San Joaquin Valley
Unified Air Pollution Control District

Best Available Control Technology (BACT) Guideline 4.7.2*

Emissions Unit: Offset Lithographic Printing - Non-Heatset Press **Industry Type:** All

Equipment Rating: All **Last Update:** 3/27/26

Pollutant	Achieved in Practice or contained in SIP	Technologically Feasible	Alternate Basic Equipment
VOC	Using materials with the following VOC contents: <u>Inks:</u> • Less than 5% VOC by weight (less water and exempt compounds) or • Less than 30% VOC by weight (less water and exempt compounds) for high-end graphics <u>Fountain Solutions:</u> • Less than 0.42 lb-VOC/gal for coldset web offset lithographic, • Less than 0.42 lb-VOC/gal for sheet-fed offset lithographic with maximum sheet size greater than 11x17 inches, or • Less than 5% VOC by volume for high-end graphics	1. 98% VOC capture and control efficiency (thermal incineration or equivalent) using inks and fountain solutions meeting Achieved in Practice (AIP) requirements 2. 95% VOC capture and control efficiency (carbon adsorption or equivalent) using inks and fountain solutions meeting AIP requirements	

BACT is the most stringent control technique for the emissions unit and class of source. Control techniques that are not achieved in practice or contained in a state implementation plan must be cost effective as well as feasible. Economic analysis to demonstrate cost effectiveness is required for all determinations that are not achieved in practice or contained in an EPA approved State Implementation Plan.

***This is a Summary Page for this Class of Source - Permit Specific BACT Determinations on Next Page(s)**

Proactive Best Available Control Technology Analysis

District BACT Guideline 4.7.2

Offset Lithographic Printing - Non-Heatset Press

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I. Introduction

The objective of this project is to proactively update Best Available Control Technology (BACT) guideline 4.7.2, which covers Offset Lithographic Printing – Non-Heatset Presses. This guideline was last updated on October 15, 2010.

This proactive update is necessary to assure that the most stringent emission control standards that have been achieved in practice are required for this class and category of source. Furthermore, the proactive update to this BACT guideline will bring consistency in implementing the BACT standard throughout the regional offices of the District for new and modified Offset Lithographic Printing - Non-Heatset Presses triggering BACT. The discussion in this document will be limited to the following items:

- Source of Emissions
- Top-Down BACT Analysis for VOC Emissions
- Recommendation

II. Source of Emissions

Emissions from Offset Lithographic Printing - Non-Heatset Presses come from several main points in the printing line. These include the ink fountains, the press units, the printed product, press preparation and cleanup operations. If low VOC water-based inks are in use, then the primary emission points become the press preparation and clean-up operations.

This proactive BACT determination applies to Offset Lithographic Printing – Non-Heatset Presses, which solely emit VOCs.

III. Top-Down BACT Analysis for VOC Emissions

Step 1 - Identify All Possible Control Technologies

Survey of BACT Clearinghouses

The following BACT clearinghouses were reviewed to determine if there are BACT Guidelines that exist for this source category, i.e. offset lithographic presses used for both low-end and high-end graphic arts.

- South Coast AQMD (SCAQMD) BACT clearinghouse
- Bay Area AD (BAAD) BACT clearinghouse
- Sacramento Metro AQMD (SMAQMD) BACT clearinghouse
- San Diego County APCD (SDAPCD) BACT clearinghouse
- CARB BACT clearinghouse
- EPA RACT/BACT/LAER clearinghouse

