SACRAMENTO METROPOLITAN
AIR QUALITY MANAGEMENT DISTRICT

DEMONSTRATION OF REASONABLY AVAILABLE CONTROL TECHNOLOGY FOR THE 2008 OZONE NAAQS (RACT SIP)

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BACKGROUND

In 2008, the U.S. Environmental Protection Agency (EPA) revised the 8-hour standard for ozone to 0.075 parts per million[1]. EPA subsequently designated the Sacramento Metropolitan Area, which includes all of Sacramento and Yolo counties, and parts of El Dorado, Placer, Solano, and Sutter counties, as a severe nonattainment area[2] for the new standard, with an attainment date of July 20, 2027[3]. This classification requires the districts in the nonattainment area to submit several plan elements to EPA, including revisions to the State Implementation Plan (SIP) that meet the Reasonably Available Control Technology (RACT) requirements for VOC and NOx in accordance with Sections 182(b)(2) and 182(f) of the federal Clean Air Act. This requirement is known as the RACT SIP. The District submitted a RACT SIP in 2006 during implementation of the 1997 8-hour ozone standard[4], and submitted an update in 2008 when the districts of the nonattainment area requested a voluntary change in classification from serious to severe.

EPA defines RACT as "the lowest emission limitation that a particular source is capable of meeting by the application of control technology that is reasonably available considering technological and economic feasibility[5]." Sections 182(b)(2) and 182(f) of the Clean Air Act require the District to implement RACT for:

- Each category of VOC sources that is covered by a Control Technique Guideline (CTG) document issued by EPA; and
- All major stationary sources of VOC and/or NOx (a potential to emit at least 25 tons per year of VOC and/or NOx for severe nonattainment areas[6]).

2006 EPA Region IX Guidance

To help states and districts prepare their 2006 RACT SIPs, EPA Region IX provided guidance in a letter from Andrew Steckel, dated March 9, 2006. The following elements are included in the recommended strategy:

- Describe efforts to identify all source categories within the District requiring RACT, including CTG sources (i.e., covered by an EPA Control Technique Guideline document) and major non-CTG sources.
- Submit negative declarations where there are no facilities (major or minor) within the District subject to a CTG.
- For all categories needing RACT, list the state/local regulation that implements RACT. It may also be helpful to list the date EPA approved these regulations as fulfilling RACT.
- Describe the basis for concluding that the regulations fulfill RACT. Documents useful in establishing RACT include CTGs, Alternative Control Technique (ACT) guidance, Maximum Achievable Control Technology (MACT) standards, New Source Performance Standards (NSPSs), California Suggested Control Measures (SCMs) and RACT/Best Available Retrofit Control Technology (BARCT) determinations, regulations adopted in other Districts, and guidance and rules developed by other state and local agencies.

[1] 73 FR 16436, March 27, 2008.
[2] 77 FR 30088, May 21, 2012.
[3] 80 FR 12264, March 6, 2015.
[4] 70 FR 71612, November 29, 2005.
[5] 44 FR 53762, September 17, 1979.
[6] Clean Air Act Section 182(d).

EPA's Implementation Rule for the 2008 Ozone Standard

In 2013, EPA published a proposed implementation rule for the 2008 8-hour ozone standard[7]. The proposed rule provides guidance to states and districts for preparing their required SIP submittals, including RACT SIPs. The rule was finalized in 2015[8] with no changes to the proposed RACT SIP requirements or guidance. RACT must be implemented by January 1, 2017.

The proposed implementation rule notes that current EPA guidance and any other available information should be used in making RACT determinations, such as:

- CTGs and ACTs;
- BACT/LAER Clearinghouse;
- SIPs for other nonattainment areas, in particular those areas with higher classifications;
- The ''Menu of Control Measures'' for NOx and VOC[9];
- Standards of performance for existing stationary sources developed under CAA section 111(d)[10]; and
- New Source Review (NSR) and Prevention of Significant Deterioration (PSD) settlement agreements.

EPA also stated that in some cases, Maximum Achievable Control Technology (MACT) standards and National Emission Standards for Hazardous Air Pollutants (NESHAP)[11] may be used to demonstrate RACT.

> *For VOC sources subject to MACT standards, our policy is to allow states to streamline their RACT analysis by including a discussion of the MACT controls and considerations relevant to VOC RACT. Historically, in many cases, states have been able to rely on MACT standards for purposes of showing that a source has met VOC RACT. States need to take care to ensure that any MACT controls relied on for RACT adequately address all VOCs and not just those that are also HAPs. For example, if a manufacturer complies with MACT by reformulating products to remove HAPs but the production process still releases non-HAP VOCs, the state would need to justify why the MACT meets the RACT requirement for that source or would need to develop an appropriate RACT rule to address non-HAP VOCs.*[12]

In the final rule, EPA finalized an approach that allows states to conclude that previous RACT determinations may still constitute RACT if the incremental emission reductions that would result from additional controls would be small.

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[7] "Implementation of the 2008 National Ambient Air Quality Standards for Ozone: State Implementation Plan Requirements," Proposed Rule, 78 FR 34178, June 6, 2013.

[8] "Implementation of the 2008 National Ambient Air Quality Standards for Ozone: State Implementation Plan Requirements," Final Rule, 80 FR 12264, March 6, 2015.

[9] "Menu of Control Measures," EPA, updated April 12, 2012.

[10] Of the standards promulgated under section 111(d), only 40 CFR Part 60, Subpart Cc – Emission Guidelines and Compliance Times for Municipal Solid Waste Landfills is relevant to sources in Sacramento County.

[11] National Emission Standards for Hazardous Air Pollutants, 40 CFR Part 63.

[12] 78 FR 34193, June 6, 2013.

> *The EPA is finalizing the approach allowing in some cases for states to conclude that sources already addressed by RACT determinations for the 1-hour and/or 1997 ozone NAAQS do not need to implement additional controls to meet the 2008 ozone NAAQS RACT requirement. We believe that, in some cases, a new RACT determination under the 2008 standard would result in the same or similar control technology as the initial RACT determination under the 1-hour or 1997 standard because the fundamental control techniques, as described in the CTGs and ACTs, are still applicable. In cases where controls were applied due to the 1-hour or 1997 NAAQS ozone RACT requirement, we expect that any incremental emissions reductions from application of a second round of RACT controls may be small and, therefore, the cost for advancing that small additional increment of reduction may not be reasonable. In contrast, a RACT analysis for uncontrolled sources would be much more likely to find that new RACT-level controls are economically and technically feasible.*[13]

EPA further discussed the application of this approach in the final rule.

> *In portions of 2008 nonattainment areas where control technologies for major sources or source categories were previously reviewed and controls applied to meet the RACT requirement under the 1-hour or the 1997 ozone NAAQS, states should review and, if appropriate, accept the initial RACT analysis as meeting the RACT requirements for the 2008 ozone NAAQS. Absent data or public comments indicating that the previous RACT determination is no longer appropriate, the state need not adopt additional SIP controls to meet the new RACT requirement for these sources. In such cases, the state's SIP revision submitted after notice and comment should contain a certification, with appropriate supporting information (including consideration of new data), indicating that these sources are already subject to SIP-approved requirements that still meet the RACT obligation.*[14]

To demonstrate RACT for CTG source categories and all major stationary sources of VOC and/or NOx, the proposed and final implementation rules specify that RACT SIPs must include:

- Adopted RACT regulations;
- Certifications, where appropriate, that existing provisions are RACT;
- Negative declarations where there are no sources in the nonattainment area covered by a specific CTG source category;
- Notice and opportunity for public comment, even when certifying that the existing provisions remain RACT or when a negative declaration is being submitted; and
- Appropriate supporting information.

This RACT demonstration document has been prepared in accordance with the guidance discussed above. It will be submitted to EPA as a SIP revision to meet the requirements of Sections 182(b)(2) and 182(f) of the federal Clean Air Act.

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[13] 80 FR 12279, March 6, 2015.
[14] 80 FR 12280, March 6, 2015.

RACT ANALYSIS

The specific information sources Staff used for RACT determinations included:

- CTGs and ACTs[15];
- New Source Performance Standards (NSPSs);
- National Emission Standards for Hazardous Air Pollutants (NESHAPs);
- The Menu of Control Measures;
- NSR and PSD settlement agreements from EPA's database of Civil Cases and Settlements[16];
- CARB's Determinations of Reasonably Available Control Technology and Best Available Retrofit Control Technology;
- EPA's RACT/BACT/LAER Clearinghouse[17];
- CARB's BACT Clearinghouse[18];
- The District's BACT Clearinghouse; and
- Rules from other nonattainment areas that were classified as serious nonattainment or higher for the 1997 and/or 2008 8-hour ozone standard, including:
  - Placer County Air Pollution Control District (Severe-15 for 1997 and 2008);
  - Yolo-Solano Air Quality Management District (Severe-15 for 1997 and 2008);
  - Ventura County Air Pollution Control District (Serious for 1997 and 2008);
  - San Joaquin Valley Unified Air Pollution Control District (Extreme for 1997 and 2008);
  - South Coast Air Quality Management District (Extreme for 1997 and 2008);
  - Dallas-Fort Worth, Texas[19] (Serious for 1997);
  - Houston-Galveston-Brazoria, Texas (Severe-15 for 1997); and
  - Baltimore, Maryland[20] (Serious for 1997).

The process Staff used to demonstrate compliance with federal RACT requirements consists of the following steps:

- For each CTG, identify whether the District has sources to which the CTG applies.
- If the District has no sources to which a CTG applies, submit a negative declaration, including CTGs where the District has previously submitted negative declarations.
- If the District has a source(s) to which a CTG applies, identify the applicable District rule and perform a detailed comparison of the rule requirements with the CTG and other available RACT guidance. Appendix C contains the analyses for CTG source categories.
- For non-CTG categories that are applicable to one or more major sources within the District, perform a detailed comparison of the rule requirements applicable to those

[15] http://www.epa.gov/ozone-pollution/control-techniques-guidelines-and-alternative-control-techniques-documents-reducing
[16] http://cfpub.epa.gov/enforcement/cases/
[17] http://cfpub.epa.gov/RBLC/index.cfm?action=Home.Home
[18] http://www.arb.ca.gov/bact/bactnew/rptpara.htm
[19] The Texas air quality regulations are contained in Title 30, Part 1 of the Texas Administrative Code. http://texreg.sos.state.tx.us/public/readtac$ext.ViewTAC?tac_view=3&ti=30&pt=1
[20] The Maryland air quality regulations are contained in Title 26, Subtitle 11 of the Code of Maryland Regulations. http://www.dsd.state.md.us/comar/subtitle_chapters/26_Chapters.aspx

source categories with relevant RACT guidance. Appendix D contains the analyses for non-CTG categories where the District has applicable rules.

- For major sources, determine the types of emission units at the facility and determine which District rules apply to these sources. The RACT requirement is satisfied for a major source when all units that emit VOC or NOx are subject to rules that have been determined to satisfy RACT (as demonstrated in Appendices C and D). Appendix E contains the analyses for major sources.

Table 1 contains the list of all CTG categories, together with the applicable District rule (unless there are no sources), the most recent amendment date, and the status of the rule in the SIP. For CTGs where the District has applicable sources, District rules were analyzed to determine if the District's requirements meet RACT. These analyses are included in Appendix C.

Table 1 – CTG Source Categories

CTG Doc. No./ Date	CTG Category	SMAQMD Rule No. (Most Recent Amendment)	SIP Status
EPA-450/R-75-102 Nov. 1975	Gasoline Service Stations – Phase I Vapor Recovery	448 (2/26/09)	Adopted 2/26/09; Approved 1/7/13.
EPA-450/2-77-008 May 1977	Surface Coating Operations		
	- Coils, Paper, Fabrics, Automobiles, and Light-Duty Truck Coating Operations	No Sources	
	- Metal Can Coating	452 (9/25/08)	Adopted 9/25/08; Approved 4/9/10.
EPA-450/2-77-022 Nov. 1977	Solvent Metal Cleaning	454 (9/25/08)	Adopted 9/25/08; Approved 4/9/10.
EPA-450/2-77-025 Oct. 1977	Refineries –Vacuum Producing Systems, Wastewater Separators, and Process Unit Turnarounds	No Sources	
EPA-450/2-77-026 Oct. 1977	Gasoline Loading Terminals	447 (4/2/98)	Adopted 4/2/98; Approved 11/26/99.
EPA-450/2-77-032 Dec. 1977	Metal Furniture Coating	451 (10/28/10)	Adopted 10/28/10; Approved 11/21/11.
EPA-450/2-77-033 Dec. 1977	Magnet Wire Coating	No Sources	
EPA-450/2-77-034 Dec. 1977	Large Appliance Coating	No Sources	
EPA-450/2-77-035 Dec. 1977	Gasoline Bulk Plants	447 (4/2/98)	Adopted 4/2/98; Approved 11/26/99.
EPA-450/2-77-036 Dec. 1977	Petroleum Liquid Storage – Fixed-Roof Tanks	446 (11/16/93)	Adopted 11/16/93; Approved 9/16/94.
EPA-450/2-77-037 Dec. 1977	Cutback Asphalt	453 (8/31/82)	Adopted 8/31/82; Approved 1/24/85.
EPA-450/2-78-015 June 1978	Miscellaneous Metal Parts and Products Coating	451 (10/28/10)	Adopted 10/28/10; Approved 11/21/11.

CTG Doc. No./ Date	CTG Category	SMAQMD Rule No. (Most Recent Amendment)	SIP Status
EPA-450/2-78-029 Dec. 1978	Pharmaceutical Products Manufacturing	464 (4/28/16)	Adopted 9/25/08; Approved 10/3/11. Adopted 4/28/16; Submitted to EPA 8/30/16.
EPA-450/2-78-030 Dec. 1978	Pneumatic Tire Manufacturing	No Sources	
EPA-450/2-78-032 June 1978	Flat Wood Panel Coating	No Sources	
EPA-450/2-78-033 Dec. 1978	Graphic Arts		
	- Flexographic Printing	450 (10/23/08)	Adopted 10/23/08; Approved 4/9/10.
	- Rotogravure Printing	No Sources	
EPA-450/2-78-036 June 1978	Refineries – VOC Leaks	No Sources	
EPA-450/2-78-047 Dec. 1978	Petroleum Liquid Storage – External Floating Roof Tanks	446 (11/16/93)	Adopted 11/16/93; Approved 9/16/94.
EPA-450/2-78-051 Dec. 1978	Gasoline Tank Trucks and Vapor Collection Systems – VOC Leaks	447 (4/2/98) 448 (2/26/09)	Rule 447: Adopted 4/2/98; Approved 11/26/99. Rule 448: Adopted 2/26/09; Approved 1/7/13.
EPA-450/3-82-009 Sep. 1982	Large Petroleum Dry Cleaners	No Sources[21]	
EPA-450/3-83-006 Mar. 1984	Synthetic Organic Chemical Manufacturing – VOC Leaks	443 (9/5/96)	Adopted 9/5/96; Approved 11/9/98.
EPA-450/3-83-007 Dec. 1983	Natural Gas/Gasoline Processing – VOC Leaks	No Sources	
EPA-450/3-83-008 Nov. 1983	High Density Polyethylene, Polypropylene, and Polystyrene Resin Manufacturing	No Sources	
EPA-450/3-84-015 Dec. 1984	Synthetic Organic Chemical Manufacturing – Air Oxidation Processes	No Sources	
EPA-450/4-91-031 Aug. 1993	Synthetic Organic Chemical Manufacturing – Reactor and Distillation Operations	464 (4/28/16)	Adopted 9/25/08; Approved 10/3/11. Adopted 4/28/16; Submitted to EPA 8/30/16.
EPA-453/R-96-007 Apr. 1996	Wood Furniture Coating	463 (9/25/08)	Adopted 9/25/08; Approved 4/9/10.
EPA-453/R-97-004 Dec. 1997	Aerospace Manufacturing	No Sources[22]	

[21] This CTG applies to dry cleaning facilities that use 123,000 liters or more of petroleum solvent per year. Although there are petroleum solvent dry cleaners operating in Sacramento County, the largest facility is limited by permit to use no more than 4,164 liters per year of petroleum solvent.

CTG Doc. No./ Date	CTG Category	SMAQMD Rule No. (Most Recent Amendment)	SIP Status
EPA-453/R-06-001 Sep. 2006	Industrial Cleaning Solvents	466 (10/28/10)	Adopted 10/28/10; Approved 9/29/11.
EPA-453/R-06-002 Sep. 2006	Graphic Arts – Offset Lithographic and Letterpress Printing	450 (10/23/08)	Adopted 10/23/08; Approved 4/9/10.
EPA-453/R-06-003 Sep. 2006	Graphic Arts – Flexible Package Printing	450 (10/23/08)	Adopted 10/23/08; Approved 4/9/10.
EPA-453/R-06-004 Sep. 2006	Flat Wood Panel Coating	No Sources	
EPA-453/R-07-003 Sep. 2007	Paper, Film, and Foil Coatings	No Sources	
EPA-453/R-07-004 Sep. 2007	Large Appliance Coating	No Sources	
EPA-453/R-07-005 Sep. 2007	Metal Furniture Coating	451 (10/28/10)	Adopted 10/28/10; Approved 11/21/11.
EPA-453/R-08-003 Sep. 2008	Miscellaneous Metal and Plastic Parts Coating		
	- Metal Parts	451 (10/28/10) 459 (8/25/11)	Rule 451: Adopted 10/28/10; Approved 11/21/11. Rule 459: Adopted 8/25/11; Approved 8/9/12.
	- Plastic Parts	New Rule Required	
EPA-453/R-08-004 Sep. 2008	Fiberglass Boat Manufacturing	No Sources[23]	
EPA-453/R-08-005 Sep. 2008	Miscellaneous Industrial Adhesives	No Sources[24]	
EPA-453/R-08-006 Sep. 2008	Automobile and Light-Duty Truck Assembly Coating	No Sources	
61 FR 44050 Aug. 1996	Ship Coating	No Sources	

[22] This CTG applies to facilities that perform manufacture or rework of commercial, civil, or military aerospace vehicles or components. In severe ozone nonattainment areas, the CTG applies to sources with a potential to emit of 25 tons per year or more of VOC from such operations. Although there are sources in the District that perform these operations, all have potentials to emit of less than 25 tons per year of VOC from aerospace manufacture and rework operations.

[23] This CTG applies to facilities that manufacture fiberglass boat decks or hulls where the total actual VOC emissions from all such processes at the facility, including related cleaning activities, are equal to or exceed 15 pounds per day or an equivalent level such as 2.7 tons per 12-month rolling period, before consideration of controls. The District adopted a negative declaration for this category in 2012 after Staff determined that the only two potential sources identified had emissions much less than the threshold of 2.7 tons per 12-month rolling period. Both of these facilities have since gone out of business, and Staff's recent information search confirms that there are no new facilities.

[24] This CTG applies to miscellaneous industrial adhesives and adhesive primer application processes where the total actual VOC emissions from all such processes at the facility, including related cleaning activities, are equal to or exceed 15 pounds per day or an equivalent level such as 3 tons per 12-month rolling period, before consideration of controls. Although there are sources in the District that perform these operations, all have actual VOC emissions, before consideration of controls, less than 3 tons per 12-month rolling period from such operations.

For CTGs in Table 1 where "No Sources" is shown in lieu of a rule number, Staff reviewed the District's permit files, the emission inventory for the federal Clean Air Plan, business listings, and telephone yellow pages to verify that there are no existing stationary sources or emitting facilities for these CTG categories and Staff is not aware of any that are being proposed. If any sources in these CTG categories are constructed in the future, they will be subject to more stringent New Source Review Requirements, including Best Available Control Technology. Negative declarations for these CTG categories are included in Appendix A.

The District is in a severe nonattainment area for the 2008 8-hour ozone standard. Therefore, major sources of VOC and/or NOx are defined as those with the potential to emit at least 25 tons per year of the individual pollutants. Table 2 lists the 13 major stationary sources in the District that are subject to RACT requirements for VOC and/or NOx. The table shows the pollutant(s) for which the sources are major sources. Each of these sources was analyzed to determine if it meets RACT requirements. These analyses are included in Appendix E.

Table 2 – Major Sources of VOC and NOx in SMAQMD

Major Source	Major Pollutant(s)
Aerojet – Sacramento Operations	VOC, NOx
Central Valley Financing Authority – Carson Cogeneration Project	NOx
Chevron Sacramento Terminal	VOC
Kiefer Landfill, Department of Waste Management and Recycling, County of Sacramento	VOC, NOx
Mitsubishi Rayon Carbon Fiber and Composites, Inc.	NOx
The Procter and Gamble Manufacturing Company	VOC
RagingWire Enterprise Solutions, Inc.	NOx
Sacramento Cogeneration Authority	NOx
Sacramento Municipal Utility District Financing Authority – Cosumnes Power Plant	VOC, NOx
Sacramento Power Authority	NOx
SFPP, L.P. Bradshaw Terminal	VOC
Silgan Can Company	VOC
University of California, Davis Medical Center	VOC, NOx

Staff reviewed the permitting records of the major sources shown in Table 2 to determine the types of emission units present at each source. Many of the major sources contain emission units that do not fall into one of the CTG categories; therefore, it was necessary to perform RACT determinations for additional source categories. Table 3 lists the "non-CTG" categories that apply to major sources. In the 8 categories for which the District has applicable rules, the requirements were analyzed to determine if they meet RACT. These analyses are included in Appendix D.

Table 3 – Additional (Non-CTG) Source Categories Applicable to Major Sources

Non-CTG Source Category	SMAQMD Rule No. (Most Recent Amendment)	SIP Status
Aerospace Assembly and Component Coating Operations (Potential to Emit is <25 tons per year of VOC)	456 (10/23/08)	Adopted 10/23/08; Approved 7/14/10 (75 FR 40726)
Boilers, Process Heaters, and Steam Generators	411 (8/23/07)	Adopted 8/23/07; Approved 5/6/09 (74 FR 20880)
Gas Turbines	413 (3/24/05)	Adopted 3/24/05; Approved 1/10/08 (73 FR 1819)
Gasoline Service Stations – Phase II Vapor Recovery	449 (2/26/09)	Adopted 2/26/09; Approved 1/7/13 (78 FR 898)
Internal Combustion Engines	412 (6/1/95)	Adopted 6/1/95; Approved 4/30/96 (61 FR 18959)
Organic Chemical Manufacturing – Tanks (≤ 40,000 Gallons)	464 (4/28/16)	Adopted 9/25/08; Approved 10/3/11 (76 FR 61057). Adopted 4/28/16; Submitted to EPA 8/30/16.
Organic Chemical Manufacturing – Wastewater	464 (4/28/16)	Adopted 9/25/08; Approved 10/3/11 (76 FR 61057). Adopted 4/28/16; Submitted to EPA 8/30/16.

CONCLUSIONS

CTG Categories

For 20 CTG categories (or in some cases, specific subcategories of the CTGs), the District has no sources to which the CTGs apply, either because there are no sources of that type or there are no sources with emissions exceeding the CTG applicability thresholds. Negative declarations for these CTGs or subsets of these CTGs, as appropriate, are included in Appendix A. For the remaining CTGs, the District has SIP-approved rules that meet RACT requirements, except as discussed below. Certifications for CTG categories in which RACT is met are included in Appendix B.

- Miscellaneous Plastic Parts Coatings: A RACT deficiency was identified for surface coating of miscellaneous plastic parts, automotive/transportation plastic parts, business machine plastic parts, and pleasure craft (subcategory of the 2008 CTG for Miscellaneous Metal and Plastic Parts Coatings, EPA-453/R-08-003). There is no District rule that applies to the surface coating of these materials. The CTG applies to facilities that emit at least 2.7 tons per year of VOC from plastic parts coating operations. The District has identified one source to which the CTG applies. Therefore, the District is committing to adopt a rule that implements standards that meet RACT for coatings applied to these materials. The subject facility has permitted emission limits that meet RACT standards and will not be affected by the adoption of this rule.

Non-CTG Categories

The District meets RACT requirements for all 7 non-CTG source categories shown in Table 3.

Major Stationary Sources

Of the 13 major sources of VOC and/or NOx in Sacramento County, RACT requirements have been met for all emission units at 12 of these sources, which are listed below:

- Aerojet
- Carson Cogeneration Project
- Chevron Sacramento Terminal
- Kiefer Landfill
- Procter and Gamble
- RagingWire
- Sacramento Cogeneration Authority
- Sacramento Power Authority
- Santa Fe Pacific Pipeline
- Silgan Can Company
- SMUD Cosumnes Power Plant
- UC Davis Medical Center

A RACT deficiency was identified for Mitsubishi Rayon, a major source of NOx, because the District does not have a rule that limits NOx emissions from the gas-fired ovens at this facility. RACT will be met for Mitsubishi Rayon when the District adopts, and EPA approves, a rule to limit NOx emissions from these emission units. Because the ovens have permitted emission limits that meet RACT standards, the facility will not be affected by the adoption of this rule.

DISTRICT COMMITMENTS TO REMEDY RACT DEFICIENCIES

The District makes the following commitments to remedy the RACT deficiencies identified in this RACT SIP:

- The District will adopt a rule with that meets RACT standards for coatings applied to miscellaneous plastic parts, automotive/transportation plastic parts, business machine plastic parts, and pleasure craft.

- The District will adopt a rule that meets RACT standards for NOx emissions from gas-fired ovens at major sources of NOx.

APPENDICES

Appendix A: Negative Declarations
Appendix B: RACT Certifications for CTGs
Appendix C: RACT Analysis of CTG Source Categories
Appendix D: RACT Analysis of Non-CTG Source Categories Applicable to Major Sources
Appendix E: RACT Analysis of Major Sources

Appendix A

Negative Declarations

The District has reviewed its permit files, the emission inventory for its federal Clean Air Plan, business listings, and telephone yellow pages and has determined that there are no stationary sources or emitting facilities for the following CTG categories. The District also does not anticipate that any known businesses will propose constructing these sources in the future.

GUIDANCE DOCUMENT TITLE	DOCUMENT TYPE	DOCUMENT NUMBER
Control of Volatile Organic Emissions from Existing Stationary Sources, Volume II: Surface Coating of Cans, Coils, Paper, Fabrics, Automobiles, and Light-Duty Trucks (Negative declaration includes only coils, paper, fabrics, automobiles, and light-duty truck coating operations)	CTG	EPA-450/2-77-008
Control of Refinery Vacuum Producing Systems, Wastewater Separators and Process Unit Turnarounds	CTG	EPA-450/2-77-025
Control of Volatile Organic Emissions from Existing Stationary Sources, Volume IV: Surface Coating for Insulation of Magnet Wire	CTG	EPA-450/2-77-033
Control of Volatile Organic Emissions from Existing Stationary Sources, Volume V: Surface Coating of Large Appliances	CTG	EPA-450/2-77-034
Control of Volatile Organic Emissions from Manufacture of Pneumatic Rubber Tires	CTG	EPA-450/2-78-030
Control of Volatile Organic Emissions from Existing Stationary Sources, Volume VII: Factory Surface Coating of Flat Wood Paneling	CTG	EPA-450/2-78-032
Control of Volatile Organic Emissions from Existing Stationary Sources, Volume VIII: Graphic Arts – Rotogravure and Flexography (Negative declaration includes only rotogravure)	CTG	EPA-450/2-78-033
Control of Volatile Organic Compound Leaks from Petroleum Refinery Equipment	CTG	EPA-450/2-78-036
Control of Volatile Organic Compound Emissions from Large Petroleum Dry Cleaners	CTG	EPA-450/3-82-009
Control of Volatile Organic Compound Equipment Leaks from Natural Gas/Gasoline Processing Plants	CTG	EPA-450/2-83-007
Control of Volatile Organic Compound Emissions from Manufacture of High-Density Polyethylene, Polypropylene, and Polystyrene Resins	CTG	EPA-450/3-83-008
Control of Volatile Organic Compound Emissions from Air Oxidation Processes in the Synthetic Organic Chemical Manufacturing Industry	CTG	EPA-450/3-84-015

GUIDANCE DOCUMENT TITLE	DOCUMENT TYPE	DOCUMENT NUMBER
Control of Volatile Organic Compound Emissions from Coating Operations at Aerospace Manufacturing and Rework Operations	CTG	EPA-453/R-97-004
Control Techniques Guidelines for Flat Wood Paneling Coatings	CTG	EPA-453/R-06-004
Control Techniques Guidelines for Paper, Film, and Foil Coatings	CTG	EPA-453/R-07-003
Control Techniques Guidelines for Large Appliance Coatings	CTG	EPA-453/R-07-004
Control Techniques Guidelines for Fiberglass Boat Manufacturing Materials	CTG	EPA-453/R-08-004
Control Techniques Guidelines for Miscellaneous Industrial Adhesives	CTG	EPA-453/R-08-005
Control Techniques Guidelines for Automobile and Light-Duty Truck Assembly Coatings	CTG	EPA-453/R-08-006
Control Techniques Guidelines for Shipbuilding and Ship Repair Operations (Surface Coating)	CTG	61 FR 44050

Appendix B

RACT Certifications for CTGs

The District has determined that the following CTGs apply to stationary sources in Sacramento County. The District has further determined that the RACT requirements for these CTG sources have been met by rules which are incorporated into the SIP.

GUIDANCE DOCUMENT TITLE	DOCUMENT TYPE	DOCUMENT NUMBER	RACT RULE (ADOPTION OR AMENDMENT DATE)	SIP APPROVAL REFERENCE
Design Criteria for Stage I Vapor Control Systems – Gasoline Service Stations	CTG	EPA-450/R-75-102	448 (2/26/09)	78 FR 898
Control of Volatile Organic Emissions from Existing Stationary Sources, Volume II: Surface Coating of Cans, Coils, Paper, Fabrics, Automobiles, and Light-Duty Trucks (RACT required only for surface coating of cans)	CTG	EPA-450/2-77-008	452 (9/25/08)	75 FR 18068
Control of Volatile Organic Emissions from Solvent Metal Cleaning	CTG	EPA-450/2-77-022	454 (9/25/08)	75 FR 18068
Control of Hydrocarbons from Tank Truck Gasoline Loading Terminals	CTG	EPA-450/2-77-026	447 (4/2/98)	64 FR 66393
Control of Volatile Organic Compound Emissions from Existing Stationary Sources – Volume III: Surface Coating of Metal Furniture	CTG	EPA-450/2-77-032	451 (10/28/10)	76 FR 71886
Control of Volatile Organic Emissions from Bulk Gasoline Plants	CTG	EPA-450/2-77-035	447 (4/2/98)	64 FR 66393
Control of Volatile Organic Emissions from Storage of Petroleum Liquids in Fixed-Roof Tanks	CTG	EPA-450/2-77-036	446 (11/16/93)	59 FR 47544
Control of Volatile Organic Compounds from Use of Cutback Asphalt	CTG	EPA-450/2-77-037	453 (8/31/82)	50 FR 3338

GUIDANCE DOCUMENT TITLE	DOCUMENT TYPE	DOCUMENT NUMBER	RACT RULE (ADOPTION OR AMENDMENT DATE)	SIP APPROVAL REFERENCE
Control of Volatile Organic Compound Emissions from Existing Stationary Sources – Volume VI: Surface Coating of Miscellaneous Metal Parts and Products	CTG	EPA-450/2-78-015	451 (10/28/10)	76 FR 71886
Control of Volatile Organic Emissions from Manufacture of Synthesized Pharmaceutical Products	CTG	EPA-450/2-78-029	464 (9/25/08)	76 FR 61057
			464 (4/28/16)	Submitted to EPA 8/30/16
Control of Volatile Organic Emissions from Existing Stationary Sources, Volume VIII: Graphic Arts – Rotogravure and Flexography (RACT required only for flexography)	CTG	EPA-450/2-78-033	450 (10/23/08)	75 FR 18068
Control of Volatile Organic Emissions from Petroleum Liquid Storage in External Floating Roof Tanks	CTG	EPA-450/2-78-047	446 (11/16/93)	59 FR 47544
Control of Volatile Organic Compound Leaks from Gasoline Tank Trucks and Vapor Collection Systems	CTG	EPA-450/2-78-051	447 (4/2/98) 448 (2/26/09)	64 FR 66393 78 FR 898
Control of Volatile Organic Compound Leaks from Synthetic Organic Chemical and Polymer Manufacturing Equipment	CTG	EPA-450/3-83-006	443 (9/5/96)	63 FR 60214
Control of Volatile Organic Compound Emissions from Reactor Processes and Distillation Operations in the Synthetic Organic Chemical Manufacturing Industry	CTG	EPA-450/4-91-031	464 (9/25/08)	76 FR 61057
			464 (4/28/16)	Submitted to EPA 8/30/16
Control of Volatile Organic Compound Emissions from Wood Furniture Manufacturing Operations	CTG	EPA-453/R-96-007	463 (9/25/08)	75 FR 18068
Control Techniques Guidelines: Industrial Cleaning Solvents	CTG	EPA-453/R-06-001	466 (10/28/10)	76 FR 60376
Control Techniques Guidelines for Offset Lithographic Printing and Letterpress Printing	CTG	EPA-453/R-06-002	450 (10/23/08)	75 FR 18068

GUIDANCE DOCUMENT TITLE	DOCUMENT TYPE	DOCUMENT NUMBER	RACT RULE (ADOPTION OR AMENDMENT DATE)	SIP APPROVAL REFERENCE
Control Techniques Guidelines for Flexible Package Printing	CTG	EPA-453/R-06-003	450 (10/23/08)	75 FR 18068
Control Techniques Guidelines for Metal Furniture Coatings	CTG	EPA-453/R-07-005	451 (10/28/10)	76 FR 71886
Control Techniques Guidelines for Miscellaneous Metal and Plastic Parts Coatings (Rules meet RACT for metal parts and products and motor vehicle materials)	CTG	EPA-453/R-08-003	451 (10/28/10) 459 (8/25/11)	76 FR 71886 77 FR 47536

Appendix C

RACT Analysis of CTG Source Categories

Category: Cutback Asphalt

CTG DOCUMENT

Control of Volatile Organic Compounds from Use of Cutback Asphalt, EPA-450/2-77-037, December 1977.

