplying coatings shall be reported by the owner or operator of the printing press to the Department within 30 calendar days; and
- b. At least 30 calendar days before changing the method of compliance with this section from the use of complying coatings to daily-weighted averaging or control devices, the owner or operator shall comply with all requirements of Section (7)(C)(1) or (7)(D)(1), respectively.

C. Requirements for sources using daily-weighted averaging. Any owner or operator of a printing press subject to the limitations of this section and complying by means of

daily-weighted averaging shall comply with the following:

1. Initial certification. By January 1, 1995 or upon initial startup of a new printing press, or upon changing the method of compliance for an existing subject press from use of complying coating or control devices to daily-weighted averaging, the owner or operator of the subject printing press shall certify to the Department that the printing press will be in compliance with the daily-weighted averaging limitations under Section 4 of this Chapter on and after January 1, 1995, or on and after the initial startup date. Such certification shall include:

- a. The name and location of the facility;
- b. The address and telephone number of the person responsible for the facility;
- c. The name and identification of each printing press that will comply by means of daily-weighted averaging;
- d. The name and identification number of each coating and ink available for use on each printing press;
- e. The VOC content of each coating and ink, as applied, each day on each printing press, expressed in units necessary to determine compliance;
- f. The instrument or method by which the owner or operator will accurately measure or calculate the volume of each coating and ink, as applied, each day on each printing press;
- g. The method by which the owner or operator will create and maintain records each day as required in Section (7)(C)(2); and
- h. An example of the format in which the records required in Section (7)(C)(2) will be kept.

2. Recordkeeping. On and after January 1, 1995, or on and after the initial startup date, the owner or operator of a printing press subject to the limitations of this section and complying by means of daily-weighted averaging shall collect and record all of the following information each day for each printing press:

- a. The name and identification number of each coating and ink, as applied, on each printing press;
- b. The VOC content and the volume of each coating and ink, as applied,

each day on each printing press, expressed in units necessary to determine compliance; and

c. The daily-weighted average VOC content of all coatings and inks, as applied, on each printing press.

3. Reporting. On and after January 1, 1995, the owner or operator of a subject printing press shall notify the Department in writing in the following instances:

a. The owner or operator of a press subject to this section shall notify the Department of any noncompliance with daily-weighted average limitations within 30 calendar days after the noncompliance.

b. At least 30 calendar days before changing the method of compliance with this section from daily-weighted averaging to use of complying coatings or control devices, the owner or operator shall comply with all requirements of Section (7)(B)(1) or (7)(D)(1), respectively.

D. Requirements for sources using control devices. Any owner or operator of a printing press subject to this section and complying by means of control devices shall comply with the following:

1. Initial certification. By January 1, 1995, or upon initial startup of a new printing press, or upon changing the method of compliance for an existing printing press from use of complying coatings or daily-weighted averaging to control devices, the owner or operator of the subject printing press shall perform all tests and submit to the Department the results of all tests and calculations necessary to demonstrate that the subject printing press will be in compliance with the emissions reductions required by Section 5 of this Chapter on and after January 1, 1995, or on and after the initial startup date. Testing shall be performed according to Procedures A, B, C, E, and F as specified in Appendix A.

2. Recordkeeping. On and after January 1, 1995, or on and after the initial startup date, the owner or operator of a printing press subject to the limitations of this section and complying by means of control devices shall collect and record all of the following information each day for each printing press:

a. The name and identification number of each printing press;

b. The mass of VOC per unit volume of coating solids, as applied, the volume solids content, as applied, and the volume, as applied, of each

coating used each day on each printing press;

c. The maximum VOC content (mass of VOC per unit volume of coating solids, as applied) or the daily-weighted average VOC content (mass of VOC per unit volume of coating solids, as applied) of the coatings used each day on each printing press;

d. The required overall emission reduction efficiency for each day for each printing press as determined in Section (5)(A)(2) of this Chapter.

e. The actual overall emission reduction efficiency achieved for each day for each printing press as determined using Procedure E of Appendix A.

f. Control device monitoring data;

g. A log of operating time for the capture system, control device, monitoring equipment and the associated printing press; and

h. A maintenance log for the capture system, control device, and monitoring equipment detailing all routine and non-routine maintenance performed, including dates and duration of any outages.

i. For thermal incinerators, all continuous 3-hour periods of operation in which the average combustion temperature was more than 28 degrees C (50 degrees F) below the average combustion temperature during the most recent performance test that demonstrated that the facility was in compliance;

j. For catalytic incinerators, all continuous 3-hour periods of operation in which the average temperature of the process vent stream immediately before the catalyst bed is more than 28 degrees C (50 degrees F) below the average temperature recorded during the most recent performance test that demonstrated that the facility was in compliance; and

k. For carbon adsorbers, all continuous 3-hour periods of operation during which either the average VOC concentration or the reading of organics in the exhaust gases is more than 20 percent greater than the average exhaust gas concentration or reading measured by the organics monitoring device during the most recent determination of the recovery efficiency of the carbon adsorber that demonstrated that the facility was in compliance.

3. Reporting. On and after January 1, 1995, the owner or operator of a subject printing press shall notify the Department in writing in the following instances:

- a. Any non-compliance with control device requirements under Section 5, shall be reported and a written report submitted to the Department within 30 calendar days following the occurrence. This written report shall supply the following information: description of the cause, duration, remedial action, and steps to be taken to prevent recurrence of such malfunctions, failures, or downtimes; and
- b. At least 30 calendar days before changing the method of compliance with this section from control devices to use of complying coatings or daily-weighted averaging, the owner or operator shall file the initial certification required to demonstrate compliance by the alternate method to be implemented.

E. Recordkeeping and reporting.

The records required in this section shall be available for inspection during normal business hours and copies shall be provided to the Department or E.P.A. upon request. All records must be maintained on site for a period of 6 years.

8. Emission limitations from the handling, storage, and disposal of materials containing VOC.

A. Vapor-tight containers shall be used for the storage of spent or fresh VOC and for the storage or disposal of cloth or paper impregnated with VOC that are used for surface preparation, clean up or coating removal.

B. The use of VOC is prohibited for the cleanup of spray equipment unless equipment is used to collect the cleaning compounds and to minimize their evaporation to the atmosphere.

9. Compliance Schedule.

The owner or operator of a source subject to this regulation shall achieve final compliance with this regulation on or before May 31, 1995.

BASIS STATEMENT : In Maine, nine counties are classified as nonattainment for the federal ozone air quality standard. Some inks used in graphic arts contain volatile organic compounds (VOC), which are precursors to ground-level ozone formation.

This graphic arts regulation restricts the VOC emissions from rotogravure and flexographic printing operations. Under Section 184 of the Clean Air Act Amendments of 1990, the State must submit plans to control VOC emissions from all sources covered by a Control Technique Guideline issued before November 15, 1990.

In addition to the Basis Statement above, the Department has filed with the Secretary of State responses to comments received during the comment period.

AUTHORITY: 38 M.R.S.A., Section 585-A

EFFECTIVE DATE: February 10, 1993