Summary of BACT Requirements	
BACT Guideline	VOC Requirements
South Coast AQMD BACT for Lithographic or Offset, Non-Heatset (9/2/2022)	Achieved in Practice: Low VOC Fountain Solution (≤ 8% by Vol. VOC); Low VOC (≤ 100 g/l) Blanket and Roller Washers; Oil-Based or UV-Curable Inks; and Compliance with SCAQMD Rules 1130 and 1171 (2-1-2019) Under South Coast Rule 1130 (amended May 2, 2014), VOC content limits are capped at 300 g/L (2.5 lb/gal) for Offset Lithographic Ink and 50 g/L for fountain solutions used in sheet-fed or non-heatset web-fed presses. It also specifies 85 g/L for sheet-fed presses that use alcohol with refrigerated chiller. Under South Coast Rule 1171 (amended June 6, 2025), VOC content limits for solvents are capped at various levels depending on the application. The applicable limits are 25 g/L (0.21 lb/gal) for general cleaning and 100 g/L (0.83 lb/gal) for roller wash, blanket wash, and on-press components.
Bay Area AD BACT for Lithographic or Offset Printing – Non-Heatset, Document 110.2.1 (08/24/1998)	Achieved in Practice: Low VOC fountain solution (≤8% by vol.); and minimum possible VOC blanket wash and roller and tray washers; and cleanup solvents with ≤7.5 lb-VOC/gal and VOC vapor pressure ≤25 mmHg or ≤30% by vol. VOC; and kerosene-like oil based inks Technologically Feasible: Low VOC fountain solution (≤ 6% by vol.); and automatic blanket and roller wash with solvent capture and recycle; and cleanup solvents with ≤2.5 lb-VOC/gal or VOC vapor pressure ≤5 mmHg; and kerosene-like oil based inks. If cost-effective, capture and vent VOC to afterburner or carbon adsorption system with ≥98.5% destruction/recovery device efficiency; or VOC outlet ≤10 ppm

Sacramento Metro AQMD for lithographic offset non-heatset, Document 326 (amended 3/9/2023)	Achieved in Practice: Low VOC emissions (Compliance with SMAQMD Rule 450); If emissions are ≥ 7,806 lb-VOC/year, then an Air Pollution Control (APC) device is required. The APC must be installed with a 98.5% overall system efficiency (capture and destruction). Under SMAQMD Rule 450, section 301 (amended 10/23/2008), VOC content limits are capped at 300 g/L (2.5 lb/dal) for printing Ink and ≤5% by weight for fountain solutions used in sheet-fed or non-heatset web-fed presses. It also specifies ≤8.5% by weight for sheet-fed presses that use alcohol with refrigerated chiller. Under SMAQMD Rule 450, section 302 (amended 10/23/2008), VOC content limits for solvents are capped at various levels depending on the application. The applicable limits are 25 g/L (0.21 lb/gal) for general cleaning and for removable press components and 100 g/L (0.83 lb/gal) for roller wash, blanket wash, and on-press components.
San Diego County APCD BACT for Graphic Arts Operations, < 5 tons-VOC/year (11/2023)	Achieved in Practice: Use of low VOC fountain solution (<6% VOC by volume); Capture & recycle blanket and roller tray wash; Use of cleanup solvent which has either less than 200 grams VOC per liter or vapor pressure of less than 5 mmHg at 20 °C; and Use of metering roll cleanup solvent which has either less than 100 grams VOC per liter or vapor pressure of less than 10 mmHg at 20 °C; and use of inks which have a VOC content of less than 300 grams per liter (2.5 lb/gal) Technologically Feasible: Use of low VOC fountain solution (<5% VOC by volume); Capture & recycle blanket and roller tray wash; Use of cleanup solvent which has either less than 100 grams VOC per liter or vapor pressure of less than 5 mmHg at 20 °C; Use of metering roll cleanup solvent which has either less than 100 grams VOC per liter or vapor pressure of less than 5 mmHg at 20 °C; and Use of inks which have a VOC content of less than 225 grams per liter (1.9 lb/gal).