The CTG applies to the application of cutback asphalt. Cutback asphalt is a blend of asphalt cement and solvent. The solvent ranges in volatility depending upon the need for rapid cure (uses highly volatile gasoline or naphtha), medium cure (uses less volatile kerosene), or slow cure (uses low volatility oils). The VOCs evaporate when the cutback asphalt cures, and can range from 20% to 50% by volume, averaging 35%.

The CTG requires the substitution of an emulsifying agent and water for the solvent, resulting in a VOC emission reduction of nearly 100%. The guidance states that the emulsifier is composed of non-volatile organic chemicals. This product combining asphalt cement, emulsifying agent, and water is known as emulsified asphalt.

As a practical matter, although the CTG specifies the use of materials containing no VOCs, asphalt itself is composed of organic compounds that meet the regulatory definition of VOC, however low in volatility they may be. Therefore, rules to limit solvent content in asphalt paving materials rely on distillation test methods (percent evaporation versus temperature) to distinguish between asphalt and added solvents.

SMAQMD REQUIREMENTS

District Rule 453, Cutback and Emulsified Asphalt Paving Materials, prohibits the manufacture and use of rapid and medium cure cutback asphalt, as well as slow cure cutback asphalt containing organic compounds that evaporate at 500°F or lower (as determined by ASTM Method D-402).

In addition, Rule 453 prohibits the manufacture for sale or use of emulsified asphalt containing VOC that evaporates at 500°F or lower, in excess of 3% by volume (as determined by ASTM D-244).

Rule 453 exempts the manufacture of cutback or emulsified asphalt when it will be immediately shipped for use outside of Sacramento County. (As noted in the CTG, the vast majority of emissions from cutback asphalt occur after application, not during manufacture). Also, medium cure cutback asphalt is allowed for use as a penetrating prime coat (i.e., application of asphalt to an absorptive surface to penetrate that surface, to bind the aggregate, and/or promote adhesion to new construction), although the rule states that this exemption will be evaluated annually to determine if an acceptable substitute material has been identified.

OTHER FEDERAL GUIDANCE

ACT: None

NSPS: None

NESHAP: None

EPA Menu of Control Measures:

There is one technology identified in the menu of control measures for cutback asphalt.

Source Category	Technology	Control Efficiency
Cutback Asphalt	Reformulation-Process Modification	100%

NSR/PSD Settlement Agreements: None

Other Federal Requirements or Guidance:

> *Issues Relating to VOC Regulation Cutpoints, Deficiencies, and Deviations* (a.k.a., the "Bluebook"), U.S. EPA, May 25, 1988, revised January 11, 1990.

The Bluebook, which provides guidance on developing VOC RACT rules, includes a section on cutback and emulsified asphalt. The guidance recommends that the maximum solvent content of emulsified asphalt, as determined by ASTM Method D-244, be limited to 7% for all applications, or limited between 3% - 12% depending on application. An exemption for cutback asphalt used as a prime penetrating coat is allowed.

STATE GUIDANCE: None

BACT/LAER

EPA RACT/BACT/LAER Clearinghouse: None

ARB BACT Clearinghouse: None

SMAQMD BACT Determination: None

OTHER NONATTAINMENT RULES

The following rules were evaluated and compared with SMAQMD Rule 453:

- PCAPCD Rule 217 (9/25/90)
- YSAQMD Rule 2.28 (5/25/94)
- SJVUAPCD Rule 4641 (12/17/92)
- VCAPCD Rule 74.4 (7/5/83)
- SCAQMD Rules 1108 (2/1/85) and 1108-1 (11/4/83)
- Dallas-Fort Worth and Houston-Galveston-Brazoria Rule 115.512 (12/9/04)
- Baltimore Rule 26.11.11.02 (4/26/93)

CONCLUSION

The requirements of Rule 453 meet or exceed the requirements specified in the CTG and clarified in the EPA "Bluebook." Compliance with Rule 453 requires reformulation and process modification, which is the technology identified in EPA's Menu of Control Measures. Other California district rules contain similar requirements and exemptions, and Rule 453 is at least as stringent as all the nonattainment area rules evaluated.

In 2010, EPA approved SJVUAPCD's Rule 4641 as part of revisions to the California State Implementation Plan[25]. The Technical Support Document for EPA's approval of SJVUAPCD's RACT analysis for Rule 4641 indicated that California nonattainment area agencies generally have among the most stringent stationary source requirements nationwide and that there are currently no other reasonably available technological or operational controls likely to significantly reduce additional emissions from this source category. SMAQMD Rule 453 has requirements very similar to SJVUAPCD Rule 4641.

Rule 453 satisfies RACT for this source category.

[25] 75 FR 10690, March 9, 2010.

Category: Gasoline Service Stations – Phase I Vapor Recovery

CTG DOCUMENT

Design Criteria for Stage I Vapor Control Systems – Gasoline Service Stations, EPA-450/R-75-102, November 1975.

The CTG applies to the control of gasoline vapors during storage tank filling at gasoline service stations (Stage I sources). The CTG does not apply to vehicle fueling at gasoline service stations (Stage II sources). Emissions are the result of displaced organic vapor-laden air being forced out of the storage tank by liquid gasoline.

The CTG prohibits the release of more than 10% by weight of displaced organic vapors (90% reduction). The CTG indicates that this control efficiency can be obtained using vapor recovery systems that incorporate a number of design features including submerged fill pipe, submerged gauge well drop tube, sufficiently sized vapor return lines and connections, vapor tight caps, vapor tight tank trucks, interlocks to prevent fuel delivery until the vapor hose is connected, pressure/vacuum valves, and other requirements.

SMAQMD REQUIREMENTS

District Rule 448, Gasoline Transfer into Stationary Storage Containers, applies to this CTG category. It prohibits the transfer of gasoline from a tank truck or trailer unless the container has a permanent submerged fill pipe and the displaced vapors are processed by a CARB-certified vapor recovery system with a control efficiency of at least a 98% by volume for underground tanks and 95% by volume for aboveground tanks and mobile fuelers. (Note: CARB certification procedure CP-206 requires certified systems to be 98% efficient. Therefore, Rule 448 in effect requires 98% efficiency.) The vapor recovery system must be leak free, vapor tight, and in good working order. Caps for fill tubes and dry breaks must be vapor tight.

In 2009, the District amended Rule 448 to increase the stringency of the rule, making it comparable to the two most stringent rules among California districts: SCAQMD Rule 461 and SJVUAPCD Rule 4621. The significant changes included:

- Expanding the applicability to include transfer of gasoline into a mobile fueler with a capacity of 120 gallons or more.
- Expanding the requirements to include vapor recovery for “switch loading.” Switch loading is the transfer of diesel fuel into a container that previously contained gasoline, a process that expels gasoline vapor from the container being filled.
- Requiring the use of a vapor recovery system during “pump-out,” i.e., when gasoline is transferred out of a stationary tank or mobile fueler into a stationary tank or delivery vessel.
- Implementing work practices that will assist in reducing excess emissions from spillage when gasoline is pumped out of vehicle fuel tanks.
- Requiring the owner/operator to perform a maintenance inspection of the Phase I system each day on which a fuel delivery has been received, and to remove from

service any component with a major defect listed in California Code of Regulations (CCR) 94006.
- Requiring that installers/contractors who install or alter vapor recovery systems be certified by the International Code Council (ICC) for Vapor Recovery System Installation and Repair.

Rule 448 exempts the transfer of gasoline into the following stationary containers:
- Stationary storage containers smaller than 250 gallons.
- Mobile fuelers smaller than 120 gallons.
- Containers used primarily for the fueling of implements of husbandry (i.e., a vehicle used exclusively in the conduct of agricultural operations) if equipped with a permanent submerged fill pipe.

OTHER FEDERAL GUIDANCE

EPA Region IX:

Gasoline Vapor Recovery Guidelines – Minimum SIP Requirements for EPA Region IX to Approve a Phase I or Phase II Gasoline Transfer Rule for Ozone Nonattainment Areas, EPA Region IX, April 24, 2000.

The EPA Region IX guidelines specify that RACT rules in California must meet the following requirements:

- Require that Phase I and Phase II systems use CARB-certified vapor recovery equipment.
- List the Phase I and Phase II vapor recovery system defects contained in CCR 94006 or cite CCR 94006 as a reference for these defects.
- Prohibit operation of a Phase I or Phase II vapor recovery equipment that has liquid leaks, vapor leaks, fails to pass tests, or contains CCR 94006 defects that substantially impair effectiveness of vapor recovery equipment.
- Require that Phase I gasoline storage tanks be equipped with submerged liquid fill pipes.
- Require that Phase II systems have a warning posted prohibiting topping-off, which may cause spillage of gasoline.

ACT: None

NSPS: None

NESHAP:

Subpart CCCCCC—National Emission Standards for Hazardous Air Pollutants for Source Category: Gasoline Dispensing Facilities

The NESHAP limits the emissions of gasoline vapors from dispensing facilities. Requirements are based on throughput. The requirements for gasoline dispensing facilities with monthly throughput of 100,000 gallons of gasoline or more are required to use submerged fill pipes and operate a vapor balance system.

EPA Menu of Control Measures:

There is one technology identified in the menu of control measures for gasoline service stations.

Equipment	Technology	Control Efficiency
Stage II Service Stations – Underground Tanks (Breathing and Emptying)	LPV Relief Valve	95%

This control measure is the addition of low pressure/vacuum (LP/V) relief valves to underground gasoline storage tanks at service stations with Stage II control systems. LP/V relief valves prevent breathing emissions from gasoline storage tank vent pipes. This control measure applies to all gasoline service stations with underground gasoline storage tanks. Note: Relief valves are incorporated into CARB-certified vapor recovery systems.

NSR/PSD Settlement Agreements: None

STATE GUIDANCE

Benzene Airborne Toxic Control Measure (ATCM) for Retail Service Stations, Title 17 CCR, Section 93100, May 13, 1988.

The ATCM requires CARB-certified Phase I and Phase II vapor recovery systems at retail service stations.

California Health and Safety Code (HSC) Division 26, Part 4, Chapter 3, Article 5, Gasoline Vapor Control

The HSC directs CARB to establish standards and procedures to certify vapor recovery systems. Only certified vapor control systems can be used.

BACT/LAER

EPA RACT/BACT/LAER Clearinghouse

For gasoline storage and dispensing stations, the only BACT determination was made in 2009. The determination was for a 3,700 gallon storage tank equipped with both Phase I and Phase II CARB-certified vapor recovery.

ARB BACT Clearinghouse: None

SMAQMD BACT Determinations

In 2011, a BACT determination was made for all retail gasoline dispensing stations. The BACT determination was to require CARB-certified vapor recovery equipment for Phase I and Phase II.

OTHER NONATTAINMENT AREA RULES

The following rules were evaluated and compared with SMAQMD Rule 448:

- PCAPCD Rule 213 (2/21/13)
- YSAQMD Rule 2.22 (6/12/12)
- SJVUAPCD Rule 4621 (12/19/13)
- VCAPCD Rule 70 (3/10/09)
- SCAQMD Rule 461 (4/6/12)
- Dallas-Fort Worth and Houston-Galveston-Brazoria Rule 115.222 (10/2/14)
- Baltimore Rule 26.11.24 (11/23/15)

CONCLUSION

Rule 448 is more stringent than the CTG, which requires only 90% control and does not require vapor recovery systems to be CARB-certified. Rule 448 is at least as stringent as the EPA Region IX guidelines, state requirements, BACT/LAER determinations, the NESHAP and the EPA Menu of Control Measures. Rule 448 contains requirements and exemptions similar to other California district rules, and is at least as stringent as all the nonattainment area rules evaluated.

Rule 448 satisfies the RACT requirement for this source category.

Category: Gasoline Tank Trucks, Bulk Plants, and Bulk Terminals (Liquid Loading)

CTG DOCUMENTS

CTG #1 - Control of Hydrocarbons from Tank Truck Gasoline Loading Terminals, EPA-450/2-77-026, October 1977.

This CTG applies to the loading of gasoline tank trucks at tank truck terminals with a daily gasoline throughput of greater than 76,000 liters. It establishes presumptive RACT for loading of tank trucks at terminals as vapor collection systems with emissions of no more than 80 mg hydrocarbon per liter of gasoline loaded. The CTG indicates that this emission limit can be met with vapor collection and recovery or oxidation control systems.

CTG #2 – Control of Volatile Organic Emissions from Bulk Gasoline Plants, EPA-450/2-77-035, December 1977.

This CTG applies to loading of gasoline tank trucks at bulk gasoline plants with a daily gasoline throughput of less than 76,000 liters. Two RACT alternatives are presented for loading of account (tank) trucks at bulk gasoline plants:

- submerged filling of account trucks, or
- submerged filling and vapor balance systems to control VOC displaced by filling account trucks.

The CTG indicates that submerged filling of account trucks is equivalent to 60% control relative to uncontrolled splash filling, and that vapor balance systems provide 90% VOC control. The CTG indicates that consideration should be given to the compatibility of bulk plants with Stage I service station regulations, as well as potential economic impacts and retrofit difficulty.

CTG #3 – Control of Volatile Organic Compound Leaks from Gasoline Tank Trucks and Vapor Collection Systems, EPA-450/2-78-051, December 1978.

This CTG applies to gasoline tank trucks that are equipped for vapor collection, and to vapor collection systems at bulk terminals, bulk plants, and service stations. Presumptive RACT includes limiting loading to only vapor-tight tank trucks, established using a pressure-vacuum test. The vapor collection and vapor processing equipment must be designed and operated to prevent tank truck gauge pressure from exceeding 18 inches of H_2O and the tank truck vacuum from exceeding 6 inches of H_2O.

Vapor collection systems must be operated below the lower explosive limit, measured at 2.5 centimeters around the perimeter of a potential leak source (e.g., piping, seals, hoses, connections, pressure-vacuum vents, etc.). In general, there must be no avoidable visible liquid leaks. However, the CTG acknowledges that there will invariably be a few drops of liquid resulting from the disconnection of dry breaks in liquid lines and the raising of well-maintained top loading vapor head; the CTG indicates that these drops are allowable.

SMAQMD REQUIREMENTS

District Rule 447, Organic Liquid Loading, prohibits the transfer of organic liquids into any tank truck, trailer, or railroad tank car unless the emissions do not exceed certain limits. The emissions cannot exceed 0.08 lb of VOC per 1,000 gallons (approximately 9.6 mg/liter) of transferred organic liquids for bulk terminals and 0.6 lb of VOC per 1,000 gallons (approximately 72 mg/liter) of transferred organic liquids for bulk plants. All gasoline bulk terminals and bulk plants must be equipped with CARB-certified vapor collection and disposal systems.

Rule 447 requires that all equipment associated with the loading facility be maintained to be leak-free and vapor-tight, determined using visual and instrument monitoring methods as defined in the rule. In addition, the diaphragms used in vapor storage tanks must be maintained such that the VOC concentration in the airspace above the diaphragm does not exceed 3,000 ppm (expressed as methane).

District Rule 448 (Gasoline Transfer into Stationary Storage Containers) applies to the transfer of gasoline from delivery vessels (i.e., tank truck/rail car) into stationary storage containers (250 gallon capacity or more). Rule 448 requires all covered stationary storage containers to be equipped with a CARB-certified vapor recovery system with 98% efficiency for underground storage tanks (USTs) and 95% efficiency for above-ground storage tanks (ASTs). The vapor recovery systems must be leak free, vapor tight (i.e., for delivery vessels, a reading 100% or less of the lower explosive limit) and in good working conditions. Rule 448 also requires all vapor recovery systems to be tested annually.

Rule 448 requires the delivery tank trucks/rail cars to be certified as per CARB certification procedure CP-204[26]. The rule prohibits operation of a gasoline delivery vessel that is not leak-free and vapor-tight. CARB CP-204 contains initial and annual testing requirements for vapor recovery systems of cargo tanks and meets or exceeds the requirements of CTG #3.

Rule 447 exempts the loading of organic liquids with low vapor pressures (i.e., less than 0.5 psia) under actual loading conditions. Gasoline is not exempt because its vapor pressure is significantly greater than 0.5 psia under loading conditions. Rule 448 exempts stationary storage containers equipped with a permanent submerged fill pipe and that are exclusively used to fuel implements of husbandry. This exemption does not conflict with the CTGs, which apply to loading and unloading operations at bulk plants, bulk terminals, and service stations.

OTHER FEDERAL GUIDANCE

ACT: None

[26] Vapor Recovery Certification Procedure CP-204, last updated on April, 2013. Available online at: http://www.arb.ca.gov/vapor/cp204_041613.pdf.

NSPS:

40 CFR Part 60, Subpart XX—Standards of Performance for Bulk Gasoline Terminals

This NSPS applies to loading of gasoline tank trucks at bulk terminals (throughput >75,700 liters/day). It contains the same emission limit as CTG #1 (80 mg TOC/liter of gasoline loaded) for facilities with existing vapor processing systems. The NSPS has a more stringent limit than CTG #1 (35 mg TOC/liter of gasoline loaded) for loading of tank trucks at new facilities that do not already have an existing vapor processing system. The NSPS limits loading to only vapor-tight tank trucks. The vapor collection and loading equipment must be designed and operated to prevent gauge pressures in the delivery tank from exceeding 18 inches of H_2O. The NSPS also requires monthly visual inspection of the vapor processing system and gasoline loading racks for leaks, and repair of any leaks detected.

NESHAP:

40 CFR Part 63, Subpart R—National Emission Standards for Gasoline Distribution Facilities (Bulk Gasoline Terminals and Pipeline Breakout Stations)

This NESHAP applies to loading of tank trucks at bulk terminals that are major sources of hazardous air pollutants (HAPs). It limits emissions from vapor collection and processing systems to 10 mg TOC/liter of gasoline loaded. It limits loading to only vapor-tight tank trucks. It also requires monthly leak inspection and repair for equipment (pumps, valves, pressure relief devices, connectors, etc.) that transfers gasoline or is part of the vapor processing system.

40 CFR Part 63, Subpart BBBBBB—National Emission Standards for Hazardous Air Pollutants for Source Category: Gasoline Distribution Bulk Terminals, Bulk Plants, and Pipeline Facilities

This NESHAP applies to the area source facilities involved in gasoline transfer and distribution operations. The standards are no more stringent than those for the NSPS (Subpart XX) and the major source NESHAP (subpart R), and have the same applicability as the NSPS (throughput of 20,000 gallons (75,700 liters per day or greater) for gasoline distribution bulk terminals and gasoline bulk plants.

EPA Menu of Control Measures: None

NSR/PSD Settlement Agreements: None

STATE GUIDANCE: None

BACT/LAER

EPA RACT/BACT/LAER Clearinghouse: None

ARB BACT Clearinghouse: None

SMAQMD BACT Determination: None

OTHER NONATTAINMENT RULES

The requirements for gasoline tank trucks, bulk plants, and bulk terminals in the following rules were evaluated and compared with SMAQMD Rules 447 and 448:

- PCAPCD Rules 213 (2/21/13) and 215 (6/19/97)
- YSAQMD Rule 2.21 (3/12/14)
- SJVUAPCD Rules 4621 (12/19/13) and 4624 (12/20/07)
- VCAPCD Rule 70 (3/10/09)
- SCAQMD Rules 461 (4/6/12) and 462 (5/14/99)
- Dallas-Fort Worth and Houston-Galveston-Brazoria Rules 115.211 (1/17/03) and 115.212 (1/18/01)
- Baltimore Rules 26.11.13.04 (7/21/14) and 26.11.13.05 (7/21/14)

CONCLUSION

For gasoline bulk terminals, Rule 447 requires a CARB-certified vapor control system and limits emissions to no more than 0.08 lb VOC per 1,000 gallons transferred. These requirements are more stringent than CTG #1, the NSPS and the NESHAP when those standards are converted to equivalent units: 0.67, 0.29 and 0.084 lb of VOC per 1,000 gallons, respectively.

For gasoline bulk plants, Rule 447 requires a CARB-certified vapor control system and limits emissions to no more than 0.6 lb VOC per 1,000 gallons transferred. These requirements are at least as stringent those of CTG #2, which requires, at a minimum, submerged filling and potentially a vapor balancing system.

Rule 447 requires all equipment associated with the loading facility to be maintained leak-free and vapor-tight, which is consistent with the CTG #3 provision that limits visible equipment leaks. Rule 448 also requires gasoline delivery vessels to be leak-free and vapor-tight, consistent with the requirements in CTG #3 and the NSPS to load only vapor-tight tank trucks.

Rules 447 and 448 are at least as stringent as the applicable regulations from the other nonattainment areas.

Rules 447 and 448 satisfy the RACT requirements for gasoline tank trucks and for loading at bulk plants and bulk terminals.

Category: Graphic Arts: Flexographic, Lithographic, Letterpress, and Flexible Package Printing

CTG DOCUMENTS

CTG #1 – Control of Volatile Organic Emissions from Existing Stationary Sources – Volume VIII: Graphic Arts – Rotogravure and Flexography, EPA-450/2-78-033, December 1978.

CTG #1 applies to both flexographic and rotogravure processes used in publication and packaging printing. The guideline document does not apply to offset lithography or letterpress printing. There are no sources in the District using gravure printing, and a negative declaration will be submitted for that subcategory. The CTG requirements for gravure printing will not be discussed in this analysis.

CTG #1 specifies two alternatives for presumptive RACT for flexographic printing: add-on control devices, or water-borne and high solids inks. For add-on control (carbon adsorption or incineration), the CTG requires a VOC control device efficiency of 90% and an overall VOC capture and control efficiency of 60%. For water-borne and high solids inks, emissions reductions comparable to add-on control options can be achieved when the solvent portion of the ink consists of 75% (by volume) water and 25% (by volume) organic solvent.

CTG #2 – Control Techniques Guidelines for Offset Lithographic Printing and Letterpress Printing, EPA-453/R-06-002, September 2006.

CTG #2 applies to offset lithographic printing and letterpress printing. The CTG provides control recommendations for reducing VOC emissions stemming from the use of fountain solutions, cleaning materials, and inks in offset lithographic printing and cleaning materials and inks in letterpress printing. The requirements for fountain solutions do not apply to offset lithographic printing operations with less than or equal to 15 pounds per day of actual VOC emissions. The requirements for control equipment do not apply to presses with potential to emit less than 25 tons of VOC per year, prior to controls. (Note: all presses in the District emit less than 25 tons of VOC per year, prior to controls.) The following controls are specified as presumptive RACT.

1. Heatset Presses

CTG #2 recommends the use of emissions control equipment to reduce emissions of VOC from inks used in heatset web offset lithographic and heatset letterpress printing for presses with potential to emit from the dryer, prior to controls, of at least 25 tons/year of VOC. The recommended levels of control are as follows:

- The recommended level of control for VOC emissions from heatset dryers is 90% control efficiency for a control device whose first installation date was prior to the effective date of the State RACT rule.
- The recommended level of control for VOC emissions from heatset dryers is 95% control efficiency for a control device whose first installation date was on or after the effective date of the State RACT rule.

- To accommodate situations where the inlet VOC concentration is so low that a 90% or 95% efficiency may not be achievable, it is recommended that an alternative requirement be specified for the control device outlet concentration to be no more than 20 ppmv as hexane on a dry basis.

2. Fountain Solution VOC Content Limits

CTG #2 recommends VOC limits for fountain solutions used in offset lithographic printing for sources where the total actual emissions of VOC from all offset lithographic printing operations at the stationary source are at least 15 lb/day (or an equivalent level), prior to control. The recommended limits are:

- Heatset Web Offset Lithographic Printing: 1.6% alcohol by weight (or 3% if chilled)
- Sheet-fed Offset Lithographic Printing: 5% alcohol by weight (or 8.5% if chilled)
- Coldset Web Offset Lithographic Printing: 5% alcohol substitute by weight and no alcohol in the fountain solution

3. Cleaning Materials VOC Limits

CTG #2 recommends VOC limits for cleaning materials used in offset lithographic printing and letterpress printing for sources where the total actual emissions of VOC from all offset lithographic printing operations at the stationary source are at least 15 lb/day (or an equivalent level), prior to control. The recommended limits are:

- Cleaning materials with a VOC composite vapor pressure less than 10 mm Hg at 20 °C, or
- Cleaning materials containing less than 70% VOC by weight.

The CTG also recommends work practices that require cleaning materials and used shop towels to be kept in closed containers.

> *CTG #3 – Control Techniques Guidelines for Flexible Package Printing*, EPA-453/R-06-003, September 2006.

CTG #3 applies to flexible package printing operations, which includes printing on items such as bags, pouches, liners, and wraps utilizing paper, plastic, film, aluminum foil, metalized or coated paper or film, or any combination of these materials. The CTG provides control recommendations for reducing VOC emissions from inks, coatings, adhesives and cleaning materials. The control recommendations for inks, coatings, and adhesives apply to printing presses with potential to emit, prior to controls, of at least 25 tons/year of VOC. The control recommendations for cleaning materials apply to facilities with actual emissions, prior to controls, of at least 15 lb/day of VOC from all flexible package printing and cleaning operations.

For printing presses with potential to emit, prior to controls, of at least 25 tons/year of VOC, CTG #3 recommends two options for reducing emissions from coatings, inks, and adhesives: emissions control equipment, and low VOC materials. For emissions control equipment, the recommended control levels in the CTG include the following:

- 65% overall control for a press that was first installed prior to March 14, 1995 and that is controlled by an add-on air pollution control device whose first installation date was prior to the effective date of the State RACT rule.
- 70% overall control for a press that was first installed prior to March 14, 1995 and that is controlled by an add-on air pollution control device whose first installation date was on or after the effective date of the State RACT rule.
- 75% overall control for a press that was first installed on or after March 14, 1995 and that is controlled by an add-on air pollution control device whose first installation date was prior to the effective date of the State RACT rule.
- 80% overall control for a press that was first installed on or after March 14, 1995 and that is controlled by an add-on air pollution control device whose first installation date was on or after the effective date of the State RACT rule.

As an alternative to using emission control equipment, CTG #3 also recommends limits on the VOC content of materials that are consistent with an 80% reduction in emissions. The recommended VOC content limits are 0.8 kg VOC/kg solids applied or 0.16 kg VOC/kg material applied.

CTG #3 recommends work practices to reduce emissions from cleaning materials. These recommendations are to:

- Keep cleaning materials and used shop towels in closed containers,
- Convey cleaning materials from one location to another in closed containers or pipes.

SMAQMD REQUIREMENTS

District Rule 450, Graphics Arts Operations, applies to screening printing, flexographic printing, lithographic printing and letterpress printing, and any coating or laminating operation associated with flexible packaging material. The rule was amended in 2008 to incorporate the requirements specified in CTG #2 and CTG #3.

Graphic arts materials are subject to the VOC content limits in the following table.

Material Type	VOC Content, g/l (lb/gal)
General	
Printing Ink	300 (2.5)
Adhesive	150 (1.25)
Coating	300 (2.5)
Screen Printing	
Printing Ink	400 (3.3)
Adhesive	150 (1.25)
Coating	400 (3.3)
Electronic Circuit	800 (6.7)
Extreme Performance Ink/Coating	800 (6.7)
Metallic Ink	400 (3.3)
Sign Ink/Coating	500 (4.1)
Mechanically Formed Products	800 (6.7)

Material Type	VOC Content, g/l (lb/gal)
Overlays	800 (6.7)
Web-Fed Wallpaper	300 (2.5)
Water Slide Decals	800 (6.7)

VOC content limits (including water and exempt compounds) for fountain solutions used in lithographic printing are shown in the following table.

Material Type	VOC Content Limits (% By Weight)
Heatset Web Offset Lithography	
Fountain Solutions Containing Alcohol	
1. Chilled Using Refrigerated Chiller	3
2. Non-Chilled	1.6
Fountain Solutions Containing No Alcohol	
1. Chilled Using Refrigerated Chiller	5
2. Non-Chilled	5
Coldset Web Offset Lithography	
Fountain Solutions (Must contain no alcohol)	
1. Chilled Using Refrigerated Chiller	5
2. Non-Chilled	5
Sheet-fed Offset Lithography with maximum sheet size greater than 11 X 17 inches or total solution reservoir greater than 1 gallon	
Fountain Solutions Containing Alcohol	
1. Chilled Using Refrigerated Chiller	8.5
2. Non-Chilled	5
Fountain Solutions Containing No Alcohol	
1. Chilled Using Refrigerated Chiller	5
2. Non-Chilled	5
All Other Presses	
1. Chilled Using Refrigerated Chiller	10
2. Non-Chilled	8

The following table shows the VOC content limits (including water and exempt compounds) for materials used for cleaning in graphic arts operations.

Material Type	VOC Content (g/l)
General (e.g., maintenance, repair, solvent, wipe) Cleaning	25
Application Equipment Cleaning	
General (not specifically listed below)	25
Lithographic and Letterpress Printing	
Newsprint substrates	
On-Press Components	
Metering Rollers/Printing Plates	100
Blanket and Roller Washes and All Other On-Press Components	100
Removable Press Components	25
Substrates other than newsprint	
On-Press Components	
Metering Rollers/Printing Plates	100
Blanket and Roller Washes and All Other On-Press Components	100
Removable Press Components	25
Screen Printing	100
Flexographic Printing	25
Specialty Flexographic Printing	100
Ultraviolet/Electron Beam Inks (Except Screen Printing)	100

As an alternative to the VOC content limits, emissions control equipment may be used provided that the control device has an overall capture and control efficiency of 67% or more on a mass basis.

Rule 450 also requires that all VOC materials and VOC-containing cloth, sponges, and other materials used for solvent cleaning be stored in closed containers when not in use.

Rule 450 contains additional control requirements for presses with the potential to emit from the drying oven, prior to emissions control equipment, of 25 tons or more per year of VOC.

- Heatset web offset lithographic printing and heatset web letterpress printing presses must use air pollution control equipment with:

  - 90% overall efficiency if the permit application is deemed complete prior to October 23, 2008.
  - 95% overall efficiency if the permit application is deemed complete on or after October 23, 2008.
  - As an alternative to the minimum control efficiencies specified above, the mass concentration of VOC at the outlet of the air pollution control equipment must be less than or equal to 20 ppmv as hexane on a dry basis.
- Emissions from the use of flexible package printing inks, coatings, and adhesives operations must be reduced using air pollution control equipment with:
  - 70% overall efficiency for a press that was first installed prior to March 14, 1995.
  - 80% overall efficiency for a press that was first installed on or after March 14, 1995.

Rule 450 does not apply to the following:

- Graphic arts operations at a stationary source that either have actual emissions of less than or equal to 60 pounds of VOC per month or receive a permit that limits the potential to emit to less than or equal to 175 pounds of VOC per month.
- Gravure printing
- Business and personal printers
- Prepress operations
- Aerosol adhesives used in screen printing provided that the aerosol adhesives comply with the VOC limits for aerosol adhesives in Rule 460, Adhesives and Sealants.
- Aerosol adhesives used in graphic arts operations other than screen printing provided that the VOC emissions from the facility are less than 660 pounds per month and the aerosol adhesives comply with the VOC limits for aerosol adhesives in Rule 460, Adhesives and Sealants.
- Materials used to strip cured inks, coatings, and adhesives are not subject to VOC content limits.

As noted in CTG #3, flexible package printing is almost entirely conducted by gravure and flexographic printing methods. Although gravure printing is exempt from the requirements of Rule 450, there are no gravure printing operations in the District. A negative declaration for gravure printing is included in this RACT SIP.

OTHER FEDERAL GUIDANCE

ACT:

Alternative Control Techniques Document: Offset Lithographic Printing – Supplemental Information Based on Public Comment on Draft Control Techniques Guidance Announced in Federal Register November 8, 1993, EPA-453/R-94-054, June 1994.

The ACT incorporates and supplements a draft CTG that was never finalized. The ACT applies to offset lithographic printing, and provides control recommendations for reducing VOC emissions stemming from the use of heat set inks, fountain solutions, and cleaning materials. The control levels recommended in the ACT are identical to those in

CTG #2, with the exception of cleaning materials. The ACT recommended that cleaning material be limited to a VOC composite vapor pressure less than 10 mm Hg at 20 °C or contain less than 30% VOC by weight. CTG #2 stated that more recent information indicated that the 30% VOC limit is not achievable for all cleaning applications, and instead recommended that cleaning material be limited to a VOC composite vapor pressure less than 10 mm Hg at 20 °C or contain less than 70% VOC by weight.

