

**RHODE ISLAND DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
OFFICE OF AIR RESOURCES
AIR POLLUTION CONTROL REGULATION NO. 21**

**CONTROL OF VOLATILE ORGANIC COMPOUND EMISSIONS
FROM PRINTING OPERATIONS**

21.1 Definitions

Unless otherwise expressly defined in this section, the terms used in this regulation shall be defined by reference to the Rhode Island Air Pollution Control General Definitions Regulation. As used in this regulation, the following terms shall, where the context permits, be construed as follows:

21.1.1 **"Emission Baseline"** means a level of emissions calculated by multiplying two factors:

- (a) the lowest of the source's actual or allowable emission rate in emissions per unit of production; and
- (b) the source's actual capacity utilization, or units of production, over some representative time period. Generally, the time period is the preceding two years unless the source can demonstrate that those years were not representative of historical production.

21.1.2 **"Flexographic printing"** means the application of words, designs and/or pictures to a substrate by means of 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.

21.1.3 **"Packaging rotogravure printing"** means rotogravure printing upon paper, paper board, metal foil, plastic film or other substrates, and other substrates, which are, in subsequent operations, formed into packaging products and labels for articles to be sold.

21.1.4 **"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.

21.1.5 **"Publication rotogravure printing"** means rotogravure printing upon paper which is subsequently formed into books, magazines, catalogues, brochures, directories,

newspaper supplements, or and other types of printed materials.

21.1.6 **"Roll printing"** means the application of words, designs and/or pictures to a substrate by means of a series of hard rubber or steel rolls each with only partial coverage.

21.1.7 **"Rotogravure printing"** means the application of words, designs and/or pictures to a substrate by means of a roll-printing technique, in which the pattern to be applied by the printing roll is accomplished by an intaglio or recessed image areas in the form of cells.

21.1.8 **"Specialty printing"** means all other rotogravure and flexographic printing operations, excluding publication printing and packaging printing.

21.2 Applicability

21.2.1 This regulation applies to all roll, specialty, rotogravure, and flexographic printing facilities whose potential to emit volatile organic compounds from printing operations is or ever has been, equal to or greater than 50 tons/year. Printing operations include but are not limited to printing, drying, mixing and any other functions associated with printing.

21.2.2 This regulation does not apply to any equipment in a facility used exclusively for chemical or physical analysis or determination of product quality and commercial acceptance provided that the operation of the equipment is not an integral part of the production process and the total actual emissions from all such equipment at the facility do not exceed 204 kilograms (kg) (450 pounds (lb)) in any calendar month.

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21.2.4 Sources with potential yearly emissions of 50 tons or more of VOC, but with actual emissions not exceeding 50 tons/year VOC since 1 January 1990, may apply to the Director for exemption from this regulation. Exemption from this regulation will be given in the form of an enforceable document, and will include the following conditions:

(a) Actual annual emissions shall not exceed 50 tons VOC per year; and

(b) The facility will meet the emission cap every consecutive 12 month period or on another more stringent schedule approved as enforceable by the Director. The cap must be consistent with the anticipated level of emissions in the approved SIP. Recordkeeping to demonstrate compliance will follow the guidelines in Section 21.7.

21.3 Emission Limitations

21.3.1 No owner or operator of a rotogravure, flexographic, or specialty printing facility subject to this regulation and employing solvent-containing ink may operate, cause,

allow or permit the operation of the facility unless one of the following is complied with at all times:

- (a) the volatile fraction of ink, as it is applied to the substrate, contains not more than 25.0 percent by volume of organic solvent and not less than 75.0 percent by volume of water, or
- (b) the ink as it is applied to the substrate, less water, contains not less than 60.0 percent by volume of nonvolatile material (solids), or
- (c) the installation of one or more approved volatile organic compound control device(s), as limited by Subsections 21.3.2 and 21.3.3, is certified to achieve at least a 90 percent reduction efficiency as measured across each control device, or
- (d) an alternative measure is employed which has been demonstrated to the satisfaction of the Director to have a volatile organic compound emission reduction at least equivalent to an amount potentially achieved by Subsections 21.3.1 (a) or (b). All alternative measures must be submitted for EPA approval as a source-specific SIP revision.

21.3.2 A capture system must be used in conjunction with the emission control devices installed per Subsection 21.3.1 (c). The design and operation of a capture system must be consistent with good engineering practice, and, in conjunction with the control device, must provide for an overall reduction in volatile organic compound emissions at each printing press of at least:

- (a) 75.0 percent where publication rotogravure printing process is employed, or
- (b) 65.0 percent where packaging rotogravure printing process or specialty printing process is employed, or
- (c) 60.0 percent where flexographic printing process is employed.