The SJVAPCD BACT clearinghouse previously had one BACT guideline for screen printing operations (Guideline 4.7.2, Offset Lithographic Printing – Non-heat set press). This guideline is no longer a valid guideline in the District's BACT clearinghouse. However, the previous requirements will be included for reference purposes. The requirements are shown in the table below:

Guideline	Pollutant	Achieved in Practice or in the SIP	Technologically Feasible	Alternate Basic Equipment
4.7.2, Offset Lithographic Printing – Non-heat set press	VOC	Inks: less than 5% VOC by weight or less than 30% VOC by weight for high-end graphics. Fountain Solutions: less than 5% by volume for coldset web offset lithographic, less than 5% by volume for sheet-fed offset lithographic with maximum sheet size greater than 11x17 inches, and less than 8% by volume for high-end graphics. [This control is achieved in practice only for facilities subject to District Rule 4607]	1. VOC capture and incineration; or 2. VOC capture and carbon adsorption and using materials with the following VOC contents: Inks: less than 5% VOC by weight or less than 30% VOC by weight for high-end graphics. Fountain Solutions: less than 5% by volume for coldset web offset lithographic, less than 5% by volume for sheet-fed offset lithographic with maximum sheet size greater than 11x17 inches, and less than 8% by volume for high-end graphics.	None

The CARB BACT Clearinghouse has some links to the Bay Area AD BACT Guideline 110.2.1 (requirements discussed above), Sacramento Metro AQMD BACT Guideline 251 and San Joaquin Valley APCD BACT Guideline 4.7.2. The guideline from Sacramento Metro is outdated and the most recent version is discussed above. The San Joaquin Valley guideline has been rescinded and is no longer applicable.

The EPA RACT/BACT/LAER clearinghouse does not include general guidelines, only determinations made by individual agencies. The BACT determinations for graphic arts operations using lithographic presses were reviewed. There was only one applicable determination, IN-0277. This determination required the use of an RTO with a 98% control efficiency.

Survey of California Air District Rules

In addition, the rules and regulations of the following agencies were searched to identify if the agencies currently have any regulations that specifically apply to offset lithographic presses:

- South Coast AQMD
- Bay Area AD
- Sacramento Metro AQMD
- San Diego County APCD

- San Joaquin Valley APCD

Summary of Rule Emissions Limits	
Rule	VOC Emissions Limit
South Coast AQMD Rule 1130, *Graphic Arts* (5/23/2014)	VOC content limits are capped at 300 g/L (2.5 lb/gal) for Offset Lithographic Ink and 50 g/L (0.42 lb/gal) for fountain solutions used in sheet-fed or non-heatset web-fed presses. It also specifies 85 g/L (0.71 lb/gal) for sheet-fed presses that use alcohol with refrigerated chiller.
South Coast AQMD Rule 1171, *Solvent Cleaning Operations* (6/6/2025)	VOC content limits for solvents are capped at various levels depending on the application. The applicable limits are 25 g/L (0.21 lb/gal) for general cleaning and 100 g/L (0.83 lb/gal) for roller wash, blanket wash, and on-press components.
Bay Area AD Regulation 8, Rule 20 *Graphic Arts Printing and Coating Operations* Section 300 (11/19/2008)	Ink, Coating, and Web Splicing Adhesive: 300 g/L (2.5 lb/gal) Adhesive: 150 g/L (1.25 lb/gal) Fountain Solution: ≤8% by volume Solvent: 100 g/L (0.83 lb/gal)
Sacramento Metropolitan AQMD Rule 450, *Graphic Arts Operations* (10/23/2008)	Ink and Coating: 300 g/L (2.5 lb/gal) Adhesive: 150 g/L (1.25 lb/gal) Fountain Solution: ≤5% by weight for most uses and ≤8.5% by weight for solutions containing alcohol that are chilled using a chiller. Solvent: 25 g/L (0.21 lb/gal) for general and removable press pieces; 100 g/L (0.83 lb/gal) for all other components
San Diego County APCD Rule 67.16, *Graphic Arts Operations* (11/09/2011)	Graphic Art Materials: 300 g/L (2.5 lb/gal) Adhesive: 150 g/L (1.25 lb/gal) Fountain Solution: ≤5% by weight for most uses and ≤8.5% by weight for solutions kept to ≤60°F. Solvent: 100 g/L (0.83 lb/gal)
SJVAPCD Rule 4607, *Graphic Arts and Paper, Film, Foil, and Fabric Coatings* (12/18/2008)	Ink (Non-flexographic) and Coating: 300 g/L (2.5 lb/gal) Adhesive and Web Splicing Adhesives: 150 g/L (1.25 lb/gal) Fountain Solution: ≤5% by volume for non-heat set lithographic and sheet-fed lithographic (max 11 x 17 in) and ≤8% by volume for all other presses.