NSPS: None

NESHAP:

40 CFR Part 63, Subpart KK - National Emission Standards for the Printing and Publishing Industry

The NESHAP applies to major sources of HAPs at which publication rotogravure, product and packaging rotogravure, or wide-web flexographic printing presses are operated. The NESHAP sets standards that reduce organic HAP emissions, but there are no limits on VOC emissions.

EPA Menu of Control Measures:

Three control measures for graphic arts operations were identified in the menu of control measures:

- For flexographic printing operations using high VOC materials, the measure is a permanent total enclosure with a control device, achieving an overall combined capture and control efficiency of 90%. (Note: This measure is based on information used during the development of the MACT standards. The three model plants emitted an average of 140 tons of VOC per year, uncontrolled, which is much greater than any printing facilities in the District).
- For lithographic and letterpress printing, the measure is CTG #2 (estimated to reduce VOC emissions by 75%).
- For flexible package printing, the measure is CTG #3 (estimated to reduce VOC emissions by 67%).

NSR/PSD Settlement Agreements: None

STATE GUIDANCE: None.

BACT/LAER

EPA RACT/BACT/LAER Clearinghouse

Nine BACT determinations were made from 2004 to 2013. Blanket washes were typically limited to a composite vapor pressure of 10 mmHg at 20°C, and VOC limits for fountain solutions were generally between 3% and 5% by weight. Cleaning materials were typically limited to a composite vapor pressure in the range of 10 – 25 mmHg at 20°C or 2.5 lb of VOC per gallon (300 g/l). Eight of the nine determinations were for heatset presses, and required drying oven emissions to be controlled by thermal oxidizers with destruction and removal efficiencies from 97% to 98%. One BACT

determination was for a coldest press, and limited the VOC content of inks and coatings to 2.5 lb/gal (weighted average).

ARB BACT Clearinghouse

For flexographic printing, a 2000 determination set BACT for the drying oven as a permanent total enclosure equipped with a thermal oxidizer with a combined 95% efficiency. For heatset, lithographic offset printing, there were three BACT determinations in 2002. Each required drying oven emissions to be controlled by thermal oxidizers with overall capture and control efficiencies from 94% to 98.5%. Blanket washes were limited from 5 – 6 mmHg composite VOC vapor pressure at 20°C. Fountain solutions in one determination were limited to 8% VOC by volume and in the other two determinations, 0.10 lb/gal VOC (12 g/l).

SMAQMD BACT Determinations

A 2014 BACT determination for a non-heatset lithographic printing press required the use of low VOC inks, coatings, and fountain solutions that comply with Rule 450.

OTHER NONATTAINMENT AREA RULES

The requirements for graphic arts operations in the following rules were evaluated and compared with SMAQMD Rule 450:

- PCAPCD Rule 239 (10/11/12)
- YSAQMD Rule 2.20 (5/14/08)
- SJVUAPCD Rule 4607 (12/18/08)
- VCAPCD Rules 74.19 (6/14/11) and 74.19.1 (11/11/03)
- SCAQMD Rules 1130 (5/2/14) and 1130.1 (12/13/96)
- Dallas-Fort Worth and Houston-Galveston-Brazoria Rules 115.432 (12/29/11) and 115.442 (4/1/10)
- Baltimore Rules 26.11.19.10 (8/16/83), 26.11.19.10-1 (8/16/83) and 26.11.19.11 (8/16/83)

All the requirements of Rule 450 were found to be at least as stringent as the corresponding standards of the Texas and Baltimore rules. Compared to other California district rules, Rule 450 was generally similar, although differences in the number of specialty ink and coating categories resulted in Rule 450 having more stringent VOC limits for some categories and less stringent VOC limits for others. No California district rule was found to be more stringent than Rule 450 in all aspects. The two areas where other rules are more stringent than Rule 450 are summarized below.

Flexographic ink on porous substrates: Rule 450 requires printing inks, other than for screen printing, to meet a VOC limit of 300 g/l. The other district rules include this same general limit, but the SJVUAPCD, SCAQMD, and VCAPCD rules include a lower VOC limit of 225 g/l specifically for flexographic printing on porous substrates.

Optional control device in lieu of meeting material VOC limits: Each of the California districts provide an option to use a control device in lieu of meeting material VOC

limits. In Rule 450, such a device must have an overall capture and control efficiency of at least 67%. The other California district rules require minimum overall capture and control efficiencies as shown below:

- PCAPCD: 70 -- 80%, depending on specific operation
- YSAQMD: 75%
- SJVUAPCD and VCAPCD: 75 – 80%, depending on specific operation
- SCAQMD: 86%

CONCLUSION

Rule 450 is at least as stringent as the CTGs for control of emissions from inks, adhesives, coatings, and fountain solutions. The control requirements for heatset presses with potential to emit greater than or equal to 25 tpy in Rule 450 are equivalent to the requirements in CTGs #2 and #3. Rule 450 contains requirements for solvent cleaning that are much more stringent than the CTGs.

For lithographic printing, letterpress printing, and flexible package printing, EPA's Menu of Control Measures lists CTGs #2 and #3 as control measures. As stated above, Rule 450 is at least as stringent as these CTGs. For flexographic printing using high VOC materials, the measure listed is a permanent total enclosure with a control device, achieving an overall combined capture and control efficiency of 90%. This measure is based on information used during the development of the MACT standards. The three model plants emitted an average of 140 tons of VOC per year, uncontrolled, which is much greater than any printing facilities in the District. Staff considers this measure to be beyond RACT for sources in the District.

The VOC limits for graphic arts materials in the BACT determinations are comparable to Rule 450. For heatset dryers used in lithographic printing, BACT determinations required control devices with overall capture and control efficiencies in the range of 94% to 98%. These are slightly higher than the 90% -- 95% efficiencies required by Rule 450 for large (≥25 tpy, uncontrolled) heatset lithographic presses. However, the BACT determinations apply to new presses and are considered to be beyond RACT.

The Texas and Baltimore rules are not more stringent than Rule 450. The rules of other California districts are similar in stringency to Rule 450, with some specific VOC limits higher or lower than Rule 450, primarily due to differences in the number of specialty categories. The requirements with potential RACT implications are discussed below.

Flexographic ink on porous substrates: Lowering the VOC limit for inks used in flexographic printing would be unlikely to have a significant impact on emissions because the vast majority of the permitted businesses in the District that perform printing operations use lithographic presses. Flexographic printing is used at only two of the 60 businesses. In addition, when SJVUAPCD Rule 4607 was amended on December 18, 2008, the VOC limit for flexographic ink on porous substrates was lowered from 300 g/l to 225 g/l. In the staff report, SJVUAPCD estimated the cost effectiveness of this limit change to range from $13,195 to $26,390 per ton of VOC reduced. Staff considers the high cost effectiveness of this limit to be beyond RACT.

Optional control device in lieu of meeting material VOC limits: If a control device is used in lieu of VOC-compliant materials, Rule 450 requires an overall capture and

control efficiency of at least 67%. Other California district rules require greater control efficiencies for this alternative, ranging from 70 – 86%, depending on the type of printing operation. The Rule 450 control requirement is only slightly below the range of controls required by the other districts.

In the final implementation rule for the 2008 ozone standard, EPA finalized an approach that allows states to conclude that previous RACT determinations may still constitute RACT if the incremental emission reductions that would result from additional controls would be small.[27] The District has previously determined that Rule 450 met RACT for the 1997 8-hour ozone standard[28], and that determination was approved by EPA in 2016[29]. Currently, there are four heatset lithographic printing presses in the District that use control devices in lieu of VOC-compliant inks. Each of these control devices is required to meet an overall capture and control efficiency of 95%; therefore, a strengthening of the control requirement in Rule 450 would not result in emission reductions from any existing sources. Staff maintains that required control efficiency in Rule 450 still meets RACT.

Rule 450 satisfies the RACT requirement for this category.

[27] 80 FR 12279, March 6, 2015.
[28] "Analysis of Reasonably Available Control Technology for the 8-Hour Ozone State Implementation Plan (RACT SIP)," Sacramento Metropolitan Air Quality Management District, September 26, 2006.
[29] 81 Federal Register 2136, January 15, 2016.

Category: Industrial Cleaning Solvents

CTG DOCUMENT

Control Techniques Guidelines: Industrial Cleaning Solvents. EPA-453/R-06-001, September 2006.

This CTG applies to solvent cleaning unit operations in industries that are not covered by other CTGs, or are typically subject to other state or district rules. The cleaning activities for removal of foreign material from substrates being cleaned use methods such as wiping, flushing, or spraying.

The CTG establishes presumptive RACT using work practice standards, solvent VOC content, and alternative VOC vapor pressure limits and add-on control requirements.

The CTG recommends work practices to help reduce VOC emissions from the use, handling, storage, and disposal of cleaning solvents and shop towels:

- Covering open containers and used applicators
- Minimizing air circulation around cleaning operations
- Properly disposing of used solvent and shop towels
- Implementing equipment practices that minimize emissions (e.g., keeping parts cleaners covered, maintaining cleaning equipment to repair solvent leaks, etc.)

The CTG recommends requiring solvents used in general cleaning operations to meet a VOC content limit of 50 g/l, unless emissions are reduced by at least 85% using an emission control system. The CTG also states that, in lieu of a limit on VOC content, the VOC composite vapor pressure of the solvent can be limited to 8 mmHg.

The CTG recommends excluding solvent cleaning operations for source categories covered under other CTGs, including:

- Aerospace coatings
- Wood furniture coatings
- Shipbuilding and repair coatings
- Flexible packaging printing materials
- Lithographic printing materials
- Letterpress printing materials
- Flat wood paneling coatings
- Large appliance coatings
- Metal furniture coatings
- Paper, film and foil coatings
- Plastic parts coatings
- Miscellaneous metal parts coatings
- Fiberglass boat manufacturing materials
- Miscellaneous industrial adhesives
- Auto and light-duty truck assembly coatings

The CTG also recommends considering exempting cleaning operations that are subject to other state/district rules, based on this list from Bay Area AQMD Rule 8-4:

- Architectural coatings
- Metal container, closure, and coil coatings
- Paper, fabric, and film coatings
- Light and medium duty motor vehicle assembly plants
- Surface coating of metal furniture and large appliances
- Surface coating of miscellaneous metal parts and products
- Graphic arts printing and coating operations
- Coating of flat wood paneling and wood flat stock
- Magnet wire coating operations
- Aerospace assembly and component coating operations
- Semiconductor wafer fabrication operations
- Surface coating of plastic parts and products
- Wood products coatings
- Coating, ink, and adhesive manufacturing
- Flexible and rigid disc manufacturing
- Marine vessel coatings
- Motor vehicle and mobile equipment coating operations
- Polyester resin operations

Finally, the CTG recommends exempting solvent cleaning for these specific activities:

- Electrical and electronic components;
- Precision optics;
- Numismatic dies;
- Stripping of cured inks, coatings, and adhesives;
- Cleaning of resin, coating, ink, and adhesive mixing, molding, and application equipment;
- Research and development laboratories;
- Medical device or pharmaceutical manufacturing; and
- Performance or quality assurance testing of coatings, inks, or adhesives.

SMAQMD REQUIREMENTS

District Rule 466, Solvent Cleaning, limits VOC emissions from solvents used in cleaning operations during the production, repair, maintenance or servicing of parts, products, tools, machinery, or equipment, or in general work areas. The VOC content limits are shown in the following table:

Solvent Cleaning Activity	VOC Content Limit (g/l)
General (wipe cleaning, maintenance cleaning)	25
Product Cleaning During Manufacturing Process or Surface Preparation for Coating, Adhesive, Sealant, or Ink Application	
General	25
Electrical Apparatus Components/ Electronic Components	100
Medical Devices and Pharmaceuticals	800
Platelets	800

Solvent Cleaning Activity	VOC Content Limit (g/l)
Repair and Maintenance Cleaning	
General	25
Electrical Apparatus Components/ Electronic Components	100
Medical Devices and Pharmaceuticals	
General Work Surfaces	600
Tools, Equipment, and Machinery	800
Platelets	800
Architectural Coating Application Equipment	25
Sterilization of food manufacturing and processing equipment	200

As an alternative to complying with the VOC content limits, a control device may be used. The control device must either: 1) have a minimum capture efficiency of 90% and a minimum control efficiency of 95% (equivalent to 86% overall control) or 2) reduce the VOC concentration at the outlet of the control device to less than 50 ppm.

All solvents must be stored in closed containers when not in use. The containers must be nonleaking and nonabsorbent. Cleaning methods are limited to:

- Wipe cleaning
- Cleaning within closed containers or by using hand held spray bottles from which solvents are applied without a propellant-induced force
- Using cleaning equipment which has a solvent container that is closed during cleaning operations, except when depositing and removing objects to be cleaned, and is closed during non-operation with the exception of maintenance and repair to the cleaning equipment itself
- Using a remote reservoir degreaser, non-vapor degreaser, or vapor degreaser used pursuant to the provisions of Rule 454, Degreasing Operations
- Using solvent flushing methods where the cleaning solvent is discharged into a container that is closed except for solvent collection openings and, if necessary, openings to avoid excessive pressure buildup inside the container. The discharged solvent from the equipment must be collected into containers without atomizing into the open air. The solvent may be flushed through the system by air or hydraulic pressure, or by pumping

Rule 466 does not apply to cleaning operations regulated under the following District rules:

- Rule 444 – Petroleum Solvent Dry Cleaning
- Rule 450 – Graphic Arts Operations
- Rule 451 – Surface Coating of Miscellaneous Metal Parts and Products
- Rule 452 – Can Coating
- Rule 454 – Degreasing Operations
- Rule 456 – Aerospace Assembly and Component Coating Operations
- Rule 459 – Automotive, Mobile Equipment, and Associated Parts and Components Coating Operations
- Rule 460 – Adhesives and Sealants
- Rule 463 – Wood Products Coating
- Rule 464 – Organic Chemicals Manufacturing Operations

- Rule 465 – Polyester Resin Operations

Additional exemptions are provided, including:

- Cleaning using solvents that contain 25 grams per liter or less VOCs as applied, including water and exempt compounds
- Cleaning of solar cells, laser hardware, scientific instruments, high-voltage microwave vacuum tubes, and high-precision optics
- Cleaning of cotton swabs to remove cottonseed oil before cleaning of high-precision optics
- Cleaning of paper-based gaskets and clutch assemblies where rubber is bonded to metal by means of an adhesive
- Cleaning of application equipment used to apply coatings on satellites and radiation effect coatings
- Janitorial cleaning, including graffiti removal
- Cleaning of sterilization ink indicating equipment provided that the solvent usage is less than 1.5 gallons per day
- Cleaning with aerosol products provided that 160 fluid ounces or less of aerosol products are used per day, per stationary source
- Sanitizing products that are labeled and applied to food-contact surfaces that are used to process dry and low-moisture food products and are not rinsed prior to contact with food
- Materials used for the stripping of cured inks, cured coatings, or cured adhesives

OTHER FEDERAL GUIDANCE

ACT: None

NSPS: None

NESHAP: None

EPA Menu of Control Measures:

The 2006 CTG is identified on the menu of control measures for industrial cleaning solvents.

NSR/PSD Settlement Agreements: None

STATE GUIDANCE: None

BACT/LAER

EPA RACT/BACT/LAER Clearinghouse: None

ARB BACT Clearinghouse: None

SMAQMD BACT Determinations

In 2012, a BACT determination was made for solvent cleaning operations. BACT was determined to be compliance with District Rule 466.

OTHER NONATTAINMENT RULES

The requirements for solvent cleaning operations in the rules listed below were evaluated and compared with SMAQMD Rule 466:

- PCAPCD Rule 240 (12/11/03)
- YSAQMD Rule 2.31 (5/8/13)
- SJVUAPCD Rule 4663 (9/20/07)
- VCAPCD Rule 74.6 (11/11/03)
- SCAQMD Rules 1131 (6/6/03) and 1171 (5/1/09)
- Dallas-Fort Worth and Houston-Galveston-Brazoria Rule 115.463 (12/29/11)
- Baltimore Rule 26.11.19.09-1 (4/19/10)

The comparison included only requirements for operations covered by the CTG. The VOC standards in Rule 466 are at least as stringent as those in the other nonattainment area rules. Although Rule 466 and SCAQMD Rule 1131 both include a specialty cleaning category for solvents used to sterilize food manufacturing and processing equipment, with a higher VOC limit than the general VOC limits that apply in the other rules, this category is necessary for technical reasons. A food processing company in the District demonstrated that the higher VOC materials are needed to meet stringent USDA requirements that protect against food-borne illness.

CONCLUSION

The generally applicable VOC content limit in Rule 466 is 25 g/l, which is more stringent than the CTG limit of 50 g/l. Rule 466 allows VOC content greater than 25 g/l for certain specialized operations, including electrical apparatus components, and electronic components, medical devices, pharmaceuticals, and platelets; however, the CTG recommends that these categories be exempt from the VOC content requirements. The Rule 466 and CTG requirements for optional add-on control devices are equivalent. In addition, Rule 466 is at least as stringent as the rules of the other nonattainment areas.

Rule 466 satisfies the RACT requirement for this source category.

Category: Metal Can Coating

CTG DOCUMENT

Control of Volatile Organic Emissions from Existing Stationary Sources – Volume II: Surface Coating of Cans, Coils, Paper, Fabrics, *Automobile, and Light-Duty Trucks,* EPA-450/2-77-008, May 1977.

The CTG applies to two- and three-piece can manufacturing processes, can fabrication processes, and end coating operations. The CTG identifies five control alternatives, as shown in the following table:

Control Technology	VOC Percent Reduction
Catalytic and non-catalytic incineration	90
Carbon adsorption	90
Water-borne and high-solids coatings	60-90
Ultraviolet curing	Up to 100
Powder coating	100

For various technical reasons, not all RACT alternatives apply to each can manufacturing process. Therefore, the CTG specifies the controls that are feasible for each process operation, as shown below:

Can Coating Operation	Available controls
2-piece exterior coating	Incineration, water-borne and high solid coatings, UV curing
2-piece interior spray coating	Incineration, water-borne and high solid coatings, powder coating, carbon adsorption
3-piece sheet coating, interior	Incineration, water-borne and high solid coatings
3-piece sheet coating, exterior	Incineration, water-borne and high solid coatings, UV curing
Can fabricating, side seam spray coating	Water-borne and high solid coatings, powder coating
Can fabricating, interior spray coating	Incineration, water-borne and high solid coatings, powder coating, carbon adsorption
End coating, sealing compound	Water-borne and high solid coatings
End coating, sheet coating	Carbon adsorption, incineration, water-borne and high solid coatings

The CTG specifies presumptive RACT as the following numeric VOC limits, based on the water-borne and high-solids coatings control alternative:

Can Coating Operation	VOC Content Limit (g/l)
Sheet basecoat, overvarnish, 2-piece exterior	340
2- and 3-piece interior spray, 2-piece end	510
3-piece side seam spray	660
End sealing	440
Prime topcoat or single coat	310

SMAQMD REQUIREMENTS

District Rule 452, Can Coating, limits the VOC content for 11 categories of can coating materials as shown in the table below.

Coating type	VOC Content (g/l)
Interior base coating	225
Interior base coating overvarnish	225
Exterior base coating	225
Exterior base coating overvarnish	225
2-piece can exterior base coating	250
2-piece can exterior base overvarnish	250
2-piece can interior body spray	420
3-piece interior body spray	360
2-piece can exterior end coating	250
3-piece can side seam spray	660
End sealing compound for food/beverage cans	20
End sealing compound for non-food containers	0

Emissions control equipment may be used instead of VOC content limits, provided that the overall collection and control is at least 90% on a mass basis. Rule 452 also specifies a 25 g/l limit for cleaning materials used for container assemble equipment. Additionally, all VOC-materials and VOC-containing cloth, sponges, and other materials used for solvent cleaning must be stored in closed containers when not in use.

OTHER FEDERAL GUIDANCE

NSPS:

40 CFR Part 60, Subpart WW - Standards of Performance for the Beverage Can Surface Coating Industry

The NSPS limits VOC emissions from beverage can coating operations as shown in the following table. The facility may use low VOC materials and/or capture and control systems to meet the limits. Limits for the specific operations are as follows:

Operation type	VOC Content Limit (g/l)
2-piece exterior (except clear base coat)	290
2-piece exterior clear base coat and overvarnish coating	460
2-piece interior spray coating	890

NESHAP:

40 CFR Part 63, Subpart KKKK - National Emission Standards for Hazardous Air Pollutants: Surface Coating of Metal Cans

The NESHAP specifies HAP emissions limitations for new and existing can coating operations. The NESHAP sets standards that reduce organic HAP emissions, but there are no limits on VOC emissions.

Note: There are no sources in the District that are subject to either the NSPS or the NESHAP.

EPA Menu of Control Measures:

Three control measures for surface coating of metal cans were identified in the menu of control measures:

- For coating operations that use high VOC materials, the measure is a permanent total enclosure with a control device, achieving an overall combined capture and control efficiency of 92%. (Note: This measure is based on information used during the development of the MACT standards, which are applicable to major sources of HAPs).
- Again, for coating operations that use high VOC materials, the measure is an incinerator achieving an overall combined capture and control efficiency of 84%.
- A measure that reduces fugitive VOC emission using process modifications, reducing overall VOC emissions by 9%.

NSR/PSD Settlement Agreements: None

STATE GUIDANCE

Determination of Reasonably Available Control Technology and Best Available Retrofit Control Technology for Metal Container, Closure and Coil Coating Operations, Air Resources Board, July 21, 1992.

In 1992, the ARB issued a RACT/BARCT determination document for metal container, closure and coil coating operations. The following VOC content limits for metal can coatings were recommended as RACT and BARCT.

Coating type	VOC Content Limit (g/l)
Sheet basecoat or overvarnish	225
2-piece can exterior base coat or overvarnish	250
2-piece can interior body spray	420

Coating type	VOC Content Limit (g/l)
3-piece interior body spray	360
3-piece can side seam spray	660
Ink	300
End sealing compound for food/beverage cans	440
End sealing compound for non-food containers	20
Exterior body spray	445

Emissions control equipment may be used instead of meeting VOC content limits, provided that the overall collection and control efficiency is at least 85%.

BACT/LAER

EPA RACT/BACT/LAER Clearinghouse

There are two BACT determinations, in 2006 and 2010, for can coating operations. In both cases, BACT was determined to be a thermal oxidizer, with a capture efficiency of 80% and destruction efficiency of 98% (2010) or 95% (2006). These are equivalent to 78% and 76% overall control efficiency, respectively.

ARB BACT Clearinghouse: None

SMAQMD BACT Determinations: None

OTHER NONATTAINMENT AREA RULES

The requirements for metal can coating operations in the rules listed below were evaluated and compared with SMAQMD Rule 452:

- PCAPCD Rule 223 (10/6/94)
- SJVUAPCD Rule 4604 (9/20/07)
- SCAQMD Rule 1125 (1/13/95)
- Dallas-Fort Worth and Houston-Galveston-Brazoria Rule 115.421 (6/25/15)
- Baltimore Rule 26.11.19.04 (8/16/83)

The requirements in Rule 452 are at least as stringent as those in the other nonattainment area rules.

CONCLUSION

Rule 452 is more stringent than the CTG presumptive RACT for coating VOC limits. The CTG specifies emission control as an alternative to the coating limits. The CTG does not specify capture efficiency, but concludes that at least 90% control efficiency is achievable for incineration and carbon adsorption. Rule 452 specifies a combined capture and control efficiency of at least 90%, which also exceeds the requirements of the BACT determinations.

Rule 452 is more stringent than the NSPS and the EPA menu of control measures. Rule 452 is as stringent as or more stringent than ARB's RACT/BARCT determination and the rules of the other nonattainment area.

Rule 452 satisfies the RACT requirement for this category.

Category: Metal Furniture Coating

CTG DOCUMENTS

Control of Volatile Organic Emissions from Existing Stationary Sources Volume III: Surface Coating of Metal Furniture, EPA-450/2-77-032, December 1977.

The 1977 CTG applies to any facility that performs surface coating (finishing) of metal furniture, including any furniture made of metal or any metal parts that will be assembled with other non-metal parts to form a furniture piece. The CTG does not include a model rule, but establishes presumptive RACT for metal furniture surface coating operations as an emission limit of 0.36 kg of organic solvent emitted per liter of coating, minus water. This standard applies to the daily volume-weighted average of all coatings used on a coating line. The single emission standard does not account for differences between air dried and baked coatings or for specific requirements for individual coating types. This CTG was superseded by a new CTG in 2007, which is discussed below.

Control Techniques Guidelines for Metal Furniture Coatings, EPA-453/R-07-005, September 2007.

The 2007 CTG applies to each metal furniture surface coating unit at a facility where the total actual VOC emissions from all such operations, including related cleaning activities, are at least 15 lb/day (or an equivalent level such as 3 tons per 12-month rolling period) before consideration of controls.

The 2007 CTG specifies three alternative methods to reduce VOC emissions from metal furniture coatings: lower VOC limits, add-on controls, or a combination of lower VOC limits and add-on controls. The CTG also recommends work practices and application methods with high transfer efficiency. Specific metal furniture coatings VOC content limits are detailed below.

Coating Type	VOC Content, g/l (lb/gal)	
	Air Dried	Baked
General, One-Component	275 (2.3)	275 (2.3)
General, Multi-Component	340 (2.8)	275 (2.3)
Extreme High Gloss	340 (2.8)	360 (3.0)
Extreme Performance	420 (3.5)	360 (3.0)
Heat Resistant	420 (3.5)	360 (3.0)
Metallic	420 (3.5)	420 (3.5)
Pretreatment Coatings	420 (3.5)	420 (3.5)
Solar Absorbent	420 (3.5)	360 (3.0)

In lieu of meeting the VOC content limits, the CTG recommends an overall control efficiency of 90% for add-on control equipment for metal furniture coating operations.

SMAQMD REQUIREMENTS

District Rule 451, Surface Coating of Miscellaneous Metal Parts and Products, applies to the coating of metal parts and products, including metal furniture. Rule 451 sets the following VOC content limits and work practices for miscellaneous metal parts coatings, as shown below:

Coating Type	VOC Content, g/l (lb/gal)	
	Air Dried	Baked
Aluminum Coating for Window Frames and Door Frames*	420 (3.5)	275 (2.3)
Camouflage	420 (3.5)	360 (3.0)
Electrical Insulating	340 (2.8)	275 (2.3)
Etching Filler	420 (3.5)	420 (3.5)
Extreme High Gloss	420 (3.5)	360 (3.0)
Extreme Performance	420 (3.5)	360 (3.0]
Heat Resistant	420 (3.5)	360 (3.0)
Metallic/Iridescent	420 (3.5)	420 (3.5)
Prefabricated Architectural Component	420 (3.5)	275 (2.3)
Pretreatment Wash Primer	420 (3.5)	420 (3.5)
Silicone Release Coating	420 (3.5)	420 (3.5)
Solar Absorbent	420 (3.5)	360 (3.0)
All Other Coatings	340 (2.8)	275 (2.3)

* The limit for aluminum coatings for window frames and door frames is the same as for other prefabricated architectural component coatings.

- Coating removers (strippers): VOC content no more than 200 g/l (1.7 lb/gal).
- High efficiency applications equipment (e.g., HVLP, roll coater, dip coater, flow coater, electrostatic spray coating).
- Work practices for material storage and equipment cleaning.
- Product cleaning or surface prep solvents: VOC content no more than 25 g/l (0.21 lb/gal).

Rule 451 provides an option to use add-on control equipment with an overall control efficiency of at least 90% in lieu of using coatings and other materials that meet the VOC content limits.

Rule 451 contains the following exemptions:

- Prefabricated architectural components not coated in a shop.
- Motor vehicles.
- Aircraft or aerospace vehicles.
- Cans, coils, and magnet wire.
- Adhesives and sealants.
- Magnetic data storage disks.
- Safety indicating coatings.

- Stencil coatings.
- Conformal coatings.
- Hand lettering.
- Any coating used at less than 55 gallons per year per source, consistent with the EPA Region IX "Little Bluebook" (*Guidance Document for Correcting Common VOC and Other Rule Deficiencies*, April 1, 1991, revised August 21, 2001).

Rule 451 sets additional limits on the VOC content of coatings applied to metal furniture at a stationary source where the emissions are 3 tons of VOC or greater, prior to emissions control equipment, per 12-month rolling period. This applicability threshold is consistent with the 2007 CTG. The limits for metal furniture coatings are shown below. If a coating is subject to a limit as metal furniture coating and also as a miscellaneous metal parts and products coating, the more stringent limit applies.

Coating Type	VOC Content, g/l (lb/gal)	
	Air Dried	Baked
General, Multi-Component	340 (2.8)	275 (2.3)
Etching Filler	420 (3.5)	420 (3.5)
Extreme High Gloss	340 (2.8)	360 (3.0)
Extreme Performance	420 (3.5)	360 (3.0)
Heat Resistant	420 (3.5)	360 (3.0)
Metallic/Iridescent	420 (3.5)	420 (3.5)
Pretreatment Wash Primer	420 (3.5)	420 (3.5)
Solar Absorbent	420 (3.5)	360 (3.0)
All Other Coatings	275 (2.3)	275 (2.3)

OTHER FEDERAL GUIDANCE

ACT: None

NSPS:

40 CFR Part 60, Subpart EE—Standards of Performance for Surface Coating of Metal Furniture

The NSPS applies to any metal furniture surface coating operation using 3,842 liters (1,015 gallons) or more of organic coating per year. The emission limit in subpart EE is 0.90 kg of VOC per liter of coating solids applied. Assuming a VOC density of 0.884 kg/l (as does the 2007 CTG), this is equivalent to 450 grams of VOC per liter of coating.

NESHAP:

40 CFR Part 63, Subpart RRRR—National Emission Standards for Hazardous Air Pollutants for Surface Coating of Metal Furniture

The NESHAP applies to metal furniture surface coating operations at major sources of HAP. Existing major sources must emit no more than 0.10 kg organic HAP/liter coatings solids used (0.83 lb/gal). The denominator of the NESHAP emission limit does not

include solids lost as overspray. New and reconstructed major sources must emit no organic HAP, unless the permitting authority approves use of an alternative limit of 0.094 kg organic HAP/liter coatings solids used (0.78 lb/gal) for certain specialty applications. The new source standards were based on facilities that use powder coatings or liquid coatings that contained no organic HAP. There is no limit on the content of VOCs that are not HAPs.

EPA Menu of Control Measures:

A total of four control measures are in the menu of control measures for metal furniture coatings. Three of the control measures are based on the 2007 CTG, the NESHAP, and SCAMQD Rule 1107. The other control measure, permanent total enclosure, was evaluated by EPA in conjunction with a thermal oxidizer in the MACT standard-setting process for this source category.

Equipment	Technology	Control Efficiency	Cost Effectiveness
Metal Furniture Surface Coating	Reduced Solvent Utilization	84%	$118/ton
Metal Furniture, Appliances, Parts	Reformulation-Process Modification	36%	$4,043/ton
Metal Furniture Coatings	Low-VOC Coating Materials	35%	$200/ton
Metal Furniture Surface Coating	Permanent Total Enclosure	95%	$24,325/ton

NSR/PSD Settlement Agreements: None

STATE GUIDANCE: None

BACT/LAER

EPA RACT/BACT/LAER Clearinghouse: There have been no recent BACT determinations for metal furniture coatings. The last BACT determination is from 2000, which established a VOC emission limit of 3.5 lb/gal for metal surface coating using a dip tank.

ARB BACT Clearinghouse: None

SMAQMD BACT Determination: None

OTHER NONATTAINMENT AREA RULES

The requirements for metal furniture coating operations in the rules listed below were evaluated and compared with SMAQMD Rule 451:

- PCAPCD Rule 245 (8/20/09)
- YSAQMD Rule 2.25 (5/14/08)
- SJVUAPCD Rule 4603 (9/17/09)
- SCAQMD Rule 1107 (1/6/06)
- VCAPCD Rule 74.12 (4/8/08)

- Dallas-Fort Worth and Houston-Galveston-Brazoria Rule 115.453 (6/25/15)
- Baltimore Rule 26.11.19.08 (5/26/14)

The comparison included only requirements for operations covered by the 2007 CTG, that is, for facilities where the total actual VOC emissions from furniture coating and related cleaning activities are at least 3 tons per 12-month rolling period, prior to emissions control equipment.

Rule 451 is at least as stringent as the SJVUAPCD, SCAQMD, and Baltimore rules, all of which include limits specifically pertaining to metal furniture coating. Compared to the rules for the rest of the nonattainment areas, Rule 451 is similar but has a few lower VOC limits for certain coating categories and a few higher limits for other coating categories. Lower limits from other nonattainment area rules are shown in the table below.

	VOC Content Limit (g/l)				
Coating Type	**SMAQMD Rule 451**	**PCAPCD Rule 245**	**YSAQMD Rule 2.25**	**VCAPCD Rule 74.12**	**Texas Rule 115.453**
Extreme Performance, Air Dried	420	--	--	--	360
Heat Resistant, Air Dried	420	--	--	--	360
Metallic, Air Dried	420	--	--	--	360
Metallic, Baked	420	360	360	360	360
Pretreatment Wash Primer, Air Dried	420	340	--	340	360
Pretreatment Wash Primer, Baked	420	275	--	275	360
Solar Absorbent, Air Dried	420	--	--	--	360

The PCAPCD, YSAQMD and VCAPCD rules do not include VOC limits specifically pertaining to metal furniture coating. Metal furniture coatings in these rules are subject to the same limits as coatings for miscellaneous metal parts and products.