Facilities using add on controls to comply with Subsection 21.3.1 must show that the equipment meets specific capture and control performance standards which will be set in an enforceable document.

Control device efficiency will be determined using EPA-approved test methods. Calculations will be done on a solids applied basis. Continuous compliance will be maintained at all times. Compliance averaging times will be met according to the control device chosen and EPA test methods (as codified in 40 CFR 60), as follows:

Compliance Method	EPA Reference Test Method	Test Averaging Time
Reformulation	24	instantaneous

Solvent destruction or solvent recovery except carbon adsorption	25	3 hours
Carbon adsorption	25 or other test method as appropriate	7 day rolling average

or other methods approved by the Director and EPA. Once the control efficiency has been determined for any add-on control device by Reference Method 25, or any alternative method approved by the Department and EPA, compliance shall be determined on an instantaneous basis (e.g. determined control efficiency shall be used to calculate whether samples from the process meet the applicable emissions limit.)

The owner or operator of a facility using carbon adsorption as a control measure shall obtain data on daily solvent usage and solvent recovery and determine the solvent recovery efficiency of the system every day. The recovery efficiency for each day shall be computed as the ratio of the total recovered solvent for that day and the prior six consecutive operating days to the total solvent usage for the same seven day period. This ratio shall be expressed as a percentage. Facilities may apply to the Director for an alternative averaging time if meeting the emission limitation as a 7 day rolling average is not technically or economically feasible. In no event shall the averaging period exceed a 30-day rolling period. All alternative averaging periods must be consistent with EPA guidance.

21.3.3 Control and capture equipment installed per subsections 21.3.1 (c) and 21.3.2 will be incorporated in a permit issued in accordance with Air Pollution Control Regulation Number 9 or by approval. Compliance with the permit or approval will be determined, when necessary, with DEM and EPA approved test methods. The permit or approval will include record keeping and test methods required to demonstrate compliance.

21.4 Compliance Schedule

21.4.1 (a) The owner or operator of a rotogravure or flexographic printing facility subject to this regulation shall achieve compliance with the emission limitations in Section 21.3 according to the dates in Subsections 21.4.2 and 21.4.3, and shall submit in writing proposed plans and compliance schedules described in Subsections 21.4.4 (a) and 21.4.4 (b) to the Director for approval no later than the dates listed in Subsection 21.4.4 (c).

(b) All printing presses commencing operation after 28 January 1993 must be in compliance with the emission limits specified in Section 21.3 upon commencing operation.

21.4.2 All replacement or modification of process equipment and installation of control equipment to comply with the requirements of subsection 21.3.1 (c) shall be accomplished as expeditiously as practicable but no later than the following dates:

- (a) For facilities which had actual yearly emissions of 100 tons or more of VOC prior to 5 April 1982, compliance shall be achieved by 5 April 1984;
- (b) For facilities which had actual yearly emissions of 100 tons per year or more prior to 10 December 1989 but not before 5 April 1982, compliance shall be achieved no later than two (2) years after becoming an actual 100 ton source;
- (c) For facilities which ever had potential yearly emissions of 100 tons or more of VOC prior to 10 December 1989, compliance shall be achieved by 10 December 1991;
- (d) For facilities which have or have ever had potential yearly emissions of 50 tons or more of VOC since 1 January 1990, compliance shall be achieved by 31 May 1995; and
- (e) For facilities which become a potential 50 ton per year VOC source after 28 January 1993, compliance shall be achieved by 31 May 1995 or 18 months after the date the facility first becomes a potential 50 ton/year VOC facility, whichever is later.

21.4.3 Reformulation or alternative measures instituted to comply with the requirements of Subsections 21.3.1 (a), 21.3.1 (b) or 21.3.1 (d) shall be accomplished as expeditiously as practicable but no later than the following dates:

- (a) For facilities which had actual yearly emissions of 100 tons or more of VOC before 5 April 1982, compliance shall be achieved by 5 April 1985;
- (b) For facilities which had actual yearly emissions of 100 tons per year or more prior to 10 December 1989 but not before 5 April 1982, compliance shall be achieved no later than three (3) years after becoming an actual 100 ton source;
- (c) For facilities which ever had potential yearly emissions of 100 tons or more of VOC prior to 10 December 1989, compliance shall be achieved by 10 December 1992;
- (d) For facilities which have or have ever had potential yearly emissions of 50 tons or more of VOC since 1 January 1990, compliance shall be achieved by 31 May 1995; and
- (e) For facilities which become a potential 50 ton per year VOC source after 28 January 1993, compliance shall be achieved by 31 May 1995 or 18 months after the date the facility first becomes a potential 50 ton/year VOC facility, whichever is later.