The lowest identified rule limit is 300 g/L (2.5 lb/gal) for inks, 150 g/L (1.25 lb/gal) for adhesive and web splicing adhesives, 50 g/L (0.42 lb/gal) for fountain solutions, and ≤8% by volume for chilled fountain solutions.

Survey of SJVAPCD Permits

A search of District issued permits was conducted to determine the most stringent VOC emission limits within the District that have been achieved-in-practice for this class or category. The District currently has twenty-seven (27) permits for Offset Lithographic graphic arts operations, not including the permit being discussed within this project. There are six (6) permits that are exemption from VOC content limitations as they comply with the requirements of section 4.1 of the rule. Of the remaining twenty-one (21) permits, eighteen (18) of them are required to use the VOC content limits from District Rule 4607 and of that eighteen, eight (8) of them also require high-end graphic inks to be less than 30% VOC by weight. Two (2) of the permits specify that the VOC limit on inks used must be less than 5% by weight for low end graphics and 30% by weight for high-end graphics. The last remaining permit lists specific coatings and VOC content limits.

As discussed above, the consistently permitted VOC control method for lithographic printing operations is the use of inks, coatings, and fountain solutions that are compliant with District Rule 4607. Additionally, the VOC limits for high-end graphics are ≤30% by weight for inks and ≤5% by volume for fountain solutions.

The permit unit that lists specific coatings and VOC contents is permit unit N-3748-1-14. The inks and fountain solutions listed on the permit have lower VOC limits than the current version of District Rule 4607. However, this BACT analysis is attempting to determine an appropriate standard for VOC limits for graphic arts materials, not to recommend a certain product. Additionally, it cannot be expected for each facility to use the same inks and coatings, therefore, this lower VOC limit for graphic arts materials will not contribute to the determination made within this BACT analysis.

Summary of Survey Results

Based on the preceding survey, the BACT options identified are summarized as follows:

Option 1: Use of materials with the following VOC contents

Inks:

- Less than 5% VOC by weight (less water and exempt compounds) or
- Less than 30% VOC by weight (less water and exempt compounds) for high-end graphics

Fountain Solution:

- Less than 0.42 lb-VOC/gal for coldset we offset lithographic,

- Less than 0.42 lb-VOC/gal for sheet-fed offset lithographic with maximum sheet size greater than 11x17 inches,
- Less than 5% VOC by volume for high-end graphics

Option 2: Thermal incineration and using materials with the following VOC limits. (98% control efficiency)[1]

Inks:
- Less than 5% VOC by weight (less water and exempt compounds) or
- Less than 30% VOC by weight (less water and exempt compounds) for high-end graphics

Fountain Solution:
- Less than 0.42 lb-VOC/gal for coldset we offset lithographic,
- Less than 0.42 lb-VOC/gal for sheet-fed offset lithographic with maximum sheet size greater than 11x17 inches,
- Less than 5% VOC by volume for high-end graphics

Option 3: Carbon adsorption and using materials with the following VOC limits. (95% control efficiency)[1]

Inks:
- Less than 5% VOC by weight (less water and exempt compounds) or
- Less than 30% VOC by weight (less water and exempt compounds) for high-end graphics

Fountain Solution:
- Less than 0.42 lb-VOC/gal for coldset we offset lithographic,
- Less than 0.42 lb-VOC/gal for sheet-fed offset lithographic with maximum sheet size greater than 11x17 inches,
- Less than 5% VOC by volume for high-end graphics

Step 2 - Eliminate Technologically Infeasible Options

There are no technologically infeasible options listed in Step 1. All of the emission control options under consideration are based on either current BACT requirements or current rule requirements. Therefore, no further discussion is required.