All rules except for the Baltimore rule allow an emissions control device to be used in lieu of complying with the VOC content limits. A comparison of the minimum combined capture and control efficiencies is shown in the table below.

Minimum Overall VOC Capture and Control Efficiency						
SMAQMD Rule 451	**PCAPCD Rule 245**	**YSAQMD Rule 2.25**	**VCAPCD Rule 74.12**	**SCAQMD Rule 1107**	**SJVUAPCD Rule 4603**	**Texas Rule 115.453**
90%	95%	85%	90%	86%	90%	90%

CONCLUSION

Rule 451 is equivalent in stringency to the 2007 CTG for large metal furniture coating operations, i.e., at stationary sources where the emissions are 3 tons of VOC or greater per 12-month rolling period, prior to emissions control equipment. Rule 451 is more stringent than the NSPS.

Rule 451 is at least as stringent as the EPA Menu of Control Measures except for permanent total enclosure, which has not been required by any of the regulations included in this analysis. Rule 451 is at least as stringent as the BACT determination, which set a VOC limit of 3.5 lb/gal; none of the metal furniture coating VOC limits in Rule 451 exceeds 3.5 lb/gal.

Rule 451 is at least as stringent as the SCAQMD, SJVUAPCD and Baltimore rules. The PCAPCD, YSAQMD and VCAPCD rules have lower VOC limits for some coating categories; however, none of these rules include limits specifically pertaining to metal furniture coatings. Instead, metal furniture coatings are subject to the same limits as coatings for miscellaneous metal parts and products.

If a control device is used in lieu of complying with the VOC limits, Rule 451 requires at least 90% combined capture and control efficiency, which is in the middle of the range of efficiencies required by the other nonattainment area rules (85% to 95%).

The Texas rule contains four VOC limits that are lower than Rule 451, the CTG, and all of the other guidance and regulations compared; therefore, Staff considers these limits to be beyond RACT.

Rule 451 satisfies the RACT requirement for this category.

Category: Miscellaneous Metal and Plastic Parts and Products Coating and Motor Vehicle Materials

CTG DOCUMENTS

Control of Volatile Organic Compound Emissions from Existing Stationary Sources – Volume VI: Surface Coating of Miscellaneous Metal Parts and Products, EPA-450/2-78-015, June 1978.

The 1978 CTG applies to the coating of miscellaneous metal parts and products. This CTG is less stringent than the 2008 CTG, which is discussed below.

Control Techniques Guidelines for Miscellaneous Metal and Plastic Parts Coatings, EPA-453/R-08-003, September 2008.

The 2008 CTG applies not just to the coating of miscellaneous metal parts and products but also several other operations, including:

- Miscellaneous plastic parts and products coatings
- Automotive/transportation plastic parts coatings
- Business machine plastic parts coatings
- Pleasure craft coatings
- Motor vehicle materials

This CTG category includes several coating operations – miscellaneous plastic parts and products, automotive/transportation plastic parts, business machine plastic parts, and pleasure craft – for which the District does not have a rule that contains specific VOC content limits for the coatings. Although Rule 441, Organic Solvents, applies more generically to total VOC emissions, the rule does not meet RACT for these coating operations. This has been identified as a RACT deficiency and the District plans to adopt a RACT rule to regulate these coating operations.

This analysis will focus on RACT for the two operations the District currently regulates: miscellaneous metal parts and products coatings, and motor vehicle materials.

The 2008 CTG establishes presumptive RACT for metal part surface coating operations as the following emission limits based on low-VOC coatings:

Coating	VOC Content Limit, g/l (lb/gal)	
	Air Dried	Baked
General one-component	340 (2.8)	280 (2.3)
General multi-component	340 (2.8)	280 (2.3)
Camouflage	420 (3.5)	420 (3.5)
Electric-insulating varnish	420 (3.5)	420 (3.5)
Etching filler	420 (3.5)	420 (3.5)
Extreme high-gloss	420 (3.5)	360 (3.0)
Extreme performance	420 (3.5)	360 (3.0)

Coating	VOC Content Limit, g/l (lb/gal)	
	Air Dried	Baked
Heat-resistant	420 (3.5)	360 (3.0)
High performance architectural	740 (6.2)	740 (6.2)
High temperature	420 (3.5)	420 (3.5)
Metallic	420 (3.5)	420 (3.5)
Military specification	340 (2.8)	280 (2.3)
Mold-seal	420 (3.5)	420 (3.5)
Pan backing	420 (3.5)	420 (3.5)
Prefabricated architectural multi-component	420 (3.5)	280 (2.3)
Prefabricated architectural one-component	420 (3.5)	280 (2.3)
Pretreatment coatings	420 (3.5)	420 (3.5)
Repair and touch up	420 (3.5)	360 (3.0)
Silicone release	420 (3.5)	420 (3.5)
Solar-absorbent	420 (3.5)	360 (3.0)
Vacuum-metalizing	420 (3.5)	420 (3.5)
Drum coating, new, exterior	340 (2.8)	340 (2.8)
Drum coating, new, interior	420 (3.5)	420 (3.5)
Drum coating, reconditioned, exterior	420 (3.5)	420 (3.5)
Drum coating, reconditioned, interior	500 (4.2)	500 (4.2)

The 2008 specifies RACT VOC content limits for materials used on motor vehicle other than at automobile and light-duty truck assembly plants, as shown in the table below.

Material	VOC Content Limit (g/l)
Motor vehicle cavity wax	650
Motor vehicle sealer	650
Motor vehicle deadener	650
Motor vehicle gasket/gasket sealing material	200
Motor vehicle underbody coating	650
Motor vehicle trunk interior coating	650
Motor vehicle bedliner	200
Motor vehicle lubricating wax/compound	700

The CTG recommends an option to use add-on control equipment with an overall control efficiency of at least 90% in lieu of using coatings and other materials that meet the VOC content limits.

The 2008 CTG recommends the following work practices:

- Store all VOC-containing materials and used shop towels in closed containers
- Ensure that mixing and storage containers used for VOC-containing materials are kept closed at all times except when depositing or removing these materials
- Minimize spills of VOC-containing materials

- Convey VOC-containing materials from one location to another in closed containers or pipes
- Minimize VOC emissions from cleaning of storage, mixing, and conveying equipment

The following application methods are recommended by the 2008 CTG:

- Electrostatic application
- HVLP spray
- Flow coat
- Roller coat
- Dip coat, including electrodeposition
- Other coating application methods capable of achieving a transfer efficiency equivalent or better than that achieved by HVLP spraying

The 2008 CTG recommends the following types of coatings and coating operations be exempt from the recommended VOC content limits:

- Stencil coatings
- Safety-indicating coatings
- Solid-film lubricants
- Electric-insulating and thermal-conducting coatings
- Touch-up and repair coatings
- Coating application utilizing hand-held aerosol cans

SMAQMD REQUIREMENTS

District Rule 451, Surface Coating of Miscellaneous Metal Parts and Products, sets the following VOC content limits and work practices for miscellaneous metal parts coatings, as shown below:

Coating	VOC Content Limit, g/l (lb/gal)	
	Air Dried	Baked
Aluminum Coating for Window Frames and Door Frames*	420 (3.5)	275 (2.3)
Camouflage	420 (3.5)	360 (3.0)
Electrical Insulating	340 (2.8)	275 (2.3)
Etching Filler	420 (3.5)	420 (3.5)
Extreme High Gloss	420 (3.5)	360 (3.0)
Extreme Performance	420 (3.5)	360 (3.0]
Heat Resistant	420 (3.5)	360 (3.0)
Metallic/Iridescent	420 (3.5)	420 (3.5)
Prefabricated Architectural Component	420 (3.5)	275 (2.3)
Pretreatment Wash Primer	420 (3.5)	420 (3.5)
Silicone Release Coating	420 (3.5)	420 (3.5)
Solar Absorbent	420 (3.5)	360 (3.0)

Coating	VOC Content Limit, g/l (lb/gal)	
	Air Dried	Baked
All Other Coatings	340 (2.8)	275 (2.3)

* The limit for aluminum coatings for window frames and door frames is the same as for other prefabricated architectural component coatings.

- Coating removers (strippers): no more than 200 g VOC/liter of material (1.7 lb/gal).
- High efficiency applications equipment (e.g., HVLP, roll coater, dip coater, flow coater, electrostatic spray coating).
- Work practices for material storage and equipment cleaning.
- Product cleaning or surface prep solvents: no more than 25 g VOC/liter of material (0.21 lb/gal).

Rule 451 provides an option to use add-on control equipment with an overall control efficiency of at least 90% in lieu of using coatings and other materials that meet the VOC content limits.

Rule 451 contains the following exemptions:

- Prefabricated architectural components not coated in a shop.
- Motor vehicles.
- Aircraft or aerospace vehicles.
- Cans, coils, and magnet wire.
- Adhesives and sealants.
- Magnetic data storage disks.
- Safety indicating coatings.
- Stencil coatings.
- Conformal coatings.
- Hand lettering.
- Any coating used at less than 55 gallons per year per source, consistent with the EPA Region IX "Little Bluebook" (*Guidance Document for Correcting Common VOC and Other Rule Deficiencies*, April 1, 1991, revised August 21, 2001).

Motor Vehicle Materials

Motor vehicle materials are regulated under District Rule 459, Automotive, Mobile Equipment, and Associated Parts and Components Coating Operations. Rule 459 sets the following limits on VOC content.

Material	VOC Content Limit (g/l)
Motor vehicle cavity wax	650
Motor vehicle sealer	420*
Motor vehicle deadener	650
Motor vehicle gasket/gasket sealing material	200
Motor vehicle underbody coating	430
Motor vehicle trunk interior coating	420

Material	VOC Content Limit (g/l)
(Single stage coating)	
Motor vehicle bedliner	200
Motor vehicle lubricating wax/compound	700

* Sealer is regulated under Rule 460, Adhesives and Sealants, as "Other Sealant"

OTHER FEDERAL GUIDANCE

ACT: None

NSPS: None

NESHAP:

40 CFR Part 63, Subpart MMMM—National Emission Standards for Hazardous Air Pollutants for Surface Coating of Miscellaneous Metal Parts and Products

This NESHAP applies to miscellaneous metal parts and products manufacturing surface coating operations at major HAP sources. These standards are in terms of pounds of organic HAP per gallon solids used. Since many VOC are not HAP, these limits for HAP establish no practical limits on VOC content or VOC emissions from these operations.

EPA Menu of Control Measures:

Coating reformulation is identified in the menu of control measures for metal parts and products coating.

Equipment	Technology	Control Efficiency
Metal Parts and Products Coating	Reformulation-Process Modification	36%
Miscellaneous Metal and Plastic Parts Coating	Coating Reformulation	35%

The control measures are based on SCAQMD Rule 1107 and the 2008 CTG for miscellaneous metal and plastic parts coatings.

NSR/PSD Settlement Agreements: None

STATE GUIDANCE

Determination of Reasonably Available Control Technology for Metal Parts and Products Coating Operations, Air Resources Board, December 10, 1992.

In 1992, the ARB issued a RACT determination document for metal parts and products coating operations. The determination included:

- Low VOC coatings (or a control device with at least 85% overall efficiency)
- High transfer efficiency coating devices, such as HVLP, electrostatic, dip coat, or hand application

- Surface preparation solvents: ≤200 g/l VOC or initial boiling point >190 °C

The recommend RACT limits for coatings are shown in the table below.

Coating	VOC Content Limit, g/l (lb/gal)	
	Air Dried	Baked
Camouflage	420 (3.5)	360 (3.0)
High Gloss	420 (3.5)	360 (3.0)
High Performance Architectural	750 (6.3)	750 (6.3)
Extreme Performance	750 (6.3)	750 (6.3)
Heat Resistant	420 (3.5)	360 (3.0)
High Temperature	550 (4.6)	550 (4.6)
Metallic	420 (3.5)	420 (3.5)
Mold Seal	750 (6.3)	750 (6.3)
Pan Backing	480 (4.0)	480 (4.0)
Pretreatment wash primer	420 (3.5)	420 (3.5)
Silicone Release	420 (3.5)	420 (3.5)
Solar Absorbent	420 (3.5)	360 (3.0)
Vacuum Metalizing	800 (6.7)	800 (6.7)
All other coatings	340 (2.8)	275 (2.3)

The RACT determination recommended exempting the following:

- Stencil coatings
- Safety temperature indicating coatings
- Powder coatings
- Adhesives regulated by a district rule
- Small users
- Coating operations regulated by other source-specific rules
- Performance tests on coatings

BACT/LAER

EPA RACT/BACT/LAER Clearinghouse:

Since 2004, there have been seven BACT determinations for miscellaneous metal parts and products surface coating operations. BACT ranged from low-VOC coatings, HVLP or equivalent transfer efficiency, operator training, closed container requirements, limiting the average VOC content of all coatings used at a facility, or limitation on total usage of coatings. One of the BACT determinations for a major facility required a regenerative thermal oxidizer add-on control device.

ARB BACT Clearinghouse: None

SMAQMD BACT Determination:

In July 2016, a BACT determination for a miscellaneous metal parts coating operation was determined under two scenarios: 1) a spray booth emitting <1,170 lb/month and ≤4,660 lb/year of VOC, and 2) a spray booth emitting ≥1,170 lb/month or >4,660 lb/year of VOC. BACT for the lower emitting units was determined to be the use of HVLP spray

or equivalent application equipment, use of an enclosed gun cleaner, and compliance with the VOC content limits shown in the table below. For the higher emitting units, BACT was determined to be compliance with the VOC content limits shown in the table below plus a control device achieving ≥90% collection efficiency and ≥95% destruction efficiency.

Coating	VOC Content Limit, g/l (lb/gal)	
	Air Dried	Baked
General One- Component	275 (2.3)	275 (2.3)
Aluminum Coating for Window Frames and Door Frames	420 (3.5)	275 (2.3)
Camouflage	420 (3.5)	420 (3.5)
Electrical Insulating	340 (2.8)	275 (2.3)
Etching Filler	340 (2.8)	275 (2.3)
Extreme High Gloss	420 (3.5)	360 (3.0)
Extreme Performance	420 (3.5)	360 (3.0)
Heat Resistant	420 (3.5)	360 (3.0)
Metallic/Iridescent	420 (3.5)	420 (3.5)
Prefabricated Architectural Component	420 (3.5)	275 (2.3)
Pretreatment Wash Primer	420 (3.5)	420 (3.5)
Silicone Release	420 (3.5)	420 (3.5)
Solar Absorbent	420 (3.5)	360 (3.0)
All Other Coatings	340 (2.8)	275 (2.3)

OTHER NONATTAINMENT AREA RULES

The requirements for metal parts and products coating operations in the rules listed below were evaluated and compared with SMAQMD Rule 451:

- PCAPCD Rule 245 (8/20/09)
- YSAQMD Rule 2.25 (5/14/08)
- SJVUAPCD Rule 4603 (9/17/09)
- SCAQMD Rule 1107 (1/6/06)
- VCAPCD Rule 74.12 (4/8/08)
- Dallas-Fort Worth and Houston-Galveston-Brazoria Rule 115.453 (6/25/15)
- Baltimore Rule 26.11.19.08 (5/26/14)

No VOC content limits in the Baltimore rule were lower than those in Rule 451. For the other nonattainment areas, each rule had some VOC content limits that were higher and some lower for certain coating categories compared to the corresponding limits in Rule 451. The table below shows only the coating categories for which one or more rules have a lower VOC limit than Rule 451.

Coating Type	VOC Content Limit (g/l)						
	SMAQMD Rule 451	PCAPCD Rule 245	YSAQMD Rule 2.25	VCAPCD Rule 74.12	SCAQMD Rule 1107	SJVUAPCD Rule 4603	Texas* Rule 115.453
General One Component, Air Dried	340	275	--	275	275	--	--
Etching Filler, Baked	420	--	--	--	--	--	360
Extreme High Gloss, Air Dried	420	340	--	--	340	--	--
Metallic, Baked	420	360	360	360	--	360	360
Prefabricated Architectural Component, One Component Coating, Air Dried	420	--	--	--	275	--	--
Prefabricated Architectural Component, Multicomponent Coating, Air Dried	420	--	--	--	340	--	--
Pretreatment Wash Primer, Air Dried	420	340	--	340	--	--	--
Pretreatment Wash Primer, Baked	420	275	--	275	--	--	360
Silicone Release, Baked	420	--	--	--	--	--	360

*Facilities with VOC emissions less than 3 lb/hr and 15 lb/day are exempt from the VOC limits in Texas Rule 115.453.

All rules except for the Baltimore rule allow an emissions control device to be used in lieu of complying with the VOC content limits. A comparison of the minimum combined capture and control efficiencies is shown in the table below.

Minimum Overall VOC Capture and Control Efficiency						
SMAQMD Rule 451	PCAPCD Rule 245	YSAQMD Rule 2.25	VCAPCD Rule 74.12	SCAQMD Rule 1107	SJVUAPCD Rule 4603	Texas* Rule 115.453
90%	95%	85%	90%	86%	90%	90%

CONCLUSION

The VOC content limits in Rule 451 for miscellaneous metal parts and products coatings are more stringent than those in the 2008 CTG, which is also the recommended measure in the EPA Menu of Control Measures. If a control device is used in lieu of complying with the VOC limits, both Rule 451 and the CTG require at least 90% control. Rule 451 is also more stringent than the ARB RACT determination.

Rule 451 is at least as stringent as the Baltimore rule. For the other nonattainment areas, each rule had some VOC content limits that were higher and some lower for certain coating categories compared to the corresponding limits in Rule 451. In addition,

each of these rules contained more specialty categories than Rule 451, with higher VOC content limits than those of the more general categories in Rule 451. For these reasons, one cannot conclude that any other nonattainment area rule is more stringent than Rule 451 when the VOC limits are considered as a whole. If a control device is used in lieu of complying with the VOC limits, Rule 451 requires at least 90% combined capture and control efficiency, which is in the middle of the range of efficiencies required by the other nonattainment area rules (85% to 95%).

The SMAQMD BACT determination has lower VOC limits than Rule 451 for air dried and baked etching filler. For higher emitting spray booths, the BACT determination requires a control device in addition to meeting the coating VOC limits. The Rule 451 standards are not as stringent as the BACT determination; however, the BACT standards do not apply to existing operations and are considered to be beyond RACT.

The VOC content limits in Rule 459 for motor vehicle materials are more stringent than those specified in the 2008 CTG.

Rules 451 and 459 satisfy RACT for this source category.

Category: Organic Chemical Manufacturing: Process Vents from Reactor Processes and Distillation Operations

CTG DOCUMENT

Control of Volatile Organic Compound Emissions from Reactor Processes and Distillation Operations in the Synthetic Organic Chemical Manufacturing Industry. EPA-450/4-91-031, August 1993.

The CTG applies to continuous process vent streams from reactors, associated product recovery systems, and distillation operations in synthetic organic chemical manufacturing industry (SOCMI) process units. SOCMI process units produce a specific list of chemicals, listed in Appendix A of the CTG.

Process vents must be controlled if the Total Resource Effectiveness (TRE) index value is less than or equal to 1.0. The TRE is a measure of the relative cost effectiveness of applying combustion controls, and is calculated using equations in the CTGs. Inputs to the TRE calculation are the vent stream flow rate, heating value, and VOC emission rate measured after any product recovery devices (e.g., condensers, absorbers, absorbers) through which the reactor or distillation vent stream is discharged. A TRE of 1.0 is roughly equivalent a cost of $2,300/ton (early 1993 dollars).

The presumptive RACT VOC limit for process vent streams is 98% VOC reduction or 20 ppmv at the outlet of the combustion control device, corrected to 3% oxygen. A flare meeting the design and operational requirements of 40 CFR 60.18 can also be used. Product recovery devices (e.g., condensers, absorbers, absorbers) cannot be used to meet the 98% reduction requirement. However a facility could add a recovery device or improve recovery efficiency to reduce the VOC emission rate (measured at the outlet of the recovery device) to the point where the TRE becomes greater than 1.0, and thereby avoid the need to install combustion controls. This feature of the RACT guidance encourages pollution prevention.

SMAQMD REQUIREMENTS

Rule 464, Organic Chemical Manufacturing Operations, applies to the manufacturing of organic chemicals in general, which also includes pharmaceuticals and cosmetics. Pharmaceutical manufacturing is covered by a separate CTG, which is analyzed as a category separately in this appendix. Therefore, only the requirements of Rule 464 that pertain to organic chemicals other than pharmaceuticals will be discussed here.

The requirements of Rule 464 are summarized below.

1. Other than for cosmetics, each reactor, distillation column, crystallizer, evaporator or enclosed centrifuge that emits >15 lb/day of maximum uncontrolled VOC emissions must be equipped with an air pollution control device with an efficiency of at least 90% and an overall capture and control efficiency of at least 85% by weight.

   For cosmetics, each reactor, distillation column, crystallizer, evaporator or enclosed centrifuge that emits >10 lb/day of maximum uncontrolled VOC emissions must be

equipped an air pollution control device with an overall capture and control efficiency of at least 90% by weight. As an additional alternative for units emitting >10 lb/day and ≤15 lb/day of maximum uncontrolled VOC emissions, the unit may be equipped with a condenser that meets a specified outlet gas temperature that depends on the vapor pressure of the VOC.

2. Other than for cosmetics, each centrifuge, rotary vacuum filter, or other filter or separation device that has an exposed liquid surface where the liquid contains VOC having a VOC vapor pressure of 0.5 psia or more at 20 °C and emitting >15 lb/day of maximum uncontrolled VOC emission must be vented to an air pollution control device with an efficiency of at least 90% and an overall capture and control efficiency of at least 85% by weight

   For cosmetics, each centrifuge, rotary vacuum filter, or other filter or separation device that has an exposed liquid surface where the liquid contains VOC having a VOC vapor pressure of 0.5 psia or more at 20 °C must incorporate a hood or enclosure with a delivery system or ductwork to collect VOC emissions, exhausting to a carbon adsorber, or equivalent control method approved by the Air Pollution Control Officer and the U.S. EPA.

3. Other than for cosmetics, air dryers or production equipment exhaust systems that emit ≥ 330 lb/day of maximum uncontrolled VOC emissions must be vented to an air pollution control device with a combined capture and control system efficiency is at least 85%. Air dryers or production equipment exhaust systems that emit <330 lb/day of maximum uncontrolled VOC emissions must be vented to an air pollution control device that reduces emissions to <33 lb/day.

   For cosmetics, air dryers or production equipment exhaust systems that emit >10 lb/day of maximum uncontrolled VOC emissions must be vented to an air pollution control device with an overall capture and control efficiency of at least 90% by weight.

4. Process tanks that contain liquid having a VOC vapor pressure of 0.5 psia or more at 20 °C must be closed containers that are tightly covered at all times except when accessing the container. In addition, process tanks that emit more than 15 lb/day of maximum uncontrolled VOC emissions must be vented to an air pollution control device with an efficiency of at least 90% and an overall capture and control efficiency of at least 85% by weight.

5. Emissions from bulk loading of liquid with a VOC vapor pressure >0.5 psia at 20 °C into any tank truck, trailer, railroad tank car, or storage tank ≥2,000 gallons must be reduced by a vapor balance system that returns at least 90% of the displaced vapor back to the supply tanks; or, the vessel must be equipped with an internal or external floating roof; or, the emissions must be reduced with an air pollution control device with an efficiency of at least 90% and an overall capture and control efficiency of at least 85% by weight.

6. Storage Tanks:

   - A storage tank >55 gallons and ≤40,000 gallons that stores organic liquid with VOC vapor pressure >1.5 psia at 20 °C must be equipped with a pressure/vacuum valve with a minimum pressure setting of 0.03 psi and a minimum vacuum setting of 0.03 psi, or equivalent control. Storage tanks with capacity >40,000 gallons are subject to Rule 446 – Storage of Petroleum Products (which is analyzed under a separate CTG category in this appendix).

   - A storage tank ≤55 gallons that stores organic liquid with VOC vapor pressure >1.5 psia at 20 °C must be a closed container that is kept tightly covered at all times except when accessing the container.

7. Rule 464 also contains requirements for wastewater systems, which are not within the scope of this CTG. Requirements for wastewater systems are included in the analysis for the non-CTG category Organic Chemical Manufacturing: Wastewater in Appendix D.

8. Leaks from process equipment are subject to Rule 443 – Leaks from Synthetic Organic Chemical and Polymer Manufacturing (which is analyzed under a separate CTG category in this appendix).

Rule 464 exempts facilities that emit ≤15 lb/day (≤10 lb/day for cosmetics) of maximum uncontrolled VOC emissions. The rule also exempts vent streams from individual reactors, distillation columns, evaporators, crystallizers, and centrifuges with maximum uncontrolled VOC emissions of ≤15 lb/day (≤10 lb/day for cosmetics), and separation devices (except for cosmetics) with maximum uncontrolled VOC emissions of ≤15 lb/day.

Research and development operations, including bench scale laboratory and pilot plant operations, with cumulative emissions at the design production rating ≤15 lb/day maximum uncontrolled VOC are also exempt.

OTHER FEDERAL GUIDANCE

ACT: None

NSPS:

1) 40 CFR Part 60, Subpart NNN – Standards of Performance for Volatile Organic Compound (VOC) Emissions from Synthetic Organic Chemical Manufacturing Industry (SOCMI) Distillation Operations.

2) 40 CFR Part 60, Subpart RRR – Standards of Performance for Volatile Organic Compound Emissions from Synthetic Organic Chemical Manufacturing Industry (SOCMI) Reactor Processes.

The two NSPSs apply to relatively large facilities – those manufacturing 1,100 tons or more of product per year. The NSPSs specify vent stream applicability criteria that are a bit more stringent than the CTGs (a TRE of 1.0 for the NSPSs equates to a cost of

$2,800/ton VOC reduced in early 1990s dollars). The control requirements are the same as the CTGs.

NESHAP:

> 40 CFR Part 63, Subpart FFFF – National Emission Standards for Hazardous Air Pollutants: Miscellaneous Organic Chemical Manufacturing.

The Miscellaneous Organic NESHAP (the "MON") applies to HAP emissions from a specific list of organic chemical processes at major sources of HAP.

For continuous process vents for which the flow rate is greater than or equal to 0.005 standard cubic meter per minute, and the total resource effectiveness index value (based on total organic HAP is less than or equal to 1.9 at an existing source and less than or equal to 5.0 at a new source, the control requirements are:

- Reduce emissions of total organic HAP by ≥98% by weight or to an outlet process concentration ≤20 ppmv as organic HAP or TOC by venting emissions through a closed-vent system to any combination of control devices (except a flare); or
- Reduce emissions of total organic HAP by venting emissions through a closed vent system to a flare; or
- Use a recovery device to maintain the TRE above 1.9 for an existing source or above 5.0 for a new source

For other continuous process vents, the control requirement is to use a recovery device to maintain a TRE above 1.9 for an existing source or above 5.0 for a new source. The Miscellaneous Organic NESHAP applies to organic HAP, and does not set standards for total VOC.

> 40 CFR Part 63, Subpart VVVVVV – National Emission Standards for Hazardous Air Pollutants for Chemical Manufacturing Area Sources.

This NESHAP applies to HAP emissions from area (non-major) sources of HAP that process, use, or produce HAPs from a specific list. The control requirements apply to process vents at chemical manufacturing process units (MPCUs) for which the total uncontrolled HAP emissions for the MPCU are equal to or greater than 10,000 lb/yr. HAP emissions from all batch process vents should be reduced by 85% or to 20 ppmv using controls. Total organic HAP emissions from continuous process vents with a TRE less than or equal to 1.0 should be reduced by 95% or to 20 ppmv using controls. Subpart VVVVVV is less stringent than subpart FFFF. The area source NESHAP applies to organic HAP, and does not set standards for total VOC.

EPA Menu of Control Measures: None

NSR/PSD Settlement Agreements: None

STATE GUIDANCE: None

BACT/LAER

EPA RACT/BACT/LAER Clearinghouse: None

ARB BACT Clearinghouse: None

SMAQMD BACT Determination: None

OTHER NONATTAINMENT AREA RULES

Only one other nonattainment area examined has a rule that applies to organic chemical manufacturing:

- Baltimore Rule 26.11.19.09 (6/5/95)

Rule 464 and the Baltimore rule require similar levels of control. However, Rule 464 has lower emission thresholds for requiring control, making it more stringent than the Baltimore rule.

CONCLUSION

The CTG, NSPSs and NESHAPs all use TRE criteria to determine which vent streams must be controlled, although the NESHAPs apply to total organic HAP and not total VOC. Under the CTG and NSPSs, the TRE criteria result in controls being required only for process vents with relatively high emission rates. There is only one source in the District, Procter and Gamble, to which the CTG applies. When Rule 464 was first adopted in 1998, Procter and Gamble provided process information and calculations demonstrating that no process vents covered by the CTG had TRE values less than 1.0; therefore, no vents at Procter and Gamble would require control under the CTG. Because the two NSPSs also use the same TRE criteria, no process vents at Procter and Gamble would require control under these regulations.

On the other hand, Rule 464 applies to all process vents with uncontrolled emissions greater than 15 lb/day regardless of TRE, and as a result, Rule 464 requires control of more vent streams and reduces emissions to a greater extent than the CTG or NSPSs.

Only one other nonattainment area examined, the Baltimore area, has a rule that applies to organic chemical manufacturing. Rule 464 is more stringent than the Baltimore rule.

Rule 464 satisfies the RACT requirement for this source category.

Category: Pharmaceuticals Manufacturing

CTG DOCUMENT

Control of Volatile Organic Emissions from Manufacture of Synthesized Pharmaceutical Products, EPA-450/2-78-029, December 1978.

The CTG applies to unit operations at facilities manufacturing synthesized pharmaceuticals. These unit operations include reactors, distillation operations, crystallizers, centrifuges, vacuum dryers, and associated storage tanks and transfer operations.

The CTG establishes presumptive RACT for the following sources at facilities that manufacture synthesized pharmaceuticals.

Emission Point	Applicability Criteria	VOC Limit
Process vents at reactors, distillation operations, crystallizers, centrifuges, and vacuum dryers	Emitting more than 15 lb/day of VOC	Surface condensers or equivalent controls
Air dryers and production equipment exhaust systems	Emitting 330 lb/day VOC or more	90% VOC reduction
	Emitting less than 330 lb/day VOC	Emission limit of 33 lb/day VOC
Storage tanks	Storing VOC with a vapor pressure > 4.1 psia and volume > 2000 gallons	90% vapor balance
	Storing VOC with vapor pressure > 1.5 psia	Pressure conservation vents set at 0.2 kPa (0.03 psia)
Centrifuges, rotary vacuum filters, and other filters having an exposed liquid surface	Applies to liquids with a total VOC vapor pressure of 0.5 psia	Enclose equipment
In-process tanks	All	Tanks equipped with covers that are closed when possible
Equipment leaks	Liquid leaks (visible)	Repair as soon as practicable

SMAQMD REQUIREMENTS

Prior to April 28, 2016, there were two District rules that applied to pharmaceuticals manufacturing: Rule 464, Organic Chemical Manufacturing Operations, which applied to the broader category of organic chemicals (including pharmaceuticals), and Rule 455, Pharmaceuticals Manufacturing, which applied only to pharmaceuticals and cosmetics. On April 28, 2016, the District amended Rule 464 to consolidate all requirements for pharmaceuticals manufacturing and, at the same time, repealed Rule 455. In addition, the requirements for pharmaceuticals manufacturing were strengthened. ARB submitted the amended Rule 464 to EPA for SIP approval on August 3, 2016.

The most stringent requirements of Rule 464 take effect on October 28, 2017. These are the requirements for pharmaceuticals manufacturing that will be presented here.

Rule 464 exempts pharmaceutical manufacturing facilities that emit, at the design production rate, 10 lb/day or less of maximum uncontrolled VOC emissions. This exemption level is lower than the 15 lb/day threshold in the CTG and EPA's "Bluebook" (*Issues Relating to VOC Regulation Cutpoints, Deficiencies, and Deviations*, May 25, 1988, revised January 11, 1990).

The requirements of Rule 464 for pharmaceuticals manufacturing are summarized below.

1. For each reactor, distillation column, crystallizer, evaporator or enclosed centrifuge that emits >15 lb/day of maximum uncontrolled VOC emissions, an air pollution control device with an overall capture and control efficiency of at least 90% by weight is required.

2. For each reactor, distillation column, crystallizer, evaporator or enclosed centrifuge that emits >10 lb/day but ≤15 lb/day of maximum uncontrolled VOC emissions, either an air pollution control device with an overall capture and control efficiency of at least 90% by weight or surface condensers must be used. Surface condensers must meet the following conditions, which depend on the absolute vapor pressure of the VOC at 20 °C:

VOC Vapor Pressure at 20 °C:	Maximum Condenser Outlet Gas Temperature (°C)
0.5 to 1.0 psia	25
1.0 to 1.5 psia	10
1.5 to 2.9 psia	0
2.9 to 5.8 psia	-15
over 5.8 psia	-25

3. Each centrifuge, rotary vacuum filter, or other filter or separation device that has an exposed liquid surface where the liquid contains VOC having a VOC vapor pressure of 0.5 psia or more at 20 °C must incorporate a hood or enclosure with a delivery system or ductwork to collect VOC emissions, exhausting to a carbon adsorber, or equivalent control method approved by the Air Pollution Control Officer and the U.S. EPA.