21.4.4 (a) All compliance schedules for process equipment replacement or modification or for installation of control equipment shall provide for periodic increments of progress to document such, including but not limited to:

- (1) Submittal of engineering plans,

- (2) Issuance of purchase orders,
 - (3) Installation date of equipment,
 - (4) Date by which the applicable regulatory emission limitation will be achieved after equipment is in satisfactory operation,
 - (5) A written report every six months that details the progress in attaining compliance with this regulation.
- (b) All compliance schedules based upon reformulation or alternative measures shall provide for periodic increments of progress, including but not limited to:
- (1) Submittal of research, engineering plans, and formulations,
 - (2) Operating and maintenance procedures,
 - (3) Schedules for research and development,
 - (4) Purchase orders for reformulations,
 - (5) Commencement and completion of process modifications and product marketability testing,
 - (6) Date by which regulatory emission limitation will be achieved,
 - (7) Justification showing the need for alternative measures, if chosen, and
 - (8) A written report every six months that details progress towards attaining compliance with this regulation.
- (c) Compliance schedules discussed in Subsections 21.4.4 (a) and 21.4.4 (b) shall be submitted by the following dates:
- (1) For facilities which had actual yearly emissions of 100 tons or more of VOC prior to 5 April 1982, compliance schedules shall be submitted 5 August 1982;
 - (2) For facilities which had actual yearly emissions of 100 tons or more of VOC prior to 10 December 1989 but not before 5 April 1982, compliance schedules shall be submitted by four months after becoming an actual 100 ton per year VOC source;
 - (3) For facilities which had potential yearly emissions of 100 tons or more of VOC prior to 10 December 1989, compliance schedules shall be submitted by 10 April 1990;

- (4) For facilities which have or have ever had potential yearly emissions of 50 tons or more of VOC since 1 January 1990, compliance schedules shall be submitted by 30 May 1993; and
- (5) For facilities which become a potential 50 ton per year VOC source after 28 January 1993, compliance schedules shall be submitted by 30 May 1993 or 4 months after the date the facility first becomes a potential 50 ton/year VOC facility, whichever is later.

21.4.5 The owner or operator of a facility subject to a compliance schedule by this section shall certify to the Director within five (5) days after the deadline for each increment of progress as to whether the required increment of progress has been met, and written documentation or photocopies of documents shall be included as evidence, whenever applicable.

21.4.6 The emission limitations of Section 21.3 may be relaxed subject to the following conditions:

- (a) The owner or operator of a facility documents to the satisfaction of the Director that such emission limitations cannot be met because neither coating reformulation(s) nor the installation of a control system is economically or technically feasible or even partially feasible, and
- (b) The facility shall provide the Director with the documentation no later than twelve (12) months after the effective date of this regulation and
- (c) The facility shall submit new emission limitations that will represent an Alternative Reasonably Available Control Technology for approval by the Director. Alternative RACT shall also be submitted to EPA as a source-specific SIP revision. New emission limitations shall be achieved within two years of submittal of a SIP revision to EPA; and
- (d) The Director shall require the facility to undergo Reasonably Available Control Technology review every three years thereafter until the emission limitations of Section 21.3 are achieved.

21.4.7 (a) The compliance schedule shall not allow a printing press to supersede any applicable emission limitations required by the Director but not limited to:

- (1) Best Available Control Technology determinations, or
- (2) Lowest Achievable Emissions Rate determinations, or
- (3) Federal New Source Performance Standards, or
- (4) National Emission Standards of Hazardous Air Pollutants, or

- (5) Any other condition or standard that is specifically required by the Clean Air Act (as amended) for new or modified sources.
- (6) For bubbles issued under Section 21.5, the emission baseline.
- (b) For compliance schedules allowing bubbles involving volatile organic compounds identified as hazardous, the provisions of EPA's bubble policy (51 FR 43814) on pollutant comparability shall apply.

21.5 Alternative Standards Showing Internal Offsets for Printing Facilities (The "Bubble" Concept)

21.5.1 The Director may approve alternative volatile organic compound emission standards in applicable compliance schedules if the requirements of Subsections 21.5.2 through 21.5.9 are met. The option to meet requirements of Regulation 21 by bubbling is not available if the Federal Environmental Protection Agency has designated Rhode Island as a Non-Attainment Area for Ozone and the area is lacking an approved demonstration of attainment (NALAD). Bubbles approved when the state is under other designations shall remain in force when the state is designated as NALAD for Ozone.