Step 3 - Rank Remaining Control Technologies by Control effectiveness

[1] Except when process/project-specific determinations have demonstrated higher control efficiencies, the District generally uses 98% and 95% as the standard minimum control efficiencies for thermal incineration and carbon adsorption, respectively. These minimum control efficiencies are consistent with EPA guidelines such as the technology fact sheet for incineration (EPA-452/F-03-022, https://www3.epa.gov/ttncatc1/cica/files/fthermal.pdf) and the technical bulletin for carbon adsorption (EPA 456/F-99-004, https://www3.epa.gov/ttncatc1/cica/files/fadsorb.pdf).

Option 1: Thermal incineration and using materials with the following VOC limits. (98% control efficiency)[2] – Technologically Feasible

Inks:
- Less than 5% VOC by weight (less water and exempt compounds) or
- Less than 30% VOC by weight (less water and exempt compounds) for high-end graphics

Fountain Solution
- Less than 0.42 lb-VOC/gal for coldset web offset lithographic,
- Less than 0.42 lb-VOC/gal for sheet-fed offset lithographic with maximum sheet size greater than 11x17 inches,
- Less than 5% VOC by volume for high-end graphics

Option 2: Carbon adsorption and using materials with the following VOC limits. (95% control efficiency)[1] – Technologically Feasible

Inks:
- Less than 5% VOC by weight (less water and exempt compounds) or
- Less than 30% VOC by weight (less water and exempt compounds) for high-end graphics

Fountain Solution
- Less than 0.42 lb-VOC/gal for coldset web offset lithographic,
- Less than 0.42 lb-VOC/gal for sheet-fed offset lithographic with maximum sheet size greater than 11x17 inches,
- Less than 5% VOC by volume for high-end graphics

Option 3: Use of materials with the following VOC contents - Achieved in Practice

Inks:
- Less than 5% VOC by weight (less water and exempt compounds) or
- Less than 30% VOC by weight (less water and exempt compounds) for high-end graphics

Fountain Solution
- Less than 0.42 lb-VOC/gal for coldset web offset lithographic,
- Less than 0.42 lb-VOC/gal for sheet-fed offset lithographic with maximum sheet size greater than 11x17 inches,
- Less than 5% VOC by volume for high-end graphics

[2] Except when process/project-specific determinations have demonstrated higher control efficiencies, the District generally uses 98% and 95% as the standard minimum control efficiencies for thermal incineration and carbon adsorption, respectively. These minimum control efficiencies are consistent with EPA guidelines such as the technology fact sheet for incineration (EPA-452/F-03-022, https://www3.epa.gov/ttncatc1/cica/files/fthermal.pdf) and the technical bulletin for carbon adsorption (EPA 456/F-99-004, https://www3.epa.gov/ttncatc1/cica/files/fadsorb.pdf).

Step 4 - Cost Effectiveness Analysis

As discussed above, this BACT analysis is being performed as a proactive update to this BACT guideline and is not part of a specific permitting action. Therefore, a cost effective analysis is not necessary and will not be included as a part of this analysis.

Step 5 - Select BACT

This is a proactive determination that is not part of a specific permitting action. Therefore, selecting BACT is not necessary. However, the following VOC emission control standard has been determined to be achieved in practice and is therefore determined to be the minimum BACT requirement that needs to be met for Offset Lithographic Printing - Non-Heatset Presses:

- Using materials with the following VOC contents:
  - Inks: less than 5% VOC by weight (less water and exempt compounds) or less than 30% VOC by weight (less water and exempt compounds) for high end graphics
  - Fountain Solutions: less than 0.42 lb-VOC/gal for coldset web offset lithographic, less than 0.42 lb-VOC/gal for sheet-fed offset lithographic with a maximum sheet size greater than 11x17 inches, and less than 5% by volume for high end graphics.