4. Air dryers or production equipment exhaust systems that emit >10 lb/day of maximum uncontrolled VOC emissions must be vented to an air pollution control device with an overall capture and control efficiency of at least 90% by weight.

5. Process tanks that contain liquid having a VOC vapor pressure of 0.5 psia or more at 20 °C must be closed containers that are tightly covered at all times except when accessing the container. In addition, process tanks that emit more than 15 lb/day of maximum uncontrolled VOC emissions must be vented to an air pollution control device that has a combined system efficiency of at least 85% by weight.

6. Emissions from bulk loading of liquid with a VOC vapor pressure >0.5 psia at 20 °C into any tank truck, trailer, railroad tank car, or storage tank ≥2,000 gallons must be reduced by a vapor balance system that returns at least 90% of the displaced vapor back to the supply tanks; or, the vessel must be equipped with an internal or external floating roof; or, the emissions must be reduced with an air pollution control device with a combined system efficiency of at least 90% by weight.

7. Storage Tanks:

   - A storage tank >55 gallons and ≤40,000 gallons that stores organic liquid with VOC vapor pressure >1.5 psia at 20 °C must be equipped with a pressure/vacuum valve with a minimum pressure setting of 0.03 psi and a minimum vacuum setting of 0.03 psi, or equivalent control. Storage tanks with capacity >40,000 gallons are subject to Rule 446 – Storage of Petroleum Products (which is analyzed under a separate CTG category in this appendix).

   - A storage tank ≤55 gallons that stores organic liquid with VOC vapor pressure >1.5 psia at 20 °C must be a closed container that is kept tightly covered at all times except when accessing the container.

8. Rule 464 also contains requirements for wastewater systems, which are analyzed under the category Organic Chemical Manufacturing: Wastewater in Appendix D. Wastewater systems are not within the scope of the pharmaceuticals CTG.

9. Leaks from process equipment are subject to Rule 443 – Leaks from Synthetic Organic Chemical and Polymer Manufacturing (which is analyzed under a separate CTG category in this appendix).

OTHER FEDERAL GUIDANCE

ACT:

Control of Volatile Organic Compound Emissions from Batch Processes – Alternative Control Techniques Information Document. EPA-453/R-93-017, February 1994.

The ACT applies to reactors, distillations columns, filters, dryers, extractors, crystallizers, and other process vent emissions within batch processes. The ACT presents three alternative control levels of 90%, 95%, or 98% VOC reduction. The 98% level is based on combustion control. The 90% and 95% levels allow for use of recovery devices. The ACT does not recommend process vent applicability criteria, but instead provides optional methodologies for individual or aggregated batch vents based on emission rates, flow rates, and costs. The model rule exempts batch process trains if combined vent emissions are less than 10,000 lb/yr VOC (equivalent to 27 lb/day).

NSPS: None

NESHAP:

40 CFR Part 63, Subpart GGG - National Emission Standards for Pharmaceuticals Production

The NESHAP applies to pharmaceutical manufacturing operations at major sources of HAPs. The NESHAP regulates organic HAP emissions from process vents, storage vessels, equipment leaks, and wastewater treatment systems. The NESHAP rule contains provisions for emissions averaging and pollution prevention alternatives. There are applicability cutoffs for each emission point, but those criteria would not be relevant for VOC emissions. The control requirements for equipment that is subject to the NESHAP are presented below.

Emission Point	HAP Limits
Storage tanks	Store applicable liquids in an internal floating roof, external floating roof, or fixed roof tank that sends emissions to a control device that reduces emissions by 90% or 95% (depending on tank size and vapor pressure of HAP stored), or comply with a vapor balancing alternative
Process vents	Reduce HAP by 98% by weight for each large process vent, and by 93% by weight for all remaining vents combined. As an alternative, reduce outlet concentrations to 20 ppmv, or use a flare.
Equipment Leaks	Liquid leak visual inspection and repair requirements

EPA Menu of Control Measures:

The control measure for Pharmaceutical and Cosmetic Manufacturing Operations is SCAQMD Rule 1103, with an estimated emission reduction of 90%.

NSR/PSD Settlement Agreements: None

STATE GUIDANCE: None

BACT/LAER

EPA RACT/BACT/LAER Clearinghouse: None

ARB BACT Clearinghouse: None

SMAQMD BACT Determinations

In 2014, BACT for the control of VOC emissions from a pharmaceutical process was determined to be the use of afterburners, refrigerated condensers, carbon adsorbers, or scrubbers on the process vents with a combined capture and control of at least 90%.

OTHER NONATTAINMENT AREA RULES

The requirements for pharmaceuticals manufacturing in the rules listed below were evaluated and compared with SMAQMD Rule 464:

- YSAQMD Rule 2.35 (9/14/16)
- SCAQMD Rule 1103 (11/4/11)
- Dallas-Fort Worth and Houston-Galveston-Brazoria Rules 115.531 (8/1/92) and 115.532 (5/16/02)
- Baltimore Rule 26.11.19.14 (5/8/91)

None of the other nonattainment area rules was more stringent than Rule 464.

CONCLUSION

Rule 464 contains VOC control requirements that are more stringent than the CTG and applies to vent streams with lower emission rates. The control levels required by Rule 464 are equivalent to the District's 2014 BACT determination and are within the range presented in the ACT, but Rule 464 requires control of streams with lower emission rates than the ACT. The NESHAP sets standards to control organic HAP emissions at pharmaceutical manufacturing located at major sources of HAPs. No VOC standards are set, which prevents a comparison with Rule 464.

SCAQMD Rule 1103 is identified on EPA's Menu of Control Measures. None of the other nonattainment area rules, including SCAQMD Rule 1103, was more stringent than Rule 464.

Rule 464 satisfies the RACT requirement for this source category.

Category: Solvent Metal Cleaning (Degreasers)

CTG DOCUMENT

Control of Volatile Organic Emissions from Solvent Metal Cleaning, EPA-450/2-77-022, November 1977.

The CTG applies to cold cleaners, open top vapor degreasers, and conveyorized degreasers. It identifies machine design specifications, control devices, and work practices to reduce solvent losses from diffusion and convection, carryout, leaks, downtime, solvent transfer, water contamination, and waste disposal for each type of degreaser. The CTG does not specify a single control strategy, but defines a number of measures at two levels of cost that can be combined to form an effective control strategy depending on the level of control needed. The types of controls are summarized generally below:

- Cold cleaners: Covers on machine openings, parts draining requirements to avoid carry-out, labeling of work practices, 0.7 freeboard ratio (alternatives: water cover or control device), and work practices for waste disposal.
- Vapor degreasers: More stringent cover and carry-out controls, work practice requirements for vapor cleaning, labeling, automatic shut-off switches in case of operating deviations, leak checks, 0.75 freeboard ratio (alternatives: refrigerated chiller, carbon adsorber, enclosed design, or other control device), and work practices for separator water and waste disposal.
- Conveyorized degreasers: Refrigerated chiller or carbon adsorber, carry-out controls, automatic shutoff switches, minimized machine openings, downtime covers, and work practices for separator water and waste disposal.

SMAQMD REQUIREMENTS

District Rule 454, Degreasing Operations, specifies design and work practice standards for non-vapor degreasers, vapor degreasers, remote reservoir degreasers, and conveyorized degreasers. In 2008, the District amended Rule 454 to require that solvents used in any vapor or non-vapor degreaser contain no more than 25 g/l of VOC. As an alternative to complying with the VOC limit, an airtight/airless cleaning system may be used.

The provisions of Rule 454 do not apply to:

- Wipe cleaning (covered under Rule 466)
- Degreasers using solvents that contain no more than 25 g/l of VOC
- Degreasing of tools, equipment, and machinery regulated under Rule 456, Aerospace Assembly and Component Coating Operations
- Degreasing of aerospace products using solvents that comply with the surface preparation and cleanup VOC limits of Rule 456 (also 25 g/l VOC limit)
- Products subject to the Air Resources Board Consumer Products Regulations (Subchapter 8.5, Article 2, Section 94507-94517 of Title 17 of the California Code of Regulations)
- Degreasing of high-voltage microwave vacuum tubes

OTHER FEDERAL GUIDANCE

ACT:

Alternative Control Technology Document - *Halogenated Solvent Cleaners*, EPA-450/3-89-030, August 1989.

The ACT for halogenated solvent cleaners applies to cold, open-top, and in-line (i.e., conveyorized) degreasers using 1,1,1-trichloroethane, trichloroethylene, perchloroethylene, methylene chloride, and trichlorotrifluoroethane. The controls listed in the ACT are the same as the CTG and include a few additional design or work practice standards that are more explicit than the CTG, but not substantially different or more stringent.

NSPS: None

NESHAP:

40 CFR Part 63, Subpart G – National Emission Standards for Halogenated Solvent Cleaning

The NESHAP applies to batch vapor, in-line vapor, in-line cold, and batch cold solvent cleaning machines that use any solvent containing at least 5%, by weight, of carbon tetrachloride, chloroform, perchloroethylene, 1,1,1-trichloroethane, trichloroethylene, or methylene chloride (either alone or in combination). The NESHAP is based on the same controls as the CTG, but specifies a number of alternative combinations of control measures for each type of degreaser.

EPA Menu of Control Measures:

There are four measures identified in the menu of control measures for solvent metal cleaning.

Source Category	Technology	Control Efficiency
Cold Cleaning Degreasing	Process Modification – Based on SCAQMD Rule 1122 staff report, modifications to the cold cleaning process to reduce the fugitive VOC emissions.	95%
Cold Cleaning Degreasing	Reformulation/Process Modification – Based on the Ozone Transport Commission rule. Establishes hardware and operating requirements for specified vapor cleaning machines, as well as solvent volatility limits and operating practices for cold cleaners.	8% beyond MACT standard
Open Top Degreasing	Process Modification – Based on SCAQMD Rule 1122, modifications to the open top degreasing process to reduce the fugitive VOC emissions	97%
Open Top Degreasing	Reformulation/Process Modification – From SCAQMD Rule 1122 staff report (1997), VOC emissions from degreasing operations can be reduced by the use of low-VOC content solvents, and by changes in operating practices.	65%

NSR/PSD Settlement Agreements: None

STATE GUIDANCE:

Determination of Reasonably Available Control Technology and Best Available Retrofit Control Technology for Organic Solvent Cleaning and Degreasing Operations, Air Resources Board, July 18, 1991.

In 1991, the ARB issued a RACT/BARCT determination document for organic solvent cleaning and degreasing. The ARB concluded that RACT and BARCT standards are met by the requirements shown below.

- All cleaners must have:
  - A cover where appropriate
  - A label specifying operating instructions

- Cold cleaners must be equipped with:
  - At least a 6 inch freeboard ratio for low volatility solvents
  - At least a 0.75 freeboard ratio for all other solvents, or a water cover

- Batch loaded vapor degreasers must be equipped with:
  - A primary condenser
  - A vapor level control thermostat
  - A condenser flow switch
  - A spray safety switch
  - A freeboard ratio at least 0.75
  - If the surface area is greater than one square meter, a refrigerated freeboard chiller

- Conveyorized cold cleaners must be equipped with:
  - A rotating basket
  - An average clearance less than 10 cm or less than 10% of the opening width
  - A freeboard ratio at least 0.75 or a refrigerated chiller

- Conveyorized vapor degreasers must be equipped with:
  - An enclosed drying tunnel or rotating basket
  - An average clearance less than 10 cm or less than 10% of the opening width
  - A primary condenser
  - A condenser flow switch
  - A spray safety switch
  - A vapor level control thermostat
  - A freeboard ratio at least 0.75 or a refrigerated chiller

As an alternative to the equipment requirements, a collection and control system with an overall efficiency of at least 85% can be used. The RACT/BARCT determination also includes work practice standards to minimize emissions during operation.

BACT/LAER

EPA RACT/BACT/LAER Clearinghouse:

In 2008, there was a BACT determination for 24 new degreasers. The BACT limit was 0.08 pounds of VOC per hour per square foot, using a vapor condensing recovery system.

ARB BACT Clearinghouse: None

SMAQMD BACT Determination: None

OTHER NONATTAINMENT AREA RULES

The requirements for solvent degreasing in the rules listed below were evaluated and compared with SMAQMD Rule 454:

- PCAPCD Rule 216 (12/11/03)
- YSAQMD Rule 2.31 (5/8/13)
- SJVUAPCD Rule 4662 (9/20/07)
- SCAQMD Rule 1122 (5/1/09)
- Dallas-Fort Worth and Houston-Galveston-Brazoria Rule 115.412 (12/9/04)
- Baltimore Rule 26.11.19.09 (6/5/95)

None of the other nonattainment area rules was more stringent than Rule 454.

CONCLUSION

District Rule 454 requires equipment design and work practice standards that are more stringent than the CTG. Functionally, Rule 454 requires the use of degreasers with solvents containing no more than 25 g/l VOC or the use of airtight/airless systems. No federal guidance, state guidance or other nonattainment area rules are more stringent than Rule 454.

Rule 454 satisfies the RACT requirement for this source category.

Category: Storage of Petroleum Products (> 40,000 gallons)

CTG DOCUMENTS

Control of Volatile Organic Emissions from Storage of Petroleum Liquids in Fixed-Roof Tanks. EPA-450/2-77-036, December 1977.

This CTG applies to fixed-roof storage tanks with capacities greater than 150,000 liters (40,000 gallons) containing petroleum liquids with a true vapor pressure greater than 10.5 kPa (1.5 psia). Presumptive RACT is to retrofit fixed-roof tanks with internal floating roofs that are equipped with closure seals. Openings are to be equipped with a cover, seal, or lid. Tanks with capacities less than 1,600,000 liters (420,000 gallons) that are used to store crude oil or condensate are exempt. The VOC emission control effectiveness is estimated to be 90%.

Control of Volatile Organic Emissions from Petroleum Liquid Storage in External Floating Roof Tanks. EPA-450/2-78-047, December 1978.

This CTG applies to external floating-roof storage tanks with capacities greater than 40,000 gallons containing petroleum liquids with a true vapor pressure greater than 1.5 psia. Presumptive RACT is shown in the following table:

Tank Type	Vapor Pressure	Requirements	Exemptions
Welded external floating roof tank equipped with primary metallic shoe or liquid mounted seals	>4 psia	Retrofit with a rim-mounted secondary seal Gap area of gaps exceeding 0.32 cm in width between secondary seal and the tank wall be < 6.5 cm2 per 0.3 m of tank diameter. Openings are to be equipped with a cover, seal, or lid.	External floating roof tanks with capacities <1,600,000 liters (420,000 gallons) that store crude oil and condensate Tanks equipped with metallic-type shoe seal in a welded tank which has a shoe mounted secondary seal.
Welded external floating roof tank equipped with primary vapor mounted seals	>1.5 psia		
Riveted external floating roof tank equipped with primary metallic shoe or liquid mounted seals	>1.5 psia		

SMAQMD REQUIREMENTS

District Rule 446, Storage of Petroleum Products, applies to storage tanks with capacity greater than 40,000 gallons storing liquids with vapor pressures greater than 1.5 psia.

- Storage vessels must be pressure tanks or equipped with a floating roof, internal floating roof or vapor recovery system that achieves at least 95% reduction in emissions.
- If the liquid vapor pressure is 11 psia or greater, the storage vessel must be a pressure tank or equipped with a vapor recovery system that achieves at least 95% reduction in emissions.
- Floating roofs must have 2 seals.
- All openings in the roof shall be equipped with a cover, seal or lid which shall remain closed at all times.
- The gap between the primary and secondary seal shall not exceed 0.15 cm.
- Rule 446 also has seal requirements for metallic shoe seals, welded tanks with metallic shoe seals, and resilient toroid seals.

Rule 446 does not apply to tanks having a capacity of less than or equal to 40,000 gallons. The rule also exempts tanks when they are undergoing periodic scheduled maintenance outside the ozone season with prior written approval or are in the process of replacing seals.

OTHER FEDERAL GUIDANCE

ACT:

> *Alternative Control Techniques Document: Volatile Organic Liquid Storage in Floating and Fixed Roof Tanks.* EPA-453/R-94-001, January 1994.

The ACT provides costs and emission reductions for various tank sizes and vapor pressures. No model rule or applicability requirements are provided.

NSPS:

> 40 CFR Part 60, Subpart K – Standards of Performance for Storage Vessels for Petroleum Liquids for Which Construction, Reconstruction, or Modification Commenced After June 11, 1973, and Prior to May 19, 1978.

This NSPS applies to tanks constructed prior to May 19, 1978 and does not include requirements as stringent as the latest NSPS, Subpart Kb, which is discussed below.

> 40 CFR Part 60, Subpart Ka – Standards of Performance for Storage Vessels for Petroleum Liquids for Which Construction, Reconstruction, or Modification Commenced After May 18, 1978, and Prior to July 23, 1984.

This NSPS applies to tanks constructed prior to July 23, 1984 and does not include requirements as stringent as the latest NSPS, Subpart Kb, which is discussed below.

40 CFR Part 60, Subpart Kb – Standards of Performance for Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced After July 23, 1984.

The applicability and standards for this NSPS are shown below.

Applicability	Requirement
Volume ≥ 151 m^3 (about 40,000 gallons) and a vapor pressure 5.2 to 76.6 kPa (0.75 to 11 psia)	Three options are allowed: 1. Internal floating roof (IFR) or fixed roof retrofitted with an IFR. Equip with a foam or liquid filled seal mounted in contact with the liquid or a mechanical shoe seal or 2 seals mounted one above the other to form a continuous enclosure. Openings are to be equipped with a cover, seal, or lid. 2. External Floating Roof Equipped with a closure device that has specified types of seals between the wall of the tank and the roof edge. Openings are to be equipped with a cover, seal, or lid. 3. A closed vent system routed to a control device that achieves at least 95% reduction. The NSPS specifies extensive fitting requirements for various types of openings and cover penetrations.
Volume ≥ 75 m^3 (20,000 gallons) and VP ≥76.6 kPa (11 psia)	A closed vent system routed to a control device that achieves at least 95% reduction

NESHAP:

40 CFR Part 63, Subpart G – National Emission Standards for Organic Hazardous Air Pollutants from the Synthetic Organic Chemical Manufacturing Industry for Process Vents, Storage Vessels, Transfer Operations, and Wastewater

This NESHAP applies to storage vessels in organic HAP service. For vessels larger than 151 m^3, the NESHAP applicability levels and control requirements for existing storage vessels are the same as in NSPS Subpart Kb. For new storage vessels, the control requirements are the same as the NSPS, but apply to storage of liquids with a vapor pressure of 0.7 kPa or more.

EPA Menu of Control Measures:

EPA's Menu of Control measures identifies SCAQMD Rule 1178 as the VOC reduction measure for the petroleum storage tanks source category. The control efficiency is estimated to be 95%.

NSR/PSD Settlement Agreements: None

STATE GUIDANCE: None

BACT/LAER

EPA RACT/BACT/LAER Clearinghouse:

Since 2010, there have been seven BACT determinations for petroleum liquid storage tanks for which the capacity and liquid vapor pressure fall within the applicability of the CTGs. In most cases, BACT was determined to be compliance with NSPS subpart Kb. In one case, the BACT determination required a dome to be installed over an external floating roof.

ARB BACT Clearinghouse: None

SMAQMD BACT Determination: None

OTHER NONATTAINMENT AREA RULES

The requirements for petroleum liquid storage tanks larger than 40,000 gallons in the rules listed below were evaluated and compared with SMAQMD Rule 446:

- PCAPCD Rule 212 (6/19/97)
- YSAQMD Rule 2.21 (9/14/16)
- SJVUAPCD Rule 4623 (5/19/05)
- SCAQMD Rules 463 (11/4/11) and 1178 (4/7/06)
- VCAPCD Rule 71.2 (9/26/89)
- Dallas-Fort Worth and Houston-Galveston-Brazoria Rule 115.112 (6/25/15)
- Baltimore Rule 26.11.13.03 (5/8/91)

Rule 446 is more stringent than the Baltimore rule. Rule 446 is less stringent than SCAQMD Rule 1178, which requires storage tanks at petroleum facilities that emit 20 tons per year or more of VOC to meet more stringent design requirements and, if an external floating roof tank stores liquid with a vapor pressure of 3 psia or more, a dome must be installed. The requirements of Rule 446 are equivalent to those of other nonattainment area rules.

CONCLUSION

Rule 446 has slightly more stringent control requirements than the CTGs. Fewer exemptions are allowed, (e.g., Rule 446 has no exemptions for tanks that store crude oil or condensate) and the gap allowed between primary and secondary seals is smaller. In addition, the 1978 CTG requires a secondary seal on a welded external floating roof tank, using a primary metallic shoe or liquid mounted seal, when the liquid vapor pressure exceeds 4 psia; Rule 446 requires secondary seals for such tanks when the vapor pressure exceeds 1.5 psia.

Rule 446 is as stringent as the NSPS Subpart Kb and the NESHAP for storage tanks to which the CTG applies (that is, tanks with capacities greater than 40,000 gallons storing petroleum liquids with a true vapor pressure greater than 1.5 psia).

Compared to other nonattainment area rules, only SCAQMD Rule 1178, which requires further emission reductions from tanks at petroleum facilities that emit 20 tons per year or more of VOC, is more stringent than Rule 446 for storage tanks included in this CTG category. None of the other regulations, and only one of the seven BACT determinations, requires this level of control. Staff considers these requirements of SCAQMD Rule 1178 to be beyond RACT.

Rule 446 satisfies the RACT requirement for this source category.

Category: VOC Leaks from Synthetic Organic Chemical and Polymer Manufacturing

CTG DOCUMENT

Control of Volatile Organic Compound Leaks from Synthetic Organic Chemical and Polymer Manufacturing Equipment. EPA-450/3-83-006, March 1984.

The CTG applies to equipment in VOC service in process units operated to produce synthetic organic chemicals or polymers. The CTG establishes presumptive RACT for equipment leaks as shown below

Equipment	Service	Monitoring Frequency Using EPA Method 21	Other Requirements
Valves	Gas	Quarterly at a leak definition of 10,000 ppmv	--
	Light liquid		
Compressors	Gas		
Pumps	Light liquid		Weekly visual inspection for leaks
Pressure relief valves	Gas		Monitor after each overpressure relief
Open-ended lines	All	None	Caps or plugs
Flanges	All	None	Repair visual leaks

Leaks must be repaired within 15 days of detection.

SMAQMD REQUIREMENTS

District Rule 443, Leaks from Synthetic Organic Chemical and Polymer Manufacturing, limits fugitive emissions from process equipment in this CTG category. Rule 443 defines a leak as:

- The dripping of VOC liquid of more than three drops per minute; or
- A reading on a portable hydrocarbon detector instrument of ≥10,000 ppmv; or
- The appearance of a visible mist.

The components covered by Rule 443 include valves, pumps, compressors, open-ended lines, sampling connections, agitators, pressure relief devices, and flanges. The inspection requirements are as follows:

- Quarterly Method 21 inspections for pumps and valves in light liquid service; valves, compressors and pressure relief devices in gas service. If fewer than 2% of all valves associated with a process unit are found to be leaking for five consecutive quarterly inspections, the inspection frequency for valves can be changed to annual.
- Method 21 inspection within 24 hours after every over-pressure relief to ensure the valve has properly reseated
- Weekly inspections for visible leaks for pumps in light liquid service.

- Annual Method 21 inspections for all flanges

Rule 443 requires the repair of leaking components within two working days

OTHER FEDERAL GUIDANCE

ACT: None

NSPS:

40 CFR Part 60, Subpart VV - Standards of Performance for Equipment Leaks of VOC in the Synthetic Organic Chemicals Manufacturing Industry for which Construction, Reconstruction, or Modification Commenced After January 5, 1981, and on or Before November 7, 2006.

Subpart VV specifies new source performance standards for equipment leaks of VOC in the synthetic organic chemical manufacturing industry as follows:

Equipment	Service	Monitoring Frequency Using EPA Method 21	Other Requirements
Valves	Gas or light liquid	Monthly at a leak definition of 10,000 ppmv	Repair within 15 calendar days. Decreased monitoring frequency with good performance
	Heavy liquid	None	If evidence of a leak is found, monitor within 5 days.
Pumps	Light liquid	Monthly at a leak definition of 10,000 ppmv	Weekly visual inspection for leaks
	Heavy liquid	None	If evidence of a leak is found, monitor within 5 days.
Compressors	Gas	None	Equip with seal system that prevents leaks or has no detectable emissions (<500 ppmv)
Pressure relief valves	Gas	Within 5 days of a pressure release	No detectable emissions (<500 ppmv)
	Light or heavy liquid	None	If evidence of a leak is found, monitor within 5 days.
Open-ended lines	All	None	Caps or plugs

Equipment	Service	Monitoring Frequency Using EPA Method 21	Other Requirements
Connectors (including flanges)	All	None	If evidence of a leak is found, monitor within 5 days.

Leaks must be repaired within 15 days of detection.

40 CFR Part 60, Subpart VVa - Standards of Performance for Equipment Leaks of VOC in the Synthetic Organic Chemicals Manufacturing Industry for Which Construction, Reconstruction, or Modification Commenced After November 7, 2006.

Subpart VVa standards are similar to Subpart VV, except that the leak thresholds were lowered.

Equipment	Service	Monitoring Frequency Using EPA Method 21	Other Requirements
Valves	Gas or light liquid	Monthly at a leak definition of 500 ppmv	Decreased monitoring frequency with good performance
	Heavy liquid	None	If evidence of a leak is found, monitor within 5 days. A leak is ≥10,000 ppmv.
Pumps	Light liquid	Monthly at a leak definition of 5,000 ppmv for polymerizing monomers, 2,000 ppmv for all other light liquids	Weekly visual inspection for leaks
	Heavy liquid	None	If evidence of a leak is found, monitor within 5 days. A leak is ≥10,000 ppmv.
Compressors	Gas	None	Equip with seal system that prevents leaks or has no detectable emissions (<500 ppmv)
Pressure relief valves	Gas	Within 5 days of a pressure release	No detectable emissions (<500 ppmv)
	Light or heavy liquid	None	If evidence of a leak is found, monitor within 5 days. A leak is ≥10,000 ppmv.

Equipment	Service	Monitoring Frequency Using EPA Method 21	Other Requirements
Open-ended lines	All	None	Caps or plugs
Connectors (including flanges)	Gas or light liquid	Within 12 months after initial startup at a leak definition of 500 ppmv	--
	Heavy liquid	None	If evidence of a leak is found, monitor within 5 days. A leak is ≥10,000 ppmv.

Leaks must be repaired within 15 days of detection.

NESHAP:

40 CFR Part 63, Subpart FFFF - National Emission Standards for Hazardous Air Pollutants: Miscellaneous Organic Chemical Manufacturing

The Miscellaneous Organic NESHAP (the "MON") applies to HAP emissions from a specific list of organic chemical processes at major sources of HAP. In addition to requirements for other emission units at these sources, the MON contains requirements for equipment leaks. The equipment leak requirements are shown below.

Equipment	Service	Monitoring Frequency Using EPA Method 21	Other Requirements
Valves	Gas or light liquid	Monthly at a leak definition of 10,000 ppm, decreasing to 500 ppm (2.5 years later)	Decreased monitoring frequency with good performance
Pumps	Light liquid	Monthly at a leak definition of 10,000 ppm, decreasing to 1,000 ppm (2.5 years later)	Weekly visual inspection of leaks
Compressors	Gas	None	Equip with seal system that prevents leaks or has no detectable emissions (<500 ppmv)
Pressure relief valves	Gas	Within 5 days of a pressure release	No detectable emissions (<500 ppmv)
Open-ended lines	All	None	Sealed with a cap, blind flange, plug, or a second valve
Connectors (including flanges)	Gas or light liquid	Annually at a leak definition of 500 ppm	Decreased monitoring frequency with good performance

Leaking components must be repaired within 15 days. The MON provides that valves and pumps at process units with more than 2% leaks must meet a quality improvement program, which requires removal and inspection of failed equipment, identification of superior technology, and an equipment replacement program to achieve less than 2% leaks.

EPA Menu of Control Measures: None

NSR/PSD Settlement Agreements:

A 2014 agreement with Flint Hills Resources required an enhanced leak detection and repair program at its chemical plant in Port Arthur, Texas, including the following elements:

- Install low-emissions valve technology
- Monitor valves, connectors, pumps, and agitators more frequently
- Monitor open-end lines even though they are not required to be monitored under current regulations
- Repair valves, connectors, pumps, and agitators when they are leaking at lower levels than the regulations specify and repairing open-end lines even though the regulations do not call for this
- Conduct enhanced training
- Undertake quality assurance/quality control measures
- Retain an outside auditor to do an annual LDAR audit
- Take corrective actions based on audit results

STATE GUIDANCE: None

BACT/LAER

EPA RACT/BACT/LAER Clearinghouse

From 2006 through 2014, there were seven BACT determinations for emissions of VOC from equipment leaks. In all seven, leak detection and repair programs were determined to be BACT. In the four determinations where more specific information was given, 40 CFR Part 60, Subpart VVa was specified as BACT.

ARB BACT Clearinghouse: None

SMAQMD BACT Determinations

In 2003, a BACT determination for a major source of VOC established BACT as a leak detection and repair program. The leak definition for pump seals and compressors was set to 500 ppmv. For all other fugitive components, the leak definition was set to 100 ppmv.

OTHER NONATTAINMENT AREA RULES

The requirements for VOC leaks in the rules listed below were evaluated and compared with SMAQMD Rule 443:

- YSAQMD Rule 2.23 (8/13/97)
- VCAPCD Rule 74.7 (10/10/95)
- SJVUAPCD Rule 4455 (4/20/05)
- SCAQMD Rules 466.1 (3/16/84), 467 (3/5/82) and 1173 (2/6/09)
- Baltimore Rule 26.11.19.16 (8/19/91)

Rule 443 is more stringent than the Baltimore rule and at least as stringent as SCAQMD Rules 446.1 and 467. Rule 443, when compared with the YSAQMD, VCAPCD, and SJVUACPD rules, has some provisions that are more stringent and others that are less stringent. Rule 443 is less stringent than SCAQMD Rule 1173. More stringent provisions of other nonattainment area rules are shown in the following table.

Provisions of Other Nonattainment Area Rules That Are More Stringent Than SMAQMD Rule 443

Provision	SMAQMD Rule 443	YSAQMD Rule 2.23	VCAPCD Rule 74.7	SJVUAPCD Rule 4455	SCAQMD Rule 1173
Leak Thresholds (ppmv)	Gas Leak: ≥10,000 Liquid Leak: >3 drops/min or visible mist	Major gas leak: >10,000 Minor Gas leak: 1,000 – 10,000 Major liquid leak: Visible mist or continuous flow Minor liquid leak: >3 drops/min but not major	Major gas leak: >200 for pressure relief devices (PRDs) >10,000 for others Minor gas leak: 1,000 – 10,000 Major liquid leak: Visible mist or continuous flow Minor liquid leak: >3 drops/min but not major	Major gas leak: >10,000 others Minor gas leak, in liquid service: 100 – 10,000 for PRDs; 200 – 10,000 for valves, connections, flanges; 500 – 10,000 for all others Minor gas leak, in vapor/gas service: 200 – 10,000 for PRDs; 400 – 10,000 for valves, connections, flanges; 1,000 – 10,000 for all others Major liquid leak: Visible mist or continuous flow Minor liquid leak: >3 drops/min but not major	Major gas leak, in light liquid or gas service: >10,000 Major gas leak, in heavy liquid service: >500 Minor gas leak, in light liquid or gas service: 500 – 10,000 Minor gas leak, in heavy liquid service: 100 - 500 Liquid leak: >3 drops/min
Audiovisual inspection frequency	Weekly	Every 8 hours	Every 8 hours	Daily	Every 8 hours
Allowable leak repair periods	2 days, all components	Major gas leak >50,000 ppmv: 1 day Major liquid leak: 1 day	Major gas leak >50,000 ppmv: 1 day Major liquid leak: 1 day	--	Any leak >25,000 ppmv: 1 day Light liquid leak >3 drops/min: 1 day Components in heavy liquid service >500 ppmv: 1 day

CONCLUSION

Rule 443 is more stringent than the CTG and NSPS Subpart VV because it requires Method 21 monitoring of flanges and agitators (the CTG and NSPS Subpart VV do not) and it requires repairs to be made in a significantly shorter period of time (2 days vs. 15 days).

Some of the provisions of NSPS Subpart VVa, including the leak thresholds and monitoring frequencies, are more stringent than those in Rule 443. However, Subpart VVa allows 15 days to complete repairs, which is less stringent than the 2-day period required by Rule 443. Staff has determined that Procter and Gamble, the only facility in this CTG category, is not subject to Subpart VVa[30]. Therefore, Subpart VVa is not more stringent than Rule 443 with respect to Procter and Gamble.

The leak detection and repair provisions of the MON are very similar to NSPS Subpart VVa, and some provisions of the MON are more stringent and others less stringent than those in Rule 443. In addition, the leak detection and repair requirements of the MON apply only to those components that contain fluids that with an organic HAP content, by weight, of at least 5%; non-HAP VOC leaks are not controlled. For these reasons, the MON is not necessarily more stringent than Rule 443 overall with respect to total VOC emissions.