21.5.2 The facility demonstrates, by means of approved material balance or a DEM and EPA-acceptable emission test, that sufficient reductions in volatile organic compound emissions may be obtained by controlling other existing printing presses in an amount equivalent to all excess emissions resulting from one or more printing presses not achieving the emission limitations of Section 21.3. Such written demonstration shall be submitted to the Director and shall include:

- (a) A description of the printing presses which will not comply with the emission limitations,
- (b) Pounds per day of volatile organic compounds emitted in excess of allowable emissions for each printing press. Nonreactive VOC may not generate credit in a trade against reactive VOC in a bubble,
- (c) A description of all printing presses within the facility with air cleaning devices, if any, whose emissions, when bubbled, will offset those from printing presses reported under Subsection 21.5.2(a),
- (d) Pounds per day of volatile organic compounds from each printing press before and after the installation of any air cleaning device and/or a description of any physical or operational changes at the facility to reduce emissions and the date on which such reductions will be achieved, and
- (e) A description of the procedures and methods used to determine the emissions of

volatile organic compounds.

- (f) Demonstration of how compliance will be met on a 24 hour basis. Printing facilities utilizing Section 21.5 must demonstrate compliance with this regulation on a gallons of solids applied basis.
- (g) The Department shall not approve any emissions bubble without first giving public notice at least 30 days prior to approval, and affording all interested persons opportunity to comment. The public may request a hearing. Upon a demonstration of significant public interest, the Director, in his discretion, may hold a hearing. EPA shall be provided with the public notice, proposed approval order, and technical support by the first day of the public comment period. Public (and EPA) comments will be considered prior to final approval of the bubble application. Upon issuance of final approval of the bubble, EPA will be mailed a copy of the approval, new technical support, and response to public comments.
- (h) The combined actual emission over a 24-hour period from all inks in the bubble used on printing presses which are part of the graphic arts facility and which are eligible as per subsection 21.5.9 (a) must be less than or equal to the allowable emission total (E) determined by the following equation:

$$E = A1 \times B1 + A2 \times B2 + \dots + An \times Bn:$$

where

E= the allowable emissions from the graphic arts facility in pounds per day;

A1, A2, ..., An = the applicable emission limitation for each ink (which for the purposes of Subsection 21.5 shall be 0.5 pounds of VOC/pound of solids applied);

B1, B2 ..., Bn = the pounds of solids applied for each ink in that 24-hour period.

21.5.3 The facility-wide emission reduction plan cannot include decreases in emissions resulting from other regulations that have been promulgated by the Director.

21.5.4 The facility-wide emission reduction plan shall be fully implemented within two years of approval by the Director.

21.5.5 Any emissions in excess of those limits established for each printing press in any compliance schedule or order issued under this section shall be a violation.

21.5.6 All compliance schedules based on the provisions of this section shall be subject to all the conditions of Subsection 21.4.6.

21.5.7 The provisions and emission limitations of any approved bubble shall be incorporated in

an approval. Compliance with this approval will be determined, when necessary, with EPA approved test methods. The approval must include source specific emission limits, recordkeeping requirements, and test methods used to demonstrate compliance. A facility which is subject to an enforcement action needs EPA approval to bubble.

21.5.8 Facilities applying to bubble will be assigned an emission baseline, as described in Subsection 21.1.1. Capacity utilization will be based on the average production during the two-year period prior to application to bubble. The facility's annual emissions may not exceed the limit set by the emission baseline. Emissions must be reported monthly and compliance with the emission baseline must be met every consecutive 12 month period, or on a more stringent compliance schedule approved by the Director.

21.5.9 An approvable bubble must meet the following requirements:

- (a) Emissions must be surplus. The reductions must not have been included in those anticipated in the State Implementation Plan for the affected source. ERC's cannot be taken for reductions made prior to the base year of the State's Approved SIP. Emissions reductions shown must not have been required by current state regulations, and must not be used by the facility to meet any other regulatory requirement.
- (b) Emission reductions must be permanent. The amount and duration of the reductions must be shown.
- (c) Emission reductions must be quantifiable. A reliable basis for calculating the amount and rate of reductions must be used. Emission rates before and after the reductions must be shown, and the reductions described.
- (d) Emission reductions must be enforceable. An approval containing enforceable emissions rates will be issued.
- (e) All of the requirements of EPA's final Emission Trading Policy (51 FR 43814) must be met.