IV. Recommendation

No new control technologies were found to control the VOC emissions from Offset Lithographic Printing - Non-Heatset Presses. In addition, none of the existing technologically feasible control options listed in current BACT guideline 4.7.2 were found to be in use as control devices for Offset Lithographic Printing - Non-Heatset Presses. Therefore, adopt updated BACT guideline 4.7.2 in accordance with the requirements of the draft revised BACT guideline 4.7.2 in Appendix A.

Appendices

Appendix A: Proposed Revised Draft BACT Guideline 4.7.2
Appendix B: Current BACT Guideline 4.7.2

Appendix A
Proposed Revised Draft BACT Guideline 4.7.2

San Joaquin Valley
Unified Air Pollution Control District

Best Available Control Technology (BACT) Guideline 4.7.2*

Emissions Unit: Offset Lithographic Printing - Non-Heatset Press **Industry Type:** All

Equipment Rating: All **Last Update:** 3/27/26

Pollutant	Achieved in Practice or contained in SIP	Technologically Feasible	Alternate Basic Equipment
VOC	Using materials with the following VOC contents: <u>Inks:</u> • Less than 5% VOC by weight (less water and exempt compounds) or • Less than 30% VOC by weight (less water and exempt compounds) for high-end graphics <u>Fountain Solutions:</u> • Less than 0.42 lb-VOC/gal for coldset web offset lithographic, • Less than 0.42 lb-VOC/gal for sheet-fed offset lithographic with maximum sheet size greater than 11x17 inches, or – Less than 5% VOC by volume for high-end graphics	1. 98% VOC capture and control efficiency (thermal incineration or equivalent) using inks and fountain solutions meeting Achieved in Practice (AIP) requirements 2. 95% VOC capture and control efficiency (carbon adsorption or equivalent) using inks and fountain solutions meeting AIP requirements	

BACT is the most stringent control technique for the emissions unit and class of source. Control techniques that are not achieved in practice or contained in a state implementation plan must be cost effective as well as feasible. Economic analysis to demonstrate cost effectiveness is required for all determinations that are not achieved in practice or contained in an EPA approved State Implementation Plan.

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Appendix B
Current BACT Guideline 4.7.2

San Joaquin Valley
Unified Air Pollution Control District

Best Available Control Technology (BACT) Guideline 4.7.2*

Last Update: 10/15/2010

Offset Lithographic Printing - Non-heat Set Press

Pollutant	Achieved in Practice or contained in the SIP	Technologically Feasible	Alternate Basic Equipment
VOC	Using materials with the following VOC contents: Inks: less than 5% VOC by weight (less water and exempt compounds) or less than 30% VOC by weight (less water and exempt compounds) for high end graphics Fountain Solutions: less than 5% by volume for coldset web offset lithographic, less than 5% by volume for sheet-fed offset lithographic with maximum sheet size greater than 11x17 inches, and less than 8% by volume for high end graphics	VOC capture and incineration; or VOC capture and carbon adsorption and using materials with the following VOC contents: - Inks:less than 5% VOC by weight (less water and exempt compounds) or less than 30% VOC by weight (less water and exempt compounds) for high end graphics - Fountain Solutions: less than 5% by volume for coldset web offset lithographics, less than 5% by volume for sheet-fed offset lithographic with maximum sheet size greater than 11x17 inches, and less than 8% by volume for high end graphics	

BACT is the most stringent control technique for the emissions unit and class of source. Control techniques that are not achieved in practice or contained in a State Implementation Plan must be cost effective as well as feasible. Economic analysis to demonstrate cost effectiveness is required for all determinations that are not achieved in practice or contained in an EPA approved State Implementation Plan.

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