Rule 443 is more stringent than the Baltimore Rule, which does not require Method 21 monitoring; instead, leaks are detected using audiovisual inspections. Rule 443 is at least as stringent as SCAMQD Rules 466.1 and 467. Rule 443 has some provisions that are more stringent and others that are less stringent than the provisions of the YSAQMD, VCAPCD, and SJVUACPD rules, and all provisions of Rule 443 are less stringent than those of SCAQMD Rule 1173. However, since Rule 443 is at least as stringent as any applicable federal guidance, Staff considers the more stringent provisions of the other nonattainment area rules to be beyond RACT. Many of those rules contain provisions more akin to the BACT determinations previously discussed.

Rule 443 satisfies the RACT requirement for this source category with respect to Procter and Gamble, the only facility subject to this CTG.

[30] 40 CFR 60.480a(d)(3) exempts process units that produce heavy liquid chemicals only from heavy liquid feed.

Category: Wood Furniture Manufacturing (Surface Coating)

CTG DOCUMENT

Guideline Series: Control of Volatile Organic Compound Emissions from Wood Furniture Manufacturing Operations, EPA-453/R-96-007, April 1996.

The CTG applies to facilities that perform surface coating (finishing), cleaning or wash-off operations associated with wood furniture manufacturing operations. Wood furniture includes residential furniture, cabinets, office furniture, public building furniture (e.g., benches, bleachers, church furniture), and office and store fixtures (e.g., partitions, shelves, lockers). The CTG does not apply to refinishing or restoration of previously coated products.

The CTG establishes presumptive RACT for wood furniture surface coating operations as the following emission limits and work practices:

Surface Coating Operation		VOC limit
General Topcoat		0.8 lb VOC/lb solids, as applied
General Sealer		1.9 lb VOC/lb solids, as applied
Acid-cured alkyd amino vinyl sealers and acid-cured alkyd amino conversion varnish topcoats	Sealer	2.3 lb VOC/lb solids, as applied
	Topcoat	2.0 lb VOC/lb solids, as applied
Sealer other than an acid-cured alkyd amino vinyl sealer; and using acid-cured alkyd amino conversion varnish topcoats	Sealer	1.9 lb VOC/lb solids, as applied
	Topcoat	2.0 lb VOC/lb solids, as applied
Acid-cured alkyd amino vinyl sealer and a topcoat other than an acid-cured alkyd amino conversion varnish topcoat	Sealer	2.3 lb VOC/lb solids, as applied
	Topcoat	1.8 lb VOC/lb solids, as applied
Strippable booth coatings		0.8 lb VOC/lb solids, as applied

Work practice standards and a work practice implementation plan should include:

- Operator training course
- Leak inspection and maintenance plan
- Cleaning and washoff solvent accounting system
- Storage requirements
- Application equipment requirements
- Line cleaning
- Gun cleaning
- Wash off operations

SMAQMD REQUIREMENTS

District Rule 463, Wood Products Coatings, applies to any person who uses, manufactures, blends, sells, repackages, distributes, or specifies the use of wood products coatings or strippers. Rule 463 covers coatings used in both new furniture manufacturing and in refinishing. Since the CTG covers only new manufacturing operations, only the limits for new manufacturing from Rule 463 are presented here.

Coating Type	VOC Limit g/l (lb-VOC/lb Solids)
Clear Topcoats	275 (0.35)
Conversion Varnish (when used as a combined sealer/topcoat system)	550 (1.20)
Filler	275 (0.18)
High Solid Stain	350 (0.42)
Inks	500 (0.96)
Mold Seal Coating	750 (4.20)
Multi-Colored Coating	275 (0.33)
Pigmented Coating	275 (0.25)
Sealer	275 (0.36)
Low-Solids Stains, Toners, Washcoats	120 (1.00)
Strippers (analogous to Washoff operations in CTG)	350 (or VOC composite vapor pressure less than <2 mm Hg at 20 ^{o}C)
Surface preparation and cleanup material	25

Rule 463 also contains requirements for application equipment, spray gun cleaning, and disposal of cloth/paper used for surface preparation, cleanup, or coating removal. In lieu of meeting the emission limits, an air pollution control device may be used provided it reduces emissions to an extent equal to or greater than that achieved by using compliant coatings.

Rule 463 contains the following exemptions:

- Sources using less than 55 gallons per year.
- Wood products coatings sold in non-refillable aerosol-spray containers.
- Coating operations associated with the manufacture of finished wood panels intended for attachment to walls.
- Coating of architectural components when not performed in a shop environment.

OTHER FEDERAL GUIDANCE

ACT: None

NSPS: None

NESHAP:

40 CFR Part 63, Subpart JJ – National Emission Standards for Hazardous Air Pollutants for Wood Furniture Manufacturing Operations

The NESHAP specifies standards in terms of pounds volatile organic HAPs per pound solids applied. Since many VOC are not HAP, these limits for HAP establish no practical limits on VOC content or emissions from these operations. Work practices in Subpart JJ, which are essentially equivalent to those in the CTG model rule, would reduce VOC as well as HAP emissions.

EPA Menu of Control Measures:

Two control measures for surface coating of wood furniture were identified in the menu of control measures:

- A measure to reduce emissions by 64% using add-on controls, such as thermal incinerators, catalytic incinerators, and a combination of carbon absorbers and catalytic incinerators
- The CTG model rule, which is estimated to reduce emissions by 24%

NSR/PSD Settlement Agreements: None

STATE GUIDANCE: None

BACT/LAER

EPA RACT/BACT/LAER Clearinghouse

From 2005 to 2007, there were seven BACT determinations made for wood furniture surface coating operations. BACT controls included coating reformulation, the use of low VOC and high solids coatings, the use of proper spraying techniques, and good work practices.

ARB BACT Clearinghouse: None

SMAQMD BACT Determinations

In 2016, a BACT determination was made for spray booths used to apply wood coatings. For booths with VOC emissions <1,170 lb/month and ≤4,663 lb/year, BACT was determined to be the use of high transfer efficiency equipment and coatings that meet the VOC limits in SCAQMD Rule 1136. Except for conversion varnish (see table below), the limits in SCAQMD Rule 1136 are the same as those in Rule 463.

For booths with VOC emissions ≥1,170 lb /month or >4,663 lb /year, BACT was determined to be either:

- Use of high transfer efficiency equipment and coatings that meet the VOC limits in SCAQMD Rule and a VOC control system with ≥90% collection efficiency and ≥ 95% destruction efficiency; or
- The use of Super Clean Materials (<5% VOC by weight); or
- Use of low-VOC materials resulting in an equivalent emission reduction.

OTHER NONATTAINMENT AREA RULES

The requirements for wood furniture coating operations in the rules listed below were evaluated and compared with SMAQMD Rule 463:

- PCAPCD Rule 236 (10/14/10)
- YSAQMD Rule 2.39 (5/14/08)
- SJVUAPCD Rule 4606 (10/16/08)
- SCAQMD Rule 1136 (6/14/96)
- VCAPCD Rule 74.30 (6/27/06)
- Dallas-Fort Worth and Houston-Galveston-Brazoria Rules 115.421 (6/25/15) and 115.422 (6/25/15)
- Baltimore Rule 26.11.19.32 (4/19/10)

No VOC content limits in the PCAPCD, YSAQMD, Texas, or Baltimore rules were lower than those in Rule 463. The table below shows only the coating categories for which one or more rules has a lower VOC limit than Rule 463.

Coating Type	VOC Content Limit (g/l)			
	SMAQMD Rule 463	**VCAPCD Rule 74.30**	**SCAQMD Rule 1136**	**SJVUAPCD Rule 4606**
High Solid Stain	350	240	--	240
Sealer	275	240	--	--
Conversion Varnish (when used as a combined sealer/topcoat system)	550	275*	275*	275*

* These are general limits for topcoats

CONCLUSION

District Rule 463 establishes VOC limits that are more stringent than the limits in the CTG model rule for all coating categories. One difference is that the CTG contains a limit for strippable booth coatings, but no limit is included in Rule 463. However, strippable booth coatings are not applied to wood furniture products; they are applied to the walls of paint spray booths to receive overspray and are subsequently peeled off, reducing or eliminating the use of solvents to clean booth walls. In the District, strippable booth coatings are subject to Rule 442, Architectural Coatings, in the categories of flat (50 g/l) or nonflat coatings (100 g/l). These VOC limits are more stringent than the CTG.

Rule 463 includes some coating categories not included in the CTG (clear topcoat, filler, high-solid stain, multi-colored coating, and pigmented coating). These coatings are subcategories of the ones in the CTG, and the VOC limits in Rule 463 are more stringent than the most stringent limits in the CTG. Rule 463 also includes limits for inks and mold release coatings that are consistent with other non-attainment area rules. These two

categories are not addressed in the CTG. The work practices in Rule 463 are equivalent to the CTG, except that Rule 463 does not include a requirement for an operator training course (nor do any of the nonattainment area rules evaluated).

Rule 463 is at least as stringent as the PCAPCD, YSAQMD, Texas, and Baltimore rules. Districts with rules containing VOC limits for coating categories that were lower than the corresponding limits in Rule 463 include VCAPCD (three categories), SJVUAPCD (two categories) and SCAQMD (one category). Because these limits are lower than all of the other nonattainment area rules, the CTG and other federal guidance, Staff considers them to be beyond RACT.

Rule 463 is less stringent than the District's 2016 BACT determination, particularly for spray booths that emit ≥1,170 lb/month or >4,663 lb/year of VOC. However, these requirements apply only to new emission units and none of the other guidance reviewed was as stringent. Staff considers the BACT determination to be beyond RACT.

Rule 463 satisfies the RACT requirement for this source category.

Appendix D

RACT Analysis of Rules for Non-CTG Source Categories Applicable to Major Sources

Category: Aerospace Assembly and Component Coating Operations

Aerojet is the only major source in the District that performs aerospace coating operations. Although there is a CTG for aerospace coating, no sources in the District, including Aerojet, are subject to the CTG[31]; a negative declaration is included in Appendix A of this RACT SIP.

Nevertheless, Aerojet is a major source of VOC; therefore, the District is required by the Clean Air Act to implement RACT for this major source. The analysis below will focus on requirements applicable to the aerospace coating operations used at Aerojet, and the CTG will provide valuable guidance.

SMAQMD REQUIREMENTS

District Rule 456, Aerospace Assembly and Component Coating Operations, applies to the coating of aerospace components, including coating removal (stripping), surface preparation and cleaning, and application equipment cleanup. The rule sets VOC content limits for 31 categories of general and specialty coatings. The rule also includes additional requirements:

- High transfer-efficiency application equipment (e.g., HVLP, roll coater, dip coater, flow coater, electrostatic deposition).
- Work practices for material storage and equipment cleaning.
- Cleaning and surface prep solvents: no more than 25 g VOC/liter of material.

Rule 456 provides the following exemptions:

- A low usage exemption is provided under the following conditions:
  - The usage of noncompliant rocket motor adhesives (provided the VOC content less than 890 g/l) does not exceed 200 gallons per year; and
  - The usage of all other noncompliant materials does not exceed 55 gallons per year; and
  - The total usage of noncompliant rocket motor adhesives and other noncompliant materials does not exceed 200 gallons per year.
- Non-refillable aerosol containers holding 1 liter (1.1 quarts) or less.
- Other exemptions for lettering, touch up and repair, cleaning of space vehicles, and cleaning and surface activation prior to adhesive bonding.
- Solvents used for cleaning application equipment in a rocket motor lining process are exempt from VOC limits, provided the application equipment is cleaned in an enclosed gun cleaner.

[31] The CTG applies to facilities that perform manufacture or rework of commercial, civil, or military aerospace vehicles or components. In severe ozone nonattainment areas, the CTG applies to sources with a potential to emit of 25 tons per year or more of VOC from such operations. No sources in the District have potentials to emit of 25 tons per year or more of VOC from aerospace manufacture and rework operations.

FEDERAL GUIDANCE

CTG:

> *Guideline Series: Control of Volatile Organic Compound Emissions from Coating Operations at Aerospace Manufacturing and Rework Operations*, EPA-453/R-97-004, December 1997.

The CTG identifies presumptive RACT for controlling VOC emissions from the manufacture or rework of commercial, civil, or military aerospace vehicles or components. The CTG applies to facilities with a potential to emit from these aerospace coating operations of 25 tons per year or more of VOC in moderate, serious, and severe ozone nonattainment areas or 10 tons per year or more in extreme ozone nonattainment areas.

The CTG establishes presumptive RACT for specialty aerospace coatings in terms of VOC content. Staff reviewed records of Aerojet's coating operations and determined that Aerojet uses the following specialty coatings subject to the CTG: mold release coating, rocket motor adhesive coating, and sprayable sealant.

The CTG establishes presumptive RACT for general primers and topcoats by reference to the aerospace NESHAP (discussed below) and for specialty coatings. The CTG also includes the following requirements:

- Hand wipe cleaning operations: use aqueous cleaners or cleaners with a VOC composite vapor pressure no greater than 45 mmHg at 20 C. (13 types of cleaning operations are exempt from this requirement).
- Flush cleaning: capture non-aqueous solvents in closed containers or with wipes that are kept in closed containers.
- Spray gun cleaning: use enclosed gun cleaners or work practices that avoid open atomized spraying of VOC solvent.
- Housekeeping practices to reduce VOC emissions from non-aqueous solvents, wipes, and spills.

The CTG model rule exempts the following from VOC limits:

- Cleaning and coating associated with research and development, quality control, laboratory testing, and electronic parts and assemblies (except for cleaning and coating of completed electronic assemblies).
- Manufacturing and rework operations involving space vehicles, antique aerospace vehicles and components.
- Touch up, aerosol, and Department of Defense "classified" coatings (protected against unauthorized disclosure for national security purposes).
- Coatings used in volumes of 50 gallons per year or less of each formulation, not to exceed 200 gallons per year for all exempt coatings combined.

NSPS: None.

NESHAP:

40 CFR Part 63, Subpart GG - National Emission Standards for Aerospace Manufacturing and Rework Facilities

The NESHAP applies to facilities that are engaged, either in part or in whole, in the manufacture or rework of commercial, civil, or military aerospace vehicles or components and that are major sources of HAPs. Aerojet is subject to the NESHAP.

Table A compares the VOC limits in Rule 456 and the CTG/NESHAP for materials used at Aerojet. Unlike the CTG, the NESHAP does not provide an exemption for coatings that are used in small volumes. The NESHAP includes requirements for solvent cleaning and housekeeping practices that are comparable to those in the CTG.

Table A - Comparison of VOC Content Limits in Rule 456 with the CTG/NESHAP for Materials Used in Aerojet's Aerospace Operations

Rule 456		Aerospace CTG/NESHAP	
Category	**VOC Limit (g/l)**	**Category**	**VOC Limit (g/l)**
Adhesive	600 (890 for low usage of rocket motor bonding adhesive)	Rocket Motor Bonding Adhesive	890
Mold Release	762	Mold Release	780
Primer	350	Primer - Other	350
Sealant	600	Sprayable Sealant	600
Space Vehicle Coating	Electrostatic Discharge: 888 All Other: 1,000	Space Vehicle Coating	Exempt
Topcoat	420	Topcoat	420
Solvent	25	Solvent	Composite VOC vapor pressure ≤45 mmHg @ 68 °F

EPA Menu of Control Measures:

EPA's Menu of Control Measures identifies the CTG as the control measure.

NSR/PSD Settlement Agreements: None

STATE GUIDANCE: None

BACT/LAER

EPA RACT/BACT/LAER Clearinghouse

There is only one BACT determination that lists a VOC content limit or percent control standard (as opposed to tons/year). The 2011 BACT determination requires primers and

topcoats to meet a limit of 4.5 lb/gal (approximately 540 g/l) of coating for primers and topcoats, on a monthly volume-weighted average basis.

ARB BACT Clearinghouse: None

SMAQMD BACT Determinations

In 2004, BACT was determined to be compliance with Rule 456 for aerospace coating operations with VOC emissions <3,900 lb/qtr.

OTHER NONATTAINMENT AREA RULES

The requirements for aerospace coating operations in the rules listed below were evaluated and compared with SMAQMD Rule 454:

- SJVUAPCD Rule 4605 (6/16/11)
- SCAQMD Rule 1124 (9/21/01)
- VCAPCD Rule 74.13 (9/11/12)
- Baltimore Rule 26.11.19.13-1 (10/15/01)

None of the other nonattainment area rules was more stringent than Rule 456 for the aerospace coating operations at Aerojet, with two exceptions:

- For electrostatic discharge coatings applied to space vehicles, Rule 456 sets a limit of 880 g/l VOC, whereas the other nonattainment areas have limits of 800 g/l for these coatings.
- Rule 456 sets a limit of 890 g/l VOC for rocket motor adhesives when used in quantities no more than 200 gallons per year, provided that the usage of all other noncompliant materials does not exceed 55 gallons per year and the total of all rocket motor adhesive and other noncompliant materials used does not exceed 200 gallons per year. This VOC content is higher than what is allowed under the SCAQMD and VCAPCD rules (850 g/l for non-autoclavable structural adhesives or 800 g/l for space vehicle adhesives), although these rules do not have specific limits for this highly specialized material.

CONCLUSION

For aerospace materials used at Aerojet, Rule 456 establishes VOC limits that are as stringent as or more stringent than the CTG and NESHAP. The work practice requirements are generally equivalent. For cleaning solvents, Rule 456 limits the VOC content to 25 g/l, which is more stringent than the CTG and NESHAP, which limit the VOC partial pressure in solvents to 45 mmHg at 20 °C. Rule 456 is more stringent than the BACT/LAER determination for primers and topcoats.

As discussed previously, Rule 456 is at least as stringent as the rules in other nonattainment areas, with two exceptions. First, for electrostatic discharge coatings applied to space vehicles, Rule 456 sets a VOC limit that is higher than the other nonattainment area rules. However, this difference is small, and the CTG and NESHAP both exempt space vehicle coatings entirely. Second, Rule 456 sets a VOC limit for rocket motor adhesives that is slightly higher than what is allowed under the SCAQMD and VCAPCD rules, which do not have specific limits for this highly specialized material.

The limit in Rule 456 was added in 2008 after Aerojet demonstrated that this narrow exemption would be necessary for them to deliver rocket motors meeting specifications for current and future Department of Defense contracts. The use of the rocket motor adhesives at this higher VOC content is allowed only if the usage does not exceed 55 gallons per year and the total of all noncompliant materials used does not exceed 200 gallons per year. The VCAPCD contains a similar exemption for an adhesive where it has been demonstrated that no complaint material is available and the annual volume of each separate formulation used is less than 10 gallons; however, unlike Rule 456, the VCAPCD rule does not establish a limit on the VOC content of the noncompliant adhesives and there is no limit on the total annual volume of all noncompliant adhesive formulations.

Rule 456 satisfies RACT for aerospace coating operations at Aerojet.

Category: Boilers, Process Heaters, and Steam Generators

At major sources in the District, units in this category are fired with gas fuel as the primary fuel. Therefore, the analysis will focus on gas-fired units.

SMAQMD REQUIREMENTS

District Rule 411, NOx from Boilers, Process Heaters, and Steam Generators, establishes NOx limits for units rated 1 mmBtu/hr or greater that are fired on gaseous or nongaseous fuel.

Units using gaseous fuel must meet the following NOx limits:

- For units ≥1 mmBtu/hr and <5 mmBtu/hr, 30 ppmv NOx at 3% O_2
- For units ≥5 mmBtu/hr and ≤20 mmBtu/hr, 15 ppmv NOx at 3% O_2
- For units >20 mmBtu/hr, 9 ppmv NOx at 3% O_2
- For gas-fired reformer furnaces, 30 ppmv NOx at 3% O_2
- For landfill gas-fired units ≥5 mmBtu/hr, 15 ppmv NOx at 3% O_2
- For load following units ≥5 mmBtu/hr, 15 ppmv NOx at 3% O_2

All liquid-fueled units ≥1 mmBtu/hr must meet a NOx limit of 40 ppmv NOx at 3% O_2. All biomass-fueled units ≥1 mmBtu/hr must meet a NOx limit of 70 ppmv NOx at 12% CO_2.

Rule 411 provides the following exemptions:

- Electric utility boilers (no major sources in the District have such units)
- Units where the products of combustion come into direct contact with the material to be heated
- Waste heat recovery boilers
- Standing flame pilot burners
- Units ≥5 mmBtu/hr that use less 90,000 therms of fuel per year, provided that the owner or operator applied for the exemption on or before May 31, 1997, and received approval.
- Units installed or with complete permit applications prior to October 27, 2005 are subject to a less stringent limit of 30 ppmv NOx at 3% O_2 if the annual fuel usage is below specific low usage levels that depend on boiler capacity.

FEDERAL GUIDANCE

CTGs: None

ACT:

> *Alternative Control Techniques Document – NOx Emissions from Industrial/Commercial/Institutional (ICI) Boilers*, EPA-453/R-94-022, March 1994.

The ACT applies to boiler, steam generators, and process heaters fired with gaseous or liquid fuels. The document does not establish presumptive RACT for this category.

However, the ACT discusses four control techniques for NOx that can be applied to natural gas-fired, packaged watertube boilers and estimates achievable performance as follows:

Control Technique	Achievable NOx Level
Water injection w/ oxygen trim	49 ppmv @3% O_2
Low NOx burners	66 ppmv @3% O_2
Low NOx burners w/ flue gas recirculation	49 ppmv @3% O_2
SCR	16 ppmv @3% O_2

NSPS:

40 CFR Part 60, Subpart Db - Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units

Subpart Db specifies New Source Performance Standards for industrial, commercial, and institutional steam generating units >100 mmBtu/hr input that were constructed, modified, or reconstructed after June 19, 1984. Low heat release rate units are limited to approximately 82 ppmv NOx @ 3% O_2, while high heat release rate units are limited to approximately 164 ppmv NOx @ 3% O_2 when firing natural gas or distillate oil fuel. These standards are substantially less stringent than the achievable levels presented in the ACT document.

NESHAP:

40 CFR Part 63, Subpart DDDDD - National Emission Standards for Hazardous Air Pollutants for Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters

This NESHAP applies to commercial, industrial, and institutional boilers and process heaters located at major sources of HAPs. There are emission standards for individual HAPs. There are no NOx limits or NOx co-benefits.

40 CFR Part 63, Subpart JJJJJJ - National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers Area Sources

This NESHAP applies to commercial, industrial, and institutional boilers located at area sources. Gas-fired boilers are exempt. There are emission standards for individual HAPs. There are no NOx limits or NOx co-benefits.

EPA Menu of Control Measures:

There are several technologies identified in the menu of control measures for gas-fired institutional, commercial, and institutional (ICI) boilers, as shown below. Note – The ppmv values shown in parentheses are based on uncontrolled emission factors taken from the ACT: 0.14 lb/mmBtu (approx. 117 ppmv) for boilers ≤100 mmBtu/hr and 0.26 lb/mmBtu (approx. 217 ppmv) for boilers >100 mmBtu/hr.

Equipment	Technology	Control Efficiency
ICI Boilers, Gas Fuel NOx >10 tpy uncontrolled	SNCR	40% (70 ppmv for ≤100 mmBtu/hr; 130 ppmv for >100mmBtu/hr)
ICI Boilers, Gas Fuel NOx >10 tpy uncontrolled	Low NOx Burner	50% (59 ppmv for ≤100 mmBtu/hr; 109 ppmv for >100mmBtu/hr)
ICI Boilers, Gas Fuel NOx >10 tpy uncontrolled	Low NOx burner + FGR	60% (47 ppmv for ≤100 mmBtu/hr; 87 ppmv for >100mmBtu/hr)
ICI Boilers, Gas Fuel NOx >10 tpy uncontrolled	Low NOx burner + over fire air	60% (47 ppmv for ≤100 mmBtu/hr; 87 ppmv for >100mmBtu/hr)
ICI Boilers, Gas Fuel NOx >10 tpy uncontrolled	Oxygen trim + water injection	65% (41 ppmv for ≤100 mmBtu/hr; 76 ppmv for >100mmBtu/hr)
ICI Boilers, Gas Fuel NOx >10 tpy uncontrolled	Low NOx burner + FGR + over fire air	80% (23 ppmv for ≤100 mmBtu/hr; 43 ppmv for >100mmBtu/hr)
ICI Boilers, Gas Fuel NOx >10 tpy uncontrolled	SCR	80% (23 ppmv for ≤100 mmBtu/hr; 43 ppmv for >100mmBtu/hr)

NSR/PSD Settlement Agreements: None

STATE GUIDANCE

> Determination of Reasonably Available Control Technology and Best Available Retrofit Control Technology for Industrial, Institutional, and Commercial Boilers, Steam Generators and Process Heaters, Air Resources Board, July 18, 1991.

In 1991, the ARB issued a RACT/BARCT determination document for industrial, institutional, and commercial boilers, steam generators, and process heaters. The ARB analysis considered the achievable performance levels and cost effectiveness of various NOx control strategies as applied to different size units. The analysis also took into account the variation in NOx emissions between gaseous and liquid fuels. The ARB concluded that RACT for units with ratings of 5 mmBtu/hr and larger, using 90,000 therms of fuel or more per year, is a NOx emission limit of 70 ppmv @ 3% O_2 when firing on gaseous fuel and 115 ppmv @ 3% O_2 when firing on liquid fuel.

BACT/LAER

EPA RACT/BACT/LAER Clearinghouse

The ten most recent BACT determinations were made in 2012 through 2014. Boiler ratings ranged from 25 to 100 mmBtu/hr. NOx limits ranged from 0.01 to 0.05 lb/mmBtu (approximately 8 to 42 ppmv @ 3% O_2), with an average of 0.028 lb/mmBtu (approximately 23 ppmv @ 3% O_2).

ARB BACT Clearinghouse

There were 9 BACT determinations for boilers rated from 21 to 97 mmBtu/hr. Seven set the BACT limit at 9 ppmv @3% O_2. The other two set the BACT limit to 7 ppmv @3% O_2.

SMAQMD BACT Determinations

Current SMAQMD BACT requirements are shown below:

- For boilers ≥0.075 and <2 mmBtu/hr, the NOx emission limit is 55 ppmv @3% O_2 for pool/spa heaters and 20 ppmv @3% O_2 for all others.
- For boilers ≥2 and <5 mmBtu/hr, the NOx emission limit is 12 ppmv @3% O_2 for atmospheric boilers and 9 ppmv @3% O_2 for non-atmospheric boilers.
- For boilers ≥5 and <20 mmBtu/hr, the NOx emission limit is 9 ppmv @3% O_2.
- For a specific boiler rated 108.7 mmBtu/hr, the NOx emission limit is 5 ppmv @3% O_2.

OTHER NONATTAINMENT AREA RULES

The NOx emission standards for gas-fired boilers in the rules listed below were evaluated and compared with SMAQMD Rule 411:

- PCAPCD Rules 231 (10/9/97) and 247 (10/10/13)
- YSAQMD Rule 2.27 (8/14/96),
- SJVUAPCD Rules 4306 (10/16/08), 4307 (4/21/16), 4308 (11/14/13), and 4320 (11/16/08)
- SCAQMD Rules 1146 (11/1/13) and 1146.1 (11/1/13)
- VCAPCD Rules 74.15 (11/8/94) and 74.15.1 (6/23/15)
- Dallas-Fort Worth and Houston-Galveston-Brazoria Rules 117.410 (6/14/07) and 117.310 (3/3/14)
- Baltimore Rule 26.11.19.08 (3/3/14)

RACT requirements must be met for existing boilers at major sources of NOx. None of the other nonattainment area rules was more stringent than Rule 411 for existing boilers, with the exception of SCAQMD, which has some limits that are more stringent than Rule 411. For boilers rated >2 mmBtu/hr and ≤5 mmBtu/hr, SCAQMD Rule 1146.1 requires atmospheric boilers to meet a NOx limit of 12 ppmv @3% O_2 and non-atmospheric boilers to meet a NOx limit of 9 ppmv @3% O_2. SCAQMD Rule 1146 requires boilers rated ≥5 mmBtu/hr and ≤20 mmBtu/hr to meet a NOx limit of 9 ppmv @3% O_2; boilers rated >75 mmBtu/hr must meet a NOx limit of 5 ppmv @3% O_2.

CONCLUSION

District Rule 411 sets NOx emission limits that are more stringent than the NSPS standards, the range of achievable levels specified in the ACT document, and ARB's determination of RACT and BARCT standards (and applies to smaller units than the RACT/BARCT limits). The NOx emission limits in Rule 411 are lower than those specified in EPA's Menu of Control Measures for ICI boilers with NOx emissions greater than or equal to 10 tons per year, uncontrolled (approximately equivalent to a 16 mmBtu/hr boiler operated 8,760 hours per year). The Rule 411 standards are not as stringent as the BACT clearinghouse standards; however, these standards do not apply to existing boilers.

Rule 411 is at least as stringent as the PCAPCD, YSAQMD, SJVUAPCD, VCAPCD, Texas, and Baltimore rules. The SCAQMD contained some NOx limits for boilers in

specific capacity ranges that were lower than the corresponding limits in Rule 411. Because these limits are lower than all of the other nonattainment area rules and the federal and state guidance (and are equivalent to the District's current BACT standards), Staff considers these more stringent SCAQMD standards to be beyond RACT.

Rule 411 satisfies the RACT requirement for this source category.

Category: Gas Turbines

At major sources in the District, units in this category are gas-fired simple cycle or combined cycle turbines rated between 25 MW and 170 MW. Therefore, the analysis will focus on units of these types.

SMAQMD REQUIREMENTS

District Rule 413, Stationary Gas Turbines, applies to stationary gas turbines rated ≥0.3 MW. The emission limits are listed in the table below.

Requirement Type	Annual Hours of Operation (hr/yr)	Unit Size Rating (MW)	NOx Emission Limit (ppmv @ 15% O_2)	
			Gaseous Fuel	Liquid Fuel
RACT	any	≥0.3	42.0	65.0
BARCT	any	≥0.3 to <2.9	42.0	65.0
	<877	≥2.9	42.0	65.0
	≥877	≥2.9 to <10	25.0	65.0
	≥877	≥10.0 (no SCR)	15.0	42.0
	≥877	≥10.0 (w/ SCR)	9.0	25.0

Rule 413 contains the following exemptions:

- Laboratory units used in research and testing for the advancement of gas turbine technology.
- Units used to provide emergency electrical power, emergency water pumping for flood control or firefighting, emergency potable water pumping, or emergency sewage pumping, provided they are limited to an annual total of 200 hours of operation (100 hours for maintenance).

Startup and shutdown periods are exempt from Rule 413. Shutdown periods are not to exceed 1 hour. Startup periods are not to exceed 1 hour, except for turbines ≥160 MW output that are part of a combined cycle process, for which the one-hour period was determined to be technologically infeasible. These units are allowed up to 4 hours for a startup that follows a shutdown of 72 hours or more, and up to 3 hours for a startup that follows a shutdown of between 8 and 72 hours.

FEDERAL GUIDANCE

CTGs: None

ACT:

Alternative Control Techniques (ACT) Document – NOx Emissions from Stationary Gas Turbines, EPA-453/R-93-007, January 1993.

The ACT applies to stationary gas turbines fired with gaseous or liquid fuels. The ACT does not establish presumptive RACT for stationary gas turbines. However, the document discusses three control techniques for NOx and estimates achievable performance as follows:

Control Technique	Achievable NOx Level
Wet injection	25 - 42 ppmv @15% O_2
Dry low-NOx combustion	25 - 42 ppmv @15% O_2
SCR w/ combustion controls (wet injection or dry low-NOx)	9 ppmv @15% O_2

NSPS:

40 CFR Part 60, Subpart GG - Standards of Performance for Stationary Gas Turbines

Subpart GG specifies New Source Performance Standards for stationary gas turbines ≥10 mmBtu/hr input (approximately 1 MW output) that were constructed, modified, or reconstructed after October 3, 1977. Turbines with rated heat inputs between 10 and 100 mmBtu/hr are limited to approximately 150 ppmv NOx (with upward adjustments for efficiency and fuel-bound nitrogen). Turbines with rated heat inputs >100 mmBtu/hr are limited to approximately 75 ppmv NOx. These standards are substantially less stringent than the achievable levels presented in the ACT document.

40 CFR Part 60, Subpart KKKK - Standards of Performance for Stationary Combustion Turbines

Subpart KKKK applies to turbines >3 MW. Electric-generating gas-fired turbines ≤50 mmBtu/hr (5 MW) are limited to 42 ppmv NOx. Units >50 mmBtu/hr and ≤850 mmBtu/hr (81 MW) are limited to 25 ppmv NOx, and those >850 mmBtu/hr are limited to 15 ppmv NOx.

NESHAP:

40 CFR Part 63, Subpart YYYY - National Emission Standards for Hazardous Air Pollutants for Stationary Combustion Turbines

The NESHAP applies to stationary combustion turbines located at major sources of HAPs. There are emission standards for formaldehyde, a HAP. There are no NOx limits or co-benefits.

EPA Menu of Control Measures:

There are several technologies identified in the menu of control measures for gas-fired turbines, as shown below. Note: The ppmv values shown in parentheses are based on an average uncontrolled NOx emission factor of 200 ppmv, as calculated from Table 2-1 of the ACT.