21.6 Compliance Demonstration/Testing

21.6.1 Compliance with applicable sections of this regulation shall be demonstrated in accordance with 40 CFR 60, Appendix A, Methods 24, 24A, 25 as amended or any other EPA approved method which has been accepted by the Director and EPA. A one hour bake time must be used for Methods 24 and 24A and, further, Method 24 and 24A apply to multicomponent coatings.

21.7 Recordkeeping

21.7.1 (a) The facility shall maintain the following information at the facility at all

times. This information shall be kept current and be made available to the DEM or EPA upon request.

1. Printing coating press number
2. Hours of operation per day or per year
3. Method of application
4. Number and types of inks coats applied to the substrate
5. Drying method
6. Substrate type

(b) For each ink coating,

1. Supplier name, ink coating name and Identification number
2. Ink Coating density (lb/gal)
3. Total volatile content of ink coating as supplied (vol %)
4. Water content of ink coating as supplied (wt%)
5. Exempt solvent content of ink coating as supplied (wt%)
6. Solids content of ink coating as supplied (wt%)
7. Name of diluent, if any
8. Identification number of diluent
9. Diluent solvent density (lb/gal)
10. VOC content of diluent (wt%)
11. Exempt solvent content of diluent (wt%)
12. Diluent/coating ratio (gal diluent/gal coating)

The facility should maintain 8) through 12) above for any diluent and solvents used for cleanup operations.

c) The facility shall keep the following records on site for each printing coating press on a daily basis:

1. Printing coating press number
2. Time period
3. Ink Coating identification number
4. Amount of ink coating used (gallons)
5. Diluent identification number
6. Amount of diluent used (gallons)

The facility shall also maintain 5) and 6) for clean up operations.

d) All record and reports must be maintained by the facility for no less than five years.

e) Additional recordkeeping and reporting for facilities with add-on control

1. The facility shall maintain the following information at all times. This information shall be kept current and be made available to the DEM and EPA upon request.
 - a) Control device identification number and model number
 - b) Manufacturer
 - c) Installation date
 - d) Printing press(es) controlled
 - e) Whether or not the control device is always in operation when the press(es) it is serving is in operation
 - f) Type of control device
 - g) Destruction or removal efficiency
 - h) Date tested (If not tested, method of determining destruction efficiency)
 - i) For thermal incinerators-design combustion temperature (°F)
 - j) For catalytic incinerators- design exhaust gas temperature (°F), design temperature rise across catalyst bed (°F), anticipated frequency of catalyst change, and catalyst changes
 - k) For a condenser-design inlet temperature of cooling medium (°F),

design exhaust gas temperature (°F)

- l) For a carbon adsorber-design pressure drop across the adsorber, VOC concentration at breakthrough
 - m) Emission test results-inlet VOC concentration (ppm), outlet VOC concentration (ppm), method of concentration determination, date of determination
 - n) Type and location of capture system
 - o) Capture efficiency (%)
 - p) Method of determining capture efficiency
2. The facility shall continuously monitor and record at least the following parameters.
- a) For thermal incinerators - exhaust gas temperature (°F)
 - b) For catalytic incinerators - exhaust gas temperature (°F), temperature rise across the catalyst bed (°F)
 - c) For condensers - inlet temperature of cooling medium (°F), exhaust gas temperature (°F)
 - d) For carbon adsorbers - pressure drop across the adsorber, hydrocarbon levels for breakthrough

21.8 General Provisions

21.8.1 Purpose

The purpose of this regulation is to limit volatile organic compound emissions from printing operations.

21.8.2 Authority

These regulations are authorized pursuant to R.I. Gen. Laws § 42-17.1-2(s) and 23-23, as amended, and have been promulgated pursuant to the procedures set forth in the R.I. Administrative Procedures Act, R.I. Gen. Laws Chapter 42-35

21.8.3 ***

21.8.4 Severability

If any provision of this regulation or the application thereof to any person or circumstance, is held invalid by a court of competent jurisdiction, the validity of the remainder of the regulation shall not be affected thereby.

21.8.5 Effective Date

The foregoing regulation, "Control of Volatile Organic Compound Emissions from Printing Operations", as amended, after due notice, is hereby adopted and filed with the Secretary of State this 29th day of June, 2007 to become effective twenty (20) days thereafter, in accordance with the provisions of Chapters 23-23, 42-35, 42-17.1, 42-17.6, of the General Laws of Rhode Island of 1956, as amended.

W. Michael Sullivan, PhD., Director
Department of Environmental Management

Notice Given on: February 21, 2007

Public Hearing held: March 23, 2007

Filing Date: June 29, 2007

Effective Date: July 19, 2007