Equipment	Technology	Control Efficiency
Combustion Turbine, Natural Gas, NOx >10 tpy uncontrolled	Water Injection	75% (50 ppmv)
Combustion Turbine, Natural Gas, NOx >10 tpy uncontrolled	Steam Injection	80% (40 ppmv)
Combustion Turbine, Natural Gas, NOx >10 tpy uncontrolled	Low NOx Burner	68% – 84% (32 – 64 ppmv)
Combustion Turbine, Natural Gas, NOx >10 tpy uncontrolled	SCR and Low NOx Burner	94% (12 ppmv)
Combustion Turbine, Natural Gas, NOx >10 tpy uncontrolled	SCR and Steam or Water Injection	95% (10 ppmv)

NSR/PSD Settlement Agreements: None

STATE GUIDANCE

Determination of Reasonably Available Control Technology and Best Available Retrofit Control Technology for the Control of Oxides of Nitrogen from Stationary Gas Turbines, Air Resources Board, May 18, 1992.

In 1992, the ARB issued a RACT/BARCT determination document for stationary gas turbines. In developing the RACT/BARCT determination, ARB considered the achievable performance levels and cost effectiveness of various NOx control strategies as applied to different sizes of gas turbines. The analysis also took in account the variation in NOx emissions between gaseous and liquid fuels. The ARB concluded that RACT for gas turbines with ratings of 0.3 MW and larger is a NOx emission limit of 42 ppmv @ 15% O_2 when firing on gaseous fuel and 65 ppmv @ 15% O_2 when firing on liquid fuel. More stringent levels of control were considered as BARCT. Rule 413 is based on ARB's RACT/BARCT determination.

BACT/LAER

EPA RACT/BACT/LAER Clearinghouse

For natural gas-fueled simple cycle turbines >25 MW, the ten most recent BACT determinations were made from 2009 to 2013. Turbine ratings ranged from 40 to 190 MW. NOx limits ranged for 2.5 to 9 ppmv @ 15% O_2. For natural gas-fueled combined cycle turbines >25MW, the ten most recent BACT determinations were made in 2013 and 2014. Turbine ratings ranged from 62 to 274 MW. NOx limits ranged from 2 to 3 ppmv @ 15% O_2.

ARB BACT Clearinghouse

There are no BACT determinations for natural gas-fueled simple cycle turbines ≥50 MW. For natural gas-fueled combined cycle turbines ≥50 MW, the most recent BACT determinations were made in 2003. Turbine ratings ranged from 153 to 183 MW. NOx limits ranged from 2 to 2.5 ppmv @ 15% O_2.

SMAQMD BACT Determinations

In 2002, a BACT determination was made for a combined cycle, natural gas-fueled turbine rated at 170 MW. The NOx limit was 2 ppmv @ 15% O_2.

OTHER NONATTAINMENT AREA RULES

The NOx emission standards for gas-fired turbines in the rules listed below were evaluated and compared with SMAQMD Rule 413:

- PCAPCD Rule 250 (10/8/15)
- YSAQMD Rule 2.34 (11/12/14)
- SJVUAPCD Rule 4703 (9/20/07)
- SCAQMD Rule 1134 (8/8/97)
- VCAPCD Rule 74.23 (1/8/02)
- Dallas-Fort Worth and Houston-Galveston-Brazoria Rules 117.410 (6/25/15) and 117.310 (3/3/14)
- Baltimore Rule 26.11.09.08 (3/3/14)

Rule 413 was at least as stringent as the VCAPCD and Baltimore rules. Each of the other rules has emission standards for certain turbine ratings that are more stringent than Rule 413.

- The SCAQMD rule require turbines rated ≥10 MW, if not equipped with SCR, to meet a NOx limit of 12 ppmv @15% O_2. Rule 413 requires these turbines to meet a NOx limit of 15 ppmv @15% O_2. (Note: there are no major stationary sources of NOx in the District that have gas turbines ≥10 MW that are not equipped with SCR).
- The YSAQMD, PCAPCD, and Texas rules require turbines rated ≥10 MW to meet a NOx limit of 9 ppmv @15% O_2, regardless of whether SCR is used. Rule 413 requires turbines rated ≥10 MW to meet a NOx limit of 9 ppmv @15% O_2 when equipped with SCR and a NOx limit of 15 ppmv @15% O_2 when not equipped with SCR. (Note: there are no major stationary sources of NOx in the District that have gas turbines ≥10 MW that are not equipped with SCR).
- The SJVUAPCD rule has emission limits for turbines >10 MW that are more stringent than Rule 413, as show in the table below.

	NOx Limit, ppmv at 15% O_2	
Turbine Classification	**SJVUAPCD Rule 4703**	**SMAQMD Rule 413 (Corresponding Values)**
>10 MW, Combined cycle.	5	w/ SCR: 9 w/o SCR: 15
>10 MW, Simple cycle, permit condition for ≤200 hr/yr	25	42

Turbine Classification	NOx Limit, ppmv at 15% O_2	
	SJVUAPCD Rule 4703	**SMAQMD Rule 413 (Corresponding Values)**
>10 MW, Simple cycle, w/o permit condition for ≤200 hr/yr.	5	>200 and <877 hr/yr 42 ≥877 hr/yr w/ SCR: 9 w/o SCR: 15

CONCLUSION

District Rule 413 is consistent with ARB's RACT/BARCT determination and requires NOx emission limits that are in the range of achievable levels specified in the ACT document and are more stringent than the two NSPS. Rule 413 is at least as stringent as the VCAPCD and Baltimore rules and, for the turbines in the District located at major stationary sources of NOx, the YSAQMD, PCAPCD, SCAQMD and Texas rules. The NOx emission limits in Rule 413 are comparable to the most stringent of EPA's menu of control measures (applicable to units with NOx emissions greater than or equal to 10 tons per year, uncontrolled, approximately equivalent to a 3 MW gas-fired turbine operated 8,760 hours per year).

The SJVUAPCD rule has standards for combined and simple cycle turbines >10 MW that are lower than those in Rule 413 and the rules in the other nonattainment areas. Staff considers these more stringent standards to be beyond RACT. The BACT determinations are more stringent than Rule 413; Staff also considers these standards to be beyond RACT.

Rule 413 satisfies the RACT requirement for this source category.

Category: Gasoline Service Stations – Phase II Vapor Recovery

Two major sources of VOC – Aerojet and UC Davis Medical Center – have non-retail gas stations that transfer gasoline into their own vehicles. This analysis will focus on the Phase II vapor requirements for non-retail gasoline transfer. Although the basic standards for retail and non-retail stations are the same, only non-retail stations are eligible for the ORVR exemption (described below).

SMAQMD REQUIREMENTS

District Rule 449, Transfer of Gasoline into Vehicle Fuel Tanks, requires that gasoline transfer from a stationary storage container with a capacity of 250 gallons or more, or mobile fueler with a capacity of 120 gallons or more, into any motor vehicle fuel tank with a capacity of at least 5 gallons be performed only when equipped with a Phase II vapor recovery system. The vapor recovery system must be CARB-certified and have a control efficiency of at least 95% by weight.

Rule 449 prohibits operation of the gasoline dispensing equipment unless the vapor recovery system is operating in accordance with the applicable CARB Executive Orders, the manufacturer's specifications, and is maintained to be leak free, vapor tight, and in good working order; and the equipment is operated and maintained without any of the applicable defects listed in the Vapor Recovery Equipment Defects List, incorporated by reference in Title 17 CCR Section 94006.

Maintenance inspections are required on each day that the dispensing equipment is operated. Vapor recovery systems not meeting the rule requirements must be removed from service and tagged to ensure that they are not used until repaired and brought into compliance before being returned to service. Installers and contractors who install or alter vapor recovery systems must be certified by the International Code Council (ICC) for Vapor Recovery System Installation and Repair. Testers must be certified by the ICC for Vapor Recovery System Testing and Repair, once a certification test becomes available.

The operator of a gasoline dispensing facility using a Phase II vapor recovery system is required to post in a conspicuous location the operating instructions and the phone number for the District or CARB for complaints. The instructions must clearly describe how to fuel motor vehicles correctly with vapor recovery nozzles used at the station, and shall include a warning that topping off may result in spillage or recirculation of gasoline and therefore is prohibited.

Rule 449 exempts fuel dispensing equipment for:

- Emergency motor vehicles
- Implements of husbandry
- Dispensing of E85 (fuel with nominal 85% ethanol content) until CARB certifies Phase II vapor recovery systems for the dispensing of E85.
- Gasoline dispensing at non-retail facilities where 100% of the vehicles being refueled are equipped with ORVR systems. This exemption is more stringent than the guidelines in the 2007 memo from EPA, which specified that Phase II

vapor recovery requirements may be removed where 95% or more of the vehicles are equipped with ORVR.

FEDERAL GUIDANCE

CTGs: None

ACT: None

NSPS: None

NESHAP: None

EPA Menu of Control Measures: None

NSR/PSD Settlement Agreements: None

Other Federal Guidance:

Technical Guidance – Stage II Vapor Recovery Systems for Control of Vehicle Refueling Emissions at Gasoline Dispensing Facilities, EPA-450/3-91-022a&b, November 1991.

The 1991 technical guidance applies to Stage II (a.k.a., "Phase II") vapor recovery systems used at gasoline dispensing systems during the transfer of gasoline to vehicle fuel tanks. The guidance specifies that gasoline dispensing facilities use Phase II vapor recovery systems that have at least 95% control of displaced vapors.

Gasoline Vapor Recovery Guidelines – Minimum SIP Requirements for EPA Region IX to Approve a Phase I or Phase II Gasoline Transfer Rule for Ozone Nonattainment Areas, EPA Region IX, April 24, 2000.

The 2000 EPA Region IX guidelines specify that SIP-approvable RACT rules in California must include the following requirements for Phase II vapor recovery:

- Require that Phase II systems use CARB-certified vapor recovery equipment.
- List the Phase II vapor recovery system defects contained in Title 17 of the California Code of Regulations (CCR) Section 94006 or cite Title 17 CCR Section 94006 as a reference for these defects.
- Prohibit operation of Phase II vapor recovery equipment that has liquid leaks, vapor leaks, fails to pass tests, or contains Title 17 CCR Section 94006 defects that substantially impair effectiveness of vapor recovery equipment.
- Require that Phase II systems have a warning posted prohibiting topping-off, which may cause spillage of gasoline.

Memorandum to EPA Regional Air Division Directors – Removal of Stage II Vapor Recovery from Refueling of Corporate Fleets, Steven D. Page, Office of Air Quality Planning and Standards, and Margo Tsirigotis Oge, Office of Transportation and Air Quality. November 28, 2007.

The 2007 memo provided guidance that Phase II vapor recovery requirements may be removed for corporate or commercial fleets where 95% or more of the vehicles are equipped with onboard refueling vapor recovery (ORVR).

STATE GUIDANCE:

Benzene Airborne Toxic Control Measure (ATCM) for Retail Service Stations, Title 17 CCR), Section 93100, May 13, 1988.

The ATCM requires CARB-certified Phase I and Phase II vapor recovery systems at retail service stations.

California Health and Safety Code (HSC) Division 26, Part 4, Chapter 3, Article 5, Gasoline Vapor Control

The HSC directs CARB to establish standards and procedures to certify vapor recovery systems. Only certified vapor control systems can be used.

BACT/LAER

EPA RACT/BACT/LAER Clearinghouse

For gasoline storage and dispensing stations, the only BACT determination was made in 2009. The determination was for a 3,700 gallon storage tank equipped with both Phase I and Phase II CARB-certified vapor recovery.

ARB BACT Clearinghouse: None

SMAQMD BACT Determinations

In 2011, a BACT determination was made for all retail gasoline dispensing stations. The BACT determination was CARB-certified equipment for Phase I and II.

OTHER NONATTAINMENT AREA RULES

The following rules from other nonattainment areas were evaluated and compared with SMAQMD Rule 449:

- PCAPCD Rule 214 (2/21/13)
- YSAQMD Rule 2.22 (1/14/15)
- SCAQMD Rule 461 (4/6/12)
- SJVUAPCD Rule 4622 (12/19/13)
- VCAPCD Rule 70 (3/10/09)
- Dallas-Fort Worth and Houston-Galveston-Brazoria Rule 115.242 (10/31/13)
- Baltimore Rule 26.11.24 (11/23/15)

None of the other nonattainment area rules was more stringent than Rule 449.

CONCLUSION

Rule 449 meets all of the federal and state requirements and guidance. In addition, Rule 449 is at least as stringent as the rules of the other nonattainment areas.

Rule 449 satisfies RACT for this source category.

Category: Internal Combustion Engines

The only engines for which RACT must be demonstrated are located at Kiefer Landfill, where five 4,230-hp lean-burn, spark-ignited engines are fueled by landfill gas. All of the other engines located at major sources are either emergency standby engines or nonroad engines. The District is pre-empted from setting standards for nonroad engines by federal regulations. Therefore, this analysis will focus on NOx emission requirements for landfill gas-fueled, spark-ignited engines.

SMAQMD REQUIREMENTS

District Rule 412, Stationary Internal Combustion Engines Located at Major Stationary Sources of NOx, sets RACT and BARCT emission standards for engines greater than 50 horsepower located at major sources of NOx. The rule establishes a RACT NOx emission limit of 125 ppmv @15% O_2 for lean-burn, spark-ignited engines.

In addition, engines are required to meet more stringent BARCT emission limits of 65 ppmv @15% O_2 for lean-burn, spark-ignited engines, such as the engines at Kiefer Landfill.

As an alternative to meeting the NOx concentration limits, the engine may be equipped with emission controls that reduce NOx emissions by 90%.

The following types of engines are exempt from Rule 412:

- Emergency standby engines
- Agricultural engines
- Engines on test stands
- Research engines
- Nonroad engines
- Motor vehicle engines
- Engines used to support flight line operations

FEDERAL GUIDANCE

CTGs: None

ACT:

> *Alternative Control Techniques Document – NOx Emissions from Stationary Reciprocating Internal Combustion Engines*, EPA-453/R-93-032, July 1993.

The ACT applies to spark-ignited and compression-ignition stationary engines. The document does not establish presumptive RACT for this category. However, the ACT discusses the control techniques for NOx that can be applied to lean burn spark-ignited engines and estimates achievable performance as follows:

Lean Burn Engines, 200-hp to 11,000-hp

Control Technique	Achievable NOx Level
Air/Fuel Adjustment	860 – 1,170 ppmv @15% O_2
Ignition Timing Retard	980 – 1,260 ppmv @15% O_2
Air/Fuel Adjustment plus Ignition Timing Retard	740 – 980 ppmv @15% O_2
Selective Catalytic Reduction	125 ppmv @15% O_2
Low-Emission Combustion	150 ppmv @15% O_2

NSPS:

40 CFR Part 60, Subpart JJJJ - Standards of Performance for Stationary Spark Ignition Internal Combustion Engines

Subpart JJJJ applies to all new stationary spark-ignition internal combustion engines combusting any fuel, including landfill gas. Engine manufacturers are required to test and certify newly manufactured engines to meet the emissions standards and other requirements for new non-road spark-ignition engines in the following groups:

- All engines with maximum power of 25 horsepower (HP) or less;
- Gasoline-fueled engines larger than 25 HP;
- Liquefied petroleum gas (LPG)-fueled engines larger than 25 HP

Manufacturers may participate in a voluntary certification program for engines that do not require mandatory certification. If an engine is certified and is operated in accordance with the manufacturer's instructions, the owner or operator is not required to perform initial or subsequent testing. For lean-burn engines fueled on landfill gas, the NOx certification standard is 150 ppmv at 15% O_2.

NESHAP:

40 CFR Part 63, Subpart ZZZZ - National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines

The NESHAP limits the emissions of formaldehyde, a hazardous air pollutant. There are no NOx standards.

EPA Menu of Control Measures: The are no measures applicable to landfill gas-fueled IC engines

NSR/PSD Settlement Agreements: None

STATE GUIDANCE

Determination of Reasonably Available Control Technology and Best Available Retrofit Control Technology for Stationary Spark-Ignited Internal Combustion Engines, Air Resources Board, November 2001.

In 1991, the ARB issued a RACT/BARCT determination for spark-ignited internal combustion engines. The document recommended a RACT NOx emission limit for lean-burn engines of 125 ppmv @15% O_2 or an 80% reduction in NOx emissions. CARB recommended a BARCT NOx emission limit of 65 ppmv @15% O_2 or a 90% reduction in NOx emissions for lean-burn engines.

BACT/LAER

EPA RACT/BACT/LAER Clearinghouse

From 2007 to 2013, there were ten BACT determinations for landfill gas-fueled engines larger than 1,000 hp. NOx limits ranged from 0.5 to 2 g/hp-hr, with eight of the limits within the range of 0.5 to 0.6 g/hp-hr (38 to 45 ppmv @ 15% O_2).

ARB BACT Clearinghouse

From 2002 to 2012, there were five BACT determinations for landfill gas-fueled engines larger than 1,000 hp. NOx limits ranged from 0.5 to 0.6 g/hp-hr (38 to 45 ppmv @ 15% O_2).

SMAQMD BACT Determinations

A BACT determination for 4,230 hp landfill gas-fueled engines set the NOx emission unit at 0.4 g/hp-hr (30 ppmv @ 15% O_2). This determination was for the IC engines at the Kiefer Landfill.

OTHER NONATTAINMENT AREA RULES

The emission standards in Rule 412 for engines fired on landfill gas were compared to the standards in the following nonattainment area rules:

- PCAPCD Rule 242 (4/10/03)
- YSAQMD Rule 2.32 (10/10/01)
- SJVUAPCD Rule 4702 (11/14/13)
- SCAQMD Rule 1110.2 (6/3/16)
- VCAPCD Rule 74.9 (11/8/05)
- Dallas-Fort Worth and Houston-Galveston-Brazoria Rules 117.305 (6/14/07) and 117.405 (6/25/15)

Only the SCAQMD rule was more stringent than Rule 412. The SCAQMD rule requires landfill gas-fueled engines to meet an emission limit of 45 ppmv @ 15% O_2 if rated <500 hp and a limit of 36 ppmv @ 15% O_2 if rated ≥500 hp. As of January 1, 2017, landfill gas-fueled engines must meet an emission limit of 11 ppmv @ 15% O_2, regardless of horsepower.

CONCLUSION

Under District Rule 412, the IC engines at the Kiefer Landfill are subject to a NOx emission limit of 65 ppmv @15% O_2. This standard is significantly lower than the

achievable levels specified in the ACT document and the applicable standard in the NSPS. Rule 412 is at least as stringent as the state RACT/BARCT guidance and all of the other nonattainment area rules, except for the SCAQMD rule.

The SCAQMD rule has an applicable NOx emission standard that is lower than the Rule 412 standard as well as the rules in the other nonattainment areas. Staff considers this more stringent standard to be beyond RACT. The BACT determinations are also more stringent than Rule 412, but the BACT standards reflect the emission levels achievable by new engines, and Staff considers these standards to be beyond RACT.

Rule 412 satisfies the RACT requirement for this source category.

Category: Organic Chemical Manufacturing: Process Tanks, Liquid Transfer, and Storage Tanks (≤40,000 gallons)

VOC emissions from the storage of petroleum liquids in fixed roof and floating roof tanks >40,000 gallons are covered under CTGs and are included in the analysis in Appendix C. The analysis presented below applies to process tanks, liquid transfer, and storage tanks with capacities ≤40,000 gallons at organic chemical manufacturing facilities.

Procter and Gamble is the only major source in the District for which RACT must be demonstrated in this source category.

SMAQMD REQUIREMENTS

Process Tanks: District Rule 464, Organic Chemical Manufacturing Operations, requires a process tank containing a material with a VOC composite vapor pressure over 0.5 psia to be a closed container that is kept tightly covered. Any such process tanks that emit more than 15 lb/day maximum uncontrolled VOC must be vented to a capture and control system with a combined system efficiency of at least 85% and a control efficiency of at least 90%. Process tanks include surge control vessels, bottoms receivers and other in-process tanks as defined in the rule.

Liquid Transfer: Rule 464 requires control of transfer operations that load liquid with a VOC composite partial vapor pressure greater than 0.5 psia into tank trucks, trailers, railcars, or storage tanks of 2,000 gallons capacity or greater. There are 3 control options: (1) a vapor balancing system that captures and transfers at least 90% of the displaced vapors back to the supply tank, (2) a capture and control system with a combined efficiency of at least 85% and a VOC control efficiency of at least 90%, or (3) an internal floating roof (IFR) or external floating roof (EFR) that complies with 40 CFR 63.119 and 63.120 (NESHAP storage vessel requirements).

Storage Tanks (≤40,000 gallons): Rule 464 requires storage tanks with capacities of 55 gallons or less and vapor pressures greater than 1.5 psia to be closed containers that are kept tightly covered. Storage tanks with capacities greater than 55 gallons and less than or equal to 40,000 gallons that store materials with a VOC composite partial vapor pressure greater than 1.5 psia must have a pressure/vacuum valve installed on all tank vents.

Rule 464 exempts organic chemical plants that emit 15 lb/day or less of maximum uncontrolled VOC emissions. Procter and Gamble is not exempt.

FEDERAL GUIDANCE

CTGs: None

ACT: None

NSPS:

40 CFR Part 60, Subpart Kb - Standards of Performance for Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced After July 23, 1984.

The NSPS applies to organic liquid storage tanks with a volume between 19,800 gallons and 40,000 gallons. Tanks storing organic liquids with a vapor pressure between 27.6 kPa (4 psia) and 76.6 kPa (11 psia) must be controlled with either an IFR, an EFR, or by routing emissions to a control device that achieves at least 95% VOC reduction. IFR tanks, or fixed roof tanks retrofitted with an IFR, must be equipped with a foam or liquid filled seal mounted in contact with the liquid or a mechanical shoe seal or 2 seals mounted one above the other to form a continuous enclosure. EFR tanks are to be equipped with a closure device that has specified types of seals between the wall of the tank and the roof edge. For IFR and EFR tanks, openings must be equipped with covers, seals, or lids. The NSPS specifies extensive fitting requirements for the various types of openings and cover penetrations.

All tanks with volumes greater than 19,800 gallons storing liquids with vapor pressures greater than 76.6 kPa (11 psia) are required to route vent streams to a control device that achieves at least 95% VOC reduction.

NESHAP:

40 CFR Part 63, Subpart FFFF - National Emission Standards for Hazardous Air Pollutants: Miscellaneous Organic Chemical Manufacturing

The Miscellaneous Organic NESHAP (MON) controls surge control vessels and bottoms receivers at existing sources. Controls are required if the vessel capacity is greater than or equal to 20,000 and less than 40,000 gallons and the HAP vapor pressure is greater than or equal to 1.9 psia; or if the vessel capacity is greater than or equal to 40,000 gallons and the HAP vapor pressure is greater than or equal to 0.75 psia (see 40 CFR 63.170). Such vessels must be either (1) routed through a closed vent system to a 95% efficient control device, or (2) equipped with an IFR or EFR with the seals and fittings specified in 40 CFR 63.119.

The MON covers transfer racks that load liquid containing organic HAP into tank trucks or railcars. Control is required for racks that load at least 0.65 million liters/yr (170,000 gallons/yr) and have average vapor pressures of at least 10.3 kPa (1.5 psia). These racks require vapor collection systems and controls. There are 3 control options: (1) control devices (e.g., combustion devices or recovery devices) that reduce organic HAP emissions by 98% or to 20 ppmv, (2) flares that meet the design and operational requirements of 40 CFR 60.18, or (3) a vapor balance system that routes collected vapors back to a storage vessel or to a process.

The MON also applies to storage vessels in organic HAP service. The requirements for MON storage vessels are the same as in the NSPS. Tanks with volumes between 75 m^3 (19,800 gallons) and 151 m^3 (40,000 gallons) containing organic liquids with vapor pressures greater than or equal to 13.1 kPa (1.9 psia) are required to be controlled. Procter and Gamble is subject to the MON.

EPA Menu of Control Measures: None.

NSR/PSD Settlement Agreements: None

STATE GUIDANCE: None.

BACT/LAER

EPA RACT/BACT/LAER Clearinghouse

Since 2004, only two BACT determinations have been made for organic liquid storage tanks in organic chemical manufacturing operations. In both cases, internal floating roof tanks were determined to be BACT. The capacities of the tanks and the VOC vapor pressures were not specified.

Two BACT determinations have been made since 2004 for liquid transfer in organic chemical manufacturing operations. In both cases, BACT was determined to be add-on control with 98% efficiency. The storage tank sizes and VOC vapor pressures were not specified.

ARB BACT Clearinghouse: None.

SMAQMD BACT Determinations: None.

OTHER NONATTAINMENT AREA RULES

None of the other nonattainment areas have rules that are specific to organic chemical manufacturing. Nevertheless, the more general requirements for process tanks, liquid transfer, and small storage tanks in the rules listed below were compared to those in Rule 464.

- Process tanks: None
- Organic liquid transfer:
  - YSAQMD Rule 2.21 (9/14/16)
  - SJVUAPCD Rule 4624 (12/20/07)
  - SCAQMD Rule 462 (5/14/99)
  - VCAPCD Rule 71.3 (6/16/92)
  - Dallas-Fort Worth and Houston-Galveston-Brazoria Rule 115.212 (1/19/01)
- Storage tanks ≤40,000 gallons:
  - PCAPCD Rule 212 (6/19/97)
  - SJVUAPCD Rule 4623 (5/19/05)
  - SCAQMD Rule 463 (11/4/11)
  - VCAPCD Rule 71.2 (9/26/89)
  - Dallas-Fort Worth and Houston-Galveston-Brazoria Rule 115.112 (6/25/15)

Some provisions for organic liquid transfer and small storage tanks in the rules of the other nonattainment areas more stringent than Rule 464, and some were less stringent. The more stringent provisions are shown in the following tables.

Organic Liquid Transfer

SMAQMD Rule 464	YSAQMD Rule 2.21	SJVUAPCD Rule 4624	SCAQMD Rule 462
If liquid vapor pressure >0.5 psia, one of the following: • vapor balance ≥90% efficiency • vapor control device ≥85% efficiency • IFR • EFR	If liquid vapor pressure ≥1.5 psia: • vapor control device ≥95% efficiency	If liquid vapor pressure ≥1.5 psia and facility transfers ≥4,000 and <20,000 gal/day: • reduce emissions by 95% If liquid vapor pressure ≥1.5 psia and facility transfers ≥20,000 gal/day: • emit ≤0.08 lb/1,000 gal	If liquid vapor pressure ≥1.5 psia and facility transfers ≥20,000 gal/day, both of the following: • CARB or district-certified vapor recovery system • emit ≤0.08 lb/1,000 gal

Storage Tanks ≤40,000 Gallons

SMAQMD Rule 464	PCAPCD Rule 212	SJVUAPCD Rule 4623	SCAQMD Rule 463	Texas Rule 115.112
If liquid vapor pressure >1.5 psia and tank >55 gal: • pressure/ vacuum valve	If liquid vapor pressure ≥1.5 psia and tank >20,000 gal, one of the following: • a pressure tank • IFR • EFR • CARB-certified vapor recovery system with a control efficiency of at least 95%	If liquid vapor pressure ≥0.5 psia tank ≥1,100 and ≤19,800 gal, one of the following: • pressure-vacuum valve • IFR • EFR • vapor recovery system with a control efficiency of at least 95% If liquid vapor pressure ≥0.5 and <1.5 psia and tank >19,800 and ≤39,600 gal, one of the following: • pressure-vacuum valve • IFR • EFR • vapor recovery system with a control efficiency of at least 95% If liquid vapor pressure ≥1.5 and tank >19,800 and ≤39,600 gal, one of the following: • IFR • EFR • vapor recovery system with a control efficiency of at least 95%	If liquid vapor pressure ≥1.5 psia and tank >19,815 gal, one of the following: • pressure tank • IFR • EFR • vapor recovery system with a control efficiency of at least 95%	If liquid vapor pressure ≥1.5 psia and tank >25,000 gal, one of the following: • IFR • EFR • vapor recovery system with a control efficiency of at least 90% (Houston) or 95% (Dallas)

CONCLUSION

Process Tanks: VOC emissions from process tanks are not addressed in the NSPS, BACT determinations, or the rules of other nonattainment areas. In some instances, the MON requires greater control efficiency than Rule 464; however, the MON applies to fewer process tanks than Rule 464 because it has higher applicability thresholds for both tank capacity and vapor pressure. Staff considers the level of control required by Rule 464 for process tanks to satisfy RACT.

Liquid Transfer: VOC emissions from liquid transfer at organic chemical plants are addressed by the MON and the BACT determinations. For some operations, the MON requires greater control efficiency than Rule 464; however, the MON applies to fewer loading operations than Rule 464 because it has higher applicability thresholds for both throughput and vapor pressure. The BACT determinations did not provide sufficient information about the throughput or vapor pressure to allow comparison with Rule 464.

Rule 464 is at least as stringent as the VCAPCD and Texas rules. The YSAQMD, SJVUAPCD, and SCAQMD rules require slightly higher levels of control, but apply only to loading operations where the liquid vapor pressure is 1.5 psia or more (versus 0.5 psia for Rule 464). In addition, the YSAQMD, SJVUAPCD, and SCAQMD rules are not specific to organic chemical manufacturing.

Storage Tanks (≤40,000 gallons): Rule 464 requires storage tanks with capacities greater than 55 and less than or equal to 40,000 gallons, which store liquids with a VOC vapor pressure greater than 1.5 psia, to be equipped with pressure-vacuum valves. Both the NSPS and MON require greater levels of control than Rule 464; however, they apply to fewer storage tanks than Rule 464 because each has much greater thresholds for tank capacity and vapor pressure. The BACT determinations did not provide sufficient information about the throughput or vapor pressure to allow comparison with Rule 464.

Rule 464 is at least as stringent as the VCAPCD rule for storage tanks. The PCAPCD, SJVUAPCD, SCAQMD and Texas rules require more stringent control than Rule 464 for larger tanks (ranging from >19,815 to >20,000 gallons).

At the Procter and Gamble facility, the vapor pressures of the VOC liquids stored are all much less than 0.5 psia. As a practical matter, none of the rules and regulations evaluated would apply more stringent controls than Rule 464 on Procter and Gamble's storage tanks.

Rule 464 satisfies the RACT requirements for process tanks, liquid transfer, and storage tanks ≤40,000 gallons at the Procter and Gamble facility.

Category: Organic Chemical Manufacturing: Wastewater

Procter and Gamble is the only major organic chemical manufacturing source in the District. The wastewater from Procter and Gamble is not treated on site; it is discharged to a publicly owned treatment works and treated there. Therefore, this analysis will focus on the requirements applicable to the wastewater collection and handling system at Procter and Gamble.

SMAQMD REQUIREMENTS

District Rule 464, Organic Chemical Manufacturing Operations, regulates any wastewater stream with a total VOC concentration of at least 500 ppmw and a flow rate of at least 1 liter per minute (lpm), or a total VOC concentration at least 10,000 parts per million by weight (ppmw) at any flow rate. The provisions of Rule 464 are summarized in Table A, where they are compared with the draft CTG and the MON regulation (see below). Rule 464 requires the same types of suppression and control techniques for wastewater collection system components as specified in the draft CTG and the MON.

Rule 464 exempts organic chemical plants that emit 15 lb/day or less of maximum uncontrolled VOC emissions. Research and development operations that emit 15 lb/day or less of maximum uncontrolled VOC emissions also are exempt. Procter and Gamble is not exempt from the rule.

FEDERAL GUIDANCE

CTGs:

> *Control Techniques Guidelines (CTG) Document - Control of Volatile Organic Compound Emissions from Industrial Wastewater, EPA-453/D-93-056, Draft. September 1992.*

The draft CTG document addresses RACT for control of VOC emissions from the collection and treatment of industrial wastewater generated from the organic chemicals, plastics, and synthetic fibers industry and other industries. A final version of the CTG was not published.

The draft CTG specifies presumptive RACT for suppression of emissions from the point of generation through final treatment and control of VOC emissions from any vents from the wastewater collection system or treatment devices. The presumptive RACT applies to wastewater streams with a VOC concentration of at least 500 ppmw and a flow rate of 1 lpm or more, or a VOC concentration of at least 10,000 ppmw at any flow rate. Specific requirements are shown in Table A.

ACT:

Alternative Control Technology (ACT) Document - Air Emissions from Industrial Wastewater. April 1994.

The ACT document updates the draft CTG to be consistent with the provisions of the final NESHAP for the Synthetic Organic Chemical Manufacturing Industry (40 CFR 63, subparts F and G, known as the "HON"). The HON serves as the model rule for the draft CTG document. The ACT contains revised factors for estimating emissions from wastewater streams and treatment devices and revised impact tables (i.e., emissions, emission reductions, and control costs for various concentration and flow rate applicability cutoffs) for States to use in selecting RACT. Because HON requirements are incorporated into the NESHAP for Miscellaneous Organic Chemical Manufacturing (the "MON," to which Procter and Gamble is subject), the specific requirements are included in the discussion in the MON below.

NSPS: None

NESHAP:

40 CFR Part 63, Subpart FFFF - National Emission Standards for Hazardous Air Pollutants: Miscellaneous Organic Chemical Manufacturing

This NESHAP, known as the MON, applies to wastewater streams generated by specific chemical processes located at major sources. The MON control requirements for HAPs are essentially the same as the draft CTG, and include 40 CFR 63 subparts F and G (the HON) by reference. Specific requirements are shown in Table A. The control requirements apply to wastewater streams with HAP concentrations of at least 1,000 ppmw and flow rates of at least 10 lpm, and streams with HAP concentrations of 10,000 ppmw or more at any flow rate. Different applicability cutoffs (10 ppmw and greater, 0.02 lpm and greater) apply to wastewater streams containing very volatile HAP at new sources.

EPA Menu of Control Measures: There are no measures applicable to wastewater from organic chemical manufacturing. However, a measure for control and treatment of petroleum wastewater is estimated to be 65% efficient in controlling VOC emissions.

NSR/PSD Settlement Agreements: None

STATE GUIDANCE: None

BACT/LAER

EPA RACT/BACT/LAER Clearinghouse

No BACT determinations were found for control of emissions from wastewater generated from organic chemical manufacturing. A 2009 determination for wastewater generated at a refinery specified BACT to be compliance with 40 CFR Part 63 Subparts F and G (note: these requirements are incorporated by reference into the MON).

ARB BACT Clearinghouse: None

SMAQMD BACT Determinations: None

OTHER NONATTAINMENT AREA RULES

The following table shows the applicable rules that have been adopted in other nonattainment areas.

Agency	Rule	Last Amended	Applicable Streams
SCAQMD	1176	9/13/96	VOC >5 mg/l (approx. 5 ppmw)
Dallas-Fort Worth Ozone Nonattainment Area; and Houston-Galveston-Brazoria Ozone Nonattainment Area	115.142	1/17/03	VOC ≥10,000 ppmw at any flow rate; or VOC ≥1,000 ppmw and flow rate ≥10 lpm

For the wastewater streams to which they apply, the other nonattainment area rules are not more stringent than Rule 464, with one exception. The SCAQMD rule requires a VOC control device efficiency of at least 95% for any vent, which is greater than the 90% control efficiency required by Rule 464. However, Procter and Gamble does not use wastewater emission control methods with vents.

CONCLUSION

The Rule 464 criteria (i.e., concentration and flow rate) for determining which wastewater streams are subject to the control requirements are the same as the draft CTG and ACT, and are more stringent than the MON and the Texas rule. The SCAQMD rule applies to streams with >5 mg/l VOC at any flow rate, which is more stringent than Rule 464; however, Staff considers control of wastewater streams with such low VOC concentrations and flow rates to be beyond RACT.

The Rule 464 suppression requirements provide for enclosed systems and covers to prevent VOC leaks, together with control of all vents. These requirements are consistent with the other rules and guidance. Rule 464 requires a control device efficiency of at least 90% for vented emissions, which is the same specified by the Texas rule. The ACT, MON, and SCAQMD rule require 95% control, while the draft CTG specifies a range of control from 95% to 99.5%. However, Procter and Gamble does not use wastewater emission control methods with vents, so this rule provision has no impact.

Rule 464 satisfies the RACT requirements for VOC emission from wastewater at the Procter and Gamble facility.

Table A. Summary of Wastewater Management Unit Requirements			
This type of equipment …	**Must be equipped with a . . .**		
	Draft CTG	**Miscellaneous Organics NESHAP (40 CFR 63 Subpart FFFF)**	**SMAQMD Rule 464**
Tanks	• Fixed roof, • Floating roof, or • Cover vented to a control device	Fixed roof[a]	Fixed roof[a]
Surface impoundments	Floating membrane cover	• Floating membrane cover[b], or • Cover vented to a control device[b]	Cover vented to a control device
Separators	• Fixed roof, or • Floating roof	• Fixed roof vented to a control device, or • Floating roof	• Fixed roof vented to a control device, • Floating roof, • Solid, sealed, gasketed, fixed cover, or • Solid, vapor-tight, full-contact fixed cover
Containers[c]	Not addressed in the draft CTG	• Leak-less cover, • Submerged fill pipe[c], • Container meeting Dept. of Transportation (DOT) standards[d], or • Cover vented to a control device[d]	Covered and submerged fill pipe[c]
Individual drain system components	Leak-less cover	• Leak-less covers, • Cover vented to a control device, or • Drains, junction boxes, and sewer lines that meet design standards	• Vapor-tight cover, or • Cover vented to a control device
Emission control devices	95 - 99.5% destruction	95% destruction (or an outlet concentration of $\leq$ 20 ppmv - for enclosed combustion devices only)	90% destruction

[a]If used to mix (e.g., by air sparging), heat, or treat wastewater with an exothermic reaction, then the tank must be equipped with a floating roof or be vented to control device.
[b]Air emission controls (e.g., covers) are not required for surface impoundments that are used for open biological treatment processes.
[c]The NESHAP and SMAQMD Rule 464 require submerged fill pipes for containers with capacities of 0.42 m^3 or more.
[d]Only for containers with capacities less than 0.42 m^3.

Appendix E

RACT Analysis of Major Sources

Major Source: Aerojet – Sacramento Operations

VOC Emissions: Major Source
NOx Emissions: Major Source

Facility Description

Aerojet manufactures liquid and solid propulsion systems, aerospace components, and ordnance items in support of government and commercial contracts. The facility is a major source of VOC and NOx. The plant consists of the following VOC and/or NOx emission units:

- Emergency standby IC engines for generators and fire pumps (30): IC engines emit VOC and NOx, and are subject to Rule 412. The 30 emergency standby engines range in rating from 50 to 1,500 horsepower. All are designated for emergency use, and are limited by permit from 10 to 50 hours of operation per year for maintenance purposes and a maximum of 200 hours of operation per year including both maintenance and emergency use. They are exempt from emissions limits because they operate no more than 100 hours per year for maintenance purposes.
- Prime power IC engine for abrasive blasting process (1): The IC engine emits VOC and NOx, and is subject to Rule 412. The gasoline engine is rated less than 50 horsepower and is not subject to any rule-based limits.
- Boilers (45): The boilers at the facility are fired on natural gas and propane fuels and emit VOC and NOx. The boilers are used for either steam or hot water, and have rated heat input capacities ranging from 1.26 to 15.5 mmBtu/hr. The boilers are subject to emission limits under Rule 411.
- Space heaters (60): The natural gas-fired space heaters are used to heat indoor spaces and emit VOC and NOx. The space heaters, ranging in capacity from 0.008 to 0.15 mmBtu/hr, are not subject to any rule-based emissions limits.
- Rocket testing stands (8): The rocket testing stands are used to test liquid-fueled and solid-fueled rocket engines, and emit VOC and NOx. The testing stands are not subject to any rule-based emissions limits.
- Aerospace coating operations (18): The aerospace coating operations emit VOC. These operations are subject to emission limits under Rule 456.
- Aerospace solvent cleaning operations (2): The solvent cleaning and surface preparation operations emit VOC. The solvents are subject to VOC limits under Rule 456, except when cleaning space vehicles. Solvents used to clean space vehicles are exempt from VOC limits under Rule 456.
- Metal and wood coating operation (1): The metal and wood coating operation emits VOC. The coating operation is subject to emission limits under Rule 451 when coating metal substrates and Rule 463 when coating wood substrates.
- RDX drying facility (1): The RDX (cyclotrimethylenetrinitramine) drying room emits VOC as the RDX dries. The room is equipped with a condenser for VOC control. It is not subject to any rule-based emissions limits.

- Cold cleaning operations (2): The cold cleaning operations are used to degrease parts and emit VOC from the solvents used. Both cold cleaning operations employ water covers for VOC control. They are subject to emission limits under Rule 454.
- Bowl cleaning operations (2): The bowl cleaning operations are used to clean rocket fuel mixing bowls, and emit VOC from the cleaning solvents. The cleaning operations are subject to emission limits under Rule 456, which requires that the solvent either contains ≤ 200 g/l of VOC or has a VOC composite vapor pressure ≤45 mmHg at 68 °F.
- Gasoline dispensing facility (1): The gasoline dispensing facility emits VOC. The dispensing operation is subject to emission limits under Rule 448 and 449 and is equipped with Phase I and Phase II vapor recovery systems for VOC control.
- Chemical manufacturing processes (2): There are two batch chemical manufacturing process at Aerojet. The first produces SX-2, a proprietary energetic material. The reaction of nitric acid with other materials emits NO_2 during the SX-2 manufacturing process. The second is a pilot-scale process that can produce several different chemicals as Aerojet secures new contracts. There are no rule-based emissions limits for the process equipment. Related solvent cleaning operations for these processes are subject to Rule 466.
- Soluble mandrel manufacturing process (1): The mandrel manufacturing process emits VOC. Emissions from the solvent cleaning activities are subject to Rule 466.

Note: The emissions of each unit described above are limited by local permits, regardless of whether they are subject to rule-based emission limits. Best Available Control Technology has been applied under New Source Review, where applicable.

RACT Discussion

The emission units at Aerojet that are subject to SIP-approved rules are shown in the table below. These rules have been demonstrated to satisfy RACT in Appendices C and D.

Source Category	Applicable Rules
Boilers	411
Emergency Standby IC Engines	412
Aerospace Coating Operations	456
Metal and Wood Coating Operations	451, 463
Solvent Cleaning and Surface Preparation for Space Vehicles	456
Cold Cleaning Operations	454
Bowl Cleaning Operations	466
Gasoline Dispensing Facility	448, 449
Chemical Manufacturing Processes	466
Soluble Mandrel Manufacturing Process	466

Rule 411 does not directly limit the emissions of VOC from boilers and process heaters. VOC emissions limits are not specified in the rules of other nonattainment areas, California BACT determinations, or in the guidance reviewed. Some determinations in EPA's RACT/BACTLAER

Clearinghouse set VOC emission limits that are based on good combustion practices. Rule 411 sets CO emission limits that ensure efficient fuel combustion for boilers and process heaters.

Rule 412 does not apply to the IC engine used for the abrasive blasting process because the engine is less than 50 horsepower. Staff reviewed the rules of other nonattainment areas (PCAPCD. YSAQMD, SJVUAPCD, SCAQMD, VCAPCD and the Texas nonattainment areas) and found only one – SJVUAPCD Rule 4702 – that applies to engines smaller than 50 horsepower. The SJVUAPCD rule regulates engines rated from 25 to 50 horsepower at "point-of-sale" and does not set standards for existing engines in this size range. Therefore, Staff concludes that establishing standards for IC engines less than 50 horsepower is beyond RACT.

There is no EPA guidance on RACT that is applicable to the rocket testing stands. There are no New Source Performance Standards (NSPS) or District rules that apply. There are no control technologies currently available to control emissions from the firing of rocket engines.

There is no EPA guidance on RACT that is applicable to the small natural gas-fired space heaters. There are no New Source Performance Standards (NSPSs) or District rules that apply to these small units. Several other California districts (BAAQMD, SCAQMD, SDACPD, SJVUAPCD, SLOCAPCD, VCAPCD, and YSAQMD) have "point-of-sale" rules that require fan-type, natural gas-fired central furnaces rated less than 175,000 But/hr to meet low-NOx standards upon sale or installation. However, none of these rules require the retrofit or replacement of existing units, and therefore Staff does not consider them to be RACT, which applies to existing sources.

Rule 464, Organic Chemical Manufacturing Operations, applies only to facilities that have 28 as the first two digits of their Standard Industrial Classification (SIC) code, which Aerojet does not. The permitted emissions from these units are small: 0.8 lb/day and 10 lb/quarter of NOx for the SX-2 process and 3.1 lb/day and 38 lb/quarter of VOC for the pilot plant. In 2015, the most recent year for which emission inventory information is available, neither of these processes emitted any VOC or NOx.

There are several sources with guidance on emission cut-off levels for RACT. EPA's "Bluebook[32]" recommended a cut-off level of 15 lb/day. The most recent CTGs, published by EPA in 2006, 2007 and 2008, also recommend this level, based on actual emissions. Finally, the model rule included with the 1994 ACT for batch processes (EPA-453/R-93-017) exempts processes with emissions lower than 5 tons per year. In light of this guidance, Staff does consider RACT to apply to the chemical manufacturing processes at Aerojet.

There are no District rules that apply to emissions from the soluble sand mandrel manufacturing process, although Rule 466 applies to all associated solvent cleaning activities. The permitted emissions from this process are small: 2.35 lb/day and 42 lb/quarter of VOC. In 2015, the most recent year for which emission inventory information is available, the sand mandrel process was not operated. For the same reasons stated above for the chemical manufacturing processes,

[32] *Issues Relating to VOC Regulation Cutpoints, Deficiencies, and Deviations*, EPA. May 25, 1988, revised January 11, 1990.

Staff does consider RACT to apply to the very low level of emissions from the sand mandrel manufacturing process.

There are no District rules that apply to emissions from the RDX drying facility, although Rule 466 applies to all solvent cleaning associated with these processes. The permitted, uncontrolled emissions from this operation are 150 lb/day of VOC; however, the process is required to be controlled with a refrigerated condenser that reduces VOC emissions to much lower levels. This process has been used very sparingly in recent years. In 2015, the most recent year for which emission inventory information is available, the process was not operated. For the same reasons stated above for the chemical manufacturing processes, Staff does consider RACT to apply to the low level of emissions from the RDX drying facility.

Conclusion

The RACT requirements have been satisfied for the boilers, IC engines, aerospace coating, metal coating, wood coating, solvent cleaning/surface preparation, cold cleaning, bowl cleaning, and gasoline dispensing because these emission units are subject to SIP-approved rules that have been determined to satisfy RACT.

Rocket testing stands, small space heaters, the chemical manufacturing processes, the soluble mandrel manufacturing process and the RDX dryer are not covered by a CTG or District rule. These units either have no RACT-level cost effective controls available, or have minimal emissions.

The RACT requirement is satisfied for Aerojet.

Major Source: Central Valley Financing Authority – Carson Cogeneration Project

VOC Emissions: Non-Major Source
NOx Emissions: Major Source

Facility Description

The Central Valley Financing Authority (CVFA) Carson Cogeneration Project is a combined cycle, cogeneration power plant with an electrical generating capacity of 109 MW. The facility also supplies up to 144,000 lb/hr of steam to the Sacramento Regional Wastewater Treatment Plant and to an adjacent ice production plant. This facility is a major source of NOx.

The plant consists of the following NOx emission units:

- Combined cycle gas turbine (1): The combined cycle turbine is rated at 50 MW (500 mmBtu/hr input), and fired with a combination of natural gas and digester gas. NOx is emitted from the combustion process. The turbine is subject to emission limits under Rule 413.
- Heat recovery steam generator (1): The heat recovery steam generator incorporates a duct burner system, rated at 99.9 mmBtu/hr, to produce steam from the hot turbine exhaust gas. NOx is produced from the combustion process. The duct burners fire into the hot turbine exhaust, forming a combined exhaust that is subject to emission limits under Rule 413.
- Simple cycle peaking gas turbine (1): The simple cycle turbine is rated at 42 MW (450 mmBtu/hr input), and fired with a combination of natural gas and digester gas. NOx is emitted from the combustion process. The turbine is subject to emission limits under Rule 413.
- Emergency standby diesel engine (1): The 830-horsepower, emergency standby engine drives an emergency electrical generator. IC engines emit NOx, and are subject to Rule 412. The engine is designated for emergency use, and is limited by permit to 30 hours of operation per year for maintenance purposes and 200 hours of operation per year including both maintenance and emergency use. It is exempt from emissions limits because it operates no more than 100 hours per year for maintenance purposes.
- Boiler (1), pending: The Central Valley Financing Authority has submitted a permit application to install a 100 mmBtu/hr auxiliary boiler to continue providing steam during turbine shut downs. This application is currently being evaluated by the District. The boiler is subject to emission limits under Rule 411.

Note: The emissions of each unit described above are limited by local permits (except for the planned auxiliary boiler, which has not been issued a permit), regardless of whether they are subject to rule-based emission limits. Best Available Control Technology has been applied under New Source Review, where applicable.

RACT Discussion

The emission units at Carson Cogeneration Project that are subject to SIP-approved rules are shown in the table below. These rules have been demonstrated to satisfy RACT in Appendix D.

Source Category	Applicable Rules
Boilers	411
IC Engines	412
Gas Turbines (and duct burners, if applicable)	413

There is no EPA guidance on RACT that is applicable to the duct burners. There are, however, two New Source Performance Standards (NSPS) that apply to duct burners in combined cycle systems: Subparts Da and Db of 40 CFR Part 60. In each of these subparts, the NOx standard for duct burners is 0.2 lb/mmBtu, which is equivalent to approximately 55 ppmv @15% O_2.

The duct burners fire into the hot turbine exhaust, and their emissions are therefore combined with the emissions from the turbines upstream of the emission controls. It is not feasible to operate the duct burners without operating the turbines. Therefore, the emissions from the duct burners are also subject to the NOx limit of Rule 413, 9 ppmv @ 15% O_2. This level of control satisfies the requirements of RACT for this source type.

Conclusion

The RACT requirements have been satisfied for the gas turbines, the emergency standby engine, and the planned auxiliary boiler because these units are subject to SIP-approved rules that have been determined to satisfy RACT. Because the emissions from the duct burners cannot be separated from those of the turbine, they are also limited by a SIP-approved rule.

The RACT requirement is satisfied for Carson Cogeneration Project.

Major Source: Chevron Sacramento Terminal

VOC Emissions: Major Source
NOx Emissions: Non-Major Source

Facility Description

The Chevron Sacramento Terminal is a bulk gasoline terminal that receives, stores and distributes diesel fuel and gasoline in the Sacramento area, and is a major source of VOC. The terminal supplies products to a large area of northern California.

The majority of fuel products are received via a pipeline from the Chevron Richmond refinery and pumped into large storage tanks. The Techroline and ethanol additives for gasoline are received by tank truck and are also pumped into large storage tanks. From the storage tanks, the fuel is loaded into cargo tank trucks at a loading rack equipped with vapor collection equipment vented to an absorption/carbon adsorption vapor processing system. Vapors from the loading racks at the nearby ConocoPhillips terminal are also routed to Chevron's vapor processing unit.

The Chevron Sacramento Terminal consists of the following VOC emission units:

- Storage tanks, internal floating roof (5): The internal floating roof tanks, ranging in capacity from 640,000 to 2,100,000 gallons, store organic liquid with a vapor pressure greater than 1.5 psia. The tanks are subject to emission limits under Rule 446.
- Storage tank, fixed roof (1): The 110,000 gallon fixed roof storage tank stores organic liquid with a vapor pressure greater than 1.5 psia and is vented to the vapor processing system. The tank is subject to emission limits under Rule 446.
- Organic liquid loading rack (1): The loading rack consists of 15 gasoline loading arms with three pumps and 8 diesel loading arms with two pumps, all vented to the vapor processing system. The loading rack is subject to emission limits under Rule 447.

Note: The emissions of each unit described above are limited by local permits, regardless of whether they are subject to rule-based emission limits. Best Available Control Technology has been applied under New Source Review, where applicable.

RACT Discussion

All emission units at the Chevron Sacramento Terminal are subject to SIP-approved rules, as shown in the table below. These rules have been demonstrated to satisfy RACT in Appendix C.

Source Category	Applicable Rules
Organic Liquid Storage Tanks	446
Organic Liquid Loading	447

Conclusion

All VOC emission units are subject to SIP-approved rules that have been determined to satisfy RACT. The RACT requirement has been satisfied for the Chevron Sacramento Terminal.

Major Source: **Kiefer Landfill, Department of Waste Management and Recycling, County of Sacramento**

VOC Emissions: Major Source
NOx Emissions: Major Source

Facility Description

The Kiefer Landfill is a municipal solid waste landfill owned and operated by the County of Sacramento, Department of Waste Management and Recycling. It is a major source of both VOC and NOx. Decomposing waste encapsulated within the landfill produces landfill gas that contains VOCs. A landfill gas collection system captures the landfill gas and sends it to be combusted in a set of two flares or to be used as a fuel in one of five internal combustion engines, which drive electrical generators designed to produce up to 15 MW of electricity.

The Kiefer Landfill consists of the following VOC and/or NOx emission units:

- Landfill gas collection system (1): The landfill gas collection system consists of perimeter wells, interior wells, associated piping, and two 125-horsepower blowers. The landfill gas contains VOC. The landfill gas collection system is subject to specific design and emission standards under both an NSPS (40 CFR Part 60, Subpart WWW) and a NESHAP (40 CFR Part 63, Subpart AAAA).
- Landfill gas flares (2): The two enclosed landfill gas flares, non-assisted, designated as Flare No. 1 and Flare No. 2, control VOC emissions from the landfill gas collection system. Flare No. 1 has a maximum heat input of 150 mmBtu/hr and a maximum gas flow rate of 5,000 scfm. Flare No. 2 has a maximum heat input of 150 mmBtu/hr and a maximum gas flow rate of 4,000 scfm. Emissions from the flares are not subject to rule-based limits; however, the local permits require that the flares maintain 98% destruction efficiency for VOC or emit less than 20 ppmv of VOC as hexane at 3% O_2. The flares are exempt from Rule 485, Municipal Landfill Gas, because Rule 485 exempts sources that are subject to the NSPS.
- IC engines, landfill gas-fired (5): The IC engines receive gas from the landfill gas collection system. Each engine is rated at 4,230 horsepower and drives a 3.05-MW electrical generator. The engines reduce VOC emissions from the landfill gas, and NOx is generated during the combustion process. The engines are subject to NOx and VOC emission limits under Rule 412.
- Gasoline dispensing facility (1): The gasoline dispensing facility consists of a 2,500-gallon aboveground storage tank and one dispensing nozzle. The gasoline dispensing facility emits VOC. The dispensing operation is subject to emission limits under Rule 448 and 449 and is equipped with Phase I and Phase II vapor recovery systems for VOC control.
- Nonroad portable IC engines, diesel (2): The nonroad engines provide power to portable equipment. A 225-horsepower engine drives a trommel screen. A 99-horsepower engine provides auxiliary power to a street sweeper to operate the vacuum system and sweeping brushes. Nonroad engines are exempt from RACT requirements because the

District is preempted from establishing emission standards by Section 209(e) of the federal Clean Air Act.

- Emergency standby diesel engine (1): The 546-horsepower, emergency standby engine drives an emergency electrical generator. IC engines emit VOC and NOx and are subject to Rule 412. The engine is designated for emergency use, and is limited by permit to 50 hours of operation per year for maintenance purposes and 200 hours of operation per year including both maintenance and emergency use. It is exempt from emissions limits because it operates no more than 100 hours per year for maintenance purposes.

Note: The emissions of each unit described above are limited by local permits, regardless of whether they are subject to rule-based emission limits. Best Available Control Technology has been applied under New Source Review, where applicable.

RACT Discussion

The emission units at the Kiefer Landfill that are subject to SIP-approved rules are shown in the table below. These rules have been demonstrated to satisfy RACT in Appendices C and D.

Source Category	Applicable Rules
IC Engines, Landfill Gas Fired	412
IC Engines, Emergency Standby	412
Gasoline Dispensing Facility	448, 449

The landfill gas collection system and flares are exempt from Rule 485, Municipal Landfill Gas, because Rule 485 exempts sources that are subject to the NSPS. On August 28, 2016, the District adopted a SIP revision to include source-specific RACT emission limits for the landfill gas flares at the Kiefer Landfill. VOC-related conditions of the local operating permits for Flare No. 1 (PO 24630) and Flare No. 2 (PO 24361) were subsequently submitted to EPA for approval into the SIP. All conditions pertaining to the VOC emission limits and the associated source testing, test methods, monitoring, reporting, and recordkeeping requirements were included. The flare permits require 98% destruction efficiency for VOC or emissions less than 20 ppmv of VOC as hexane at 3% O_2. This is the same level of control required by the NSPS and the NESHAP. In addition, Staff, in the most recent analysis of Best Available Control Technology for a landfill gas flare, determined this to be the most effective emission limit that has been required or used for the type of equipment. Staff concludes that the emission limits required by the District permits satisfy RACT.

Conclusion

The RACT requirements have been satisfied for the emission units at the Kiefer landfill, with the exception of the flares. This deficiency will be remedied if EPA approves the permits into the SIP.

Major Source: Mitsubishi Rayon Carbon Fiber and Composites, Inc.

Potential to Emit

VOC Emissions: Non-Major Source
NOx Emissions: Major Source

Facility Description

Mitsubishi Rayon Carbon Fiber and Composites, Inc. manufactures carbon fiber at its facility in Sacramento, California. The carbon fiber is used by their customers to manufacture finished products such as sporting goods, satellites, helicopter rotor blades, drive shafts, pumps, valves and CNG tanks.

Mitsubishi Rayon Carbon Fiber and Composites manufactures the carbon fiber from continuous polyacrylic fiber as the raw material. The carbon fiber is processed in three parallel production lines. Fiber is unwound from many spools simultaneously and processed through a sequence of production steps:

1. Surface oxidation in natural gas-fired or electric ovens;
2. Tar removal in natural gas-fired or electric ovens;
3. Carbonization in natural gas-fired or electric ovens; and
4. Surface treatment of the fibers with an electrolytic solution that promotes good adhesion.

This facility consists of the following NOx-emitting equipment:

At the Carbon Fiber Process Lines:

- Oxidation ovens, natural gas-fired (6): The natural gas-fired ovens, rated from 2.39 to 2.5 mmBtu/hr each, are used for surface oxidation, tar removal, and carbonization of the carbon fiber. NOx emissions are produced during combustion of the fuel. There is no District rule that applies to NOx emissions from these ovens.
- Thermal oxidizers (7): The thermal oxidizers are used to reduce VOC emissions from the exhaust of the natural gas-fired ovens, electric ovens, and hoods. The thermal oxidizers are rated from 2.4 to 9.18 mmBtu/hr. NOx emissions are produced during the combustion process. There is no District rule that applies to NOx emissions from the thermal oxidizers.

Other Equipment:

- Boilers (2): The two natural gas-fired boilers at the facility are rated at 4.8 mmBtu/hr and 6.124 mmBtu/hr. NOx is produced from the combustion process. The boilers are subject to emission limits under Rule 411.
- Emergency standby IC engines (2): A 197-horsepower diesel engine is used to drive an emergency fire pump. It is designated for emergency use, and is limited by permit to 50 hours of operation per year for maintenance purposes and 200 hours of operation per

year including both maintenance and emergency use. A 231-horsepower natural gas-fired engine is used to drive an emergency electrical generator. It is designated for emergency use, and is limited by permit to 100 hours of operation per year for maintenance purposes and 200 hours of operation per year including both maintenance and emergency use. IC engines emit NOx, and are subject to Rule 412. The two emergency standby engines at the facility are exempt from emissions limits because they operate no more than 100 hours per year for maintenance purposes.

Note: The emissions of each unit described above are limited by local permits, regardless of whether they are subject to rule-based emission limits. Best Available Control Technology has been applied under New Source Review, where applicable.

RACT Discussion

The emission units at Mitsubishi Rayon that are subject to SIP-approved rules are shown in the table below. These rules have been demonstrated to satisfy RACT in Appendix D.

Source Category	Applicable Rules
Boilers	411
IC Engines	412

There are no District rules that apply to NOx emissions from the natural gas-fired ovens. This has been identified as a RACT deficiency.

The thermal oxidizers are VOC control devices and NOx is a secondary pollutant. According to EPA, RACT is not applicable to secondary pollutant emissions from control devices[33].

Conclusion

The RACT requirements have been satisfied for the boilers and the emergency standby IC engines at Mitsubishi Rayon, and NOx RACT is not required for the thermal oxidizers. There are no District rules that apply to NOx emissions from the natural gas-fired ovens, which has been identified as a RACT deficiency. Therefore, the District is committing to adopt a NOx RACT rule for natural gas-fired ovens and submit the rule to EPA for approval.

The natural gas-fired ovens are limited by permit to emit no more than 30 ppmv of NOx at 3% O_2. This is the same standard contained in the most stringent district/state rule compared, SCAQMD Rule 1147 – NOx Reductions from Miscellaneous Sources, which Staff considers to satisfy RACT. Therefore, the natural gas-fired ovens at Mitsubishi Rayon will not be affected by the adoption of NOx RACT standards.

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[33] Email from Stanley Tong, U.S. EPA Region IX, to Kevin Williams, SMAQMD, September 22, 2015.

Major Source: The Procter and Gamble Manufacturing Company

VOC Emissions: Major Source
NOx Emissions: Non-Major Source

Facility Description

The Procter and Gamble Manufacturing Company (Procter and Gamble) Sacramento site is a complex industrial facility with many emission units and fugitive sources. It processes oils, such as coconut and palm kernel oil, to make a number of products. Products include fatty alcohols, glycerin, fatty acids, and fatty esters. Incoming oil is converted into methyl esters and glycerin. The glycerin is processed to remove some of the residual fatty materials and water. Crude esters are sent to distillation where methyl ester is separated into various fractions. Distilled esters are hydrogenated into fatty alcohol. The resulting crude alcohol is distilled and separated into various fractions. Another process in the plant converts fatty esters into fatty acids. This involves both reaction and purification steps. The plant sometimes processes intermediates shipped to and from other plants. The site contains emission sources generated from the oleochemical process as well as miscellaneous support equipment.

Procter and Gamble uses two centrifuge systems (each consisting of a centrifuge, slurry tank and effluent tank) to separate catalyst from fatty alcohol. Air, methanol vapor, and small amounts of entrained fatty alcohol are pulled from each process tank under a slight vacuum, combined in a single vent header, and drawn through the methanol absorber. The methanol absorber consists of a packed-column unit where the methanol is absorbed by temperature controlled water. The resulting alcohol/methanol/water mixture is pumped to an oil/water separator to recover the fatty alcohol. The methanol/water mixture is then recovered back into the manufacturing process.

The Procter and Gamble facility contains the following VOC emission units:

- Organic liquid storage tanks, fixed roof (48): The storage tanks range in capacity from 3,087 gallons to 523,661 gallons and store crude vegetable oil feedstock and products such as fatty alcohols, fatty esters, and fatty acids. Rule 446 applies to storage tanks with capacities greater than 40,000 gallons storing liquids with composite VOC vapor pressure greater than 1.5 psia. Based on printouts from EPA's Tanks 4.0 program that were provided by Procter and Gamble, all the materials stored in the storage tanks have vapor pressures well below 1.5 psia and are exempt from Rule 446. Rule 464 applies to storage tanks with capacities greater than 55 gallons and less than or equal to 40,000 gallons, storing liquids with composite VOC vapor pressure greater than 1.5 psia. Again, because of the low vapor pressures of the material being stored, all of the tanks are also exempt from Rule 464.
- Tank farm loading rack (1): The tank farm loading rack is used to pump crude vegetable from tanker trucks into the storage tanks and products from storage tanks into rail cars. Organic liquid loading at chemical manufacturing operations is subject to Rule 464 and requirements apply if the capacity of the tank truck, trailer, railroad tank car, or storage

tank being loaded is 2,000 gallons or greater and the composite VOC vapor pressure is greater than 0.5 psia. Based on printouts from EPA's Tanks 4.0 program that were provided by Procter and Gamble, all the materials loaded have vapor pressures well below 0.5 psia, so the tank farm loading rack is exempt from requirements under Rule 464.

- Methanol loading rack (1): The methanol loading rack is used to transfer methanol from the process into railcars when part of the plant experiences downtime. The methanol loading rack is subject to emission limitations under Rule 464.
- Physically refined oil process (1): This process consists of activated carbon and bleaching earth filter vessels, mixers, condensers, and process tanks. This process is subject to emission limitations under Rule 464.
- Methyl ester and glycerin manufacturing process (1): This process consists of reactor vessels, centrifuges, absorbers, condensers, and process tanks. This process is subject to emission limitations under Rule 464.
- Fatty acids manufacturing process (1): This process consists of reactor vessels, strippers, distillation columns, condensers, and process tanks. This process is subject to emission limitations under Rule 464.
- Fatty alcohol manufacturing process (1): This process consists of reactor vessels, strippers, distillation columns, filters, centrifuges, condensers, and process tanks. This process is subject to emission limitations under Rule 464.
- Process heaters (4): Two natural gas-fired fired process heaters, rated at 32 mmBtu/hr and 9.9 mmBtu/hr, are used to heat thermal fluid. There is also a 4.85 mmBtu/hr natural gas-fired hydrogen heater at the facility. The fourth process heater, rated at 3.75 mmBtu/hr, is fired on natural gas and heats process fluids in the physically refined oil process. The process heaters are subject to emissions limitations under Rule 411.
- Fire pit (1): Several processes are vented into the fire pit, where water is sprayed into the vented flammable gases. The fire pit is classified as a production exhaust system under Rule 464 and is subject to emissions limitations.
- Vent seal tanks (2): In the vent seal tanks, vented gas is forced through a liquid barrier that prevents the surrounding air from flowing back into the vent. These are classified as production exhaust systems under Rule 464 and are subject to emissions limitations.
- Emergency standby IC engine (1): A 146 horsepower diesel engine is used to drive an emergency fire pump. It is designated for emergency use, and is limited by permit to 50 hours of operation per year for maintenance purposes and 200 hours of operation per year including both maintenance and emergency use. IC engines emit VOC as well as NOx. At major sources of NOx (which Procter and Gamble is not), IC engines are subject to Rule 412. Even if Procter and Gamble were a major source of NOx, the emergency standby engine at the facility would be exempt from emissions limits because it operates no more than 100 hours per year for maintenance purposes.
- Wastewater collection and treatment system (1): The wastewater treatment system consists of drains, surface impoundments, oil/water separators, and process tanks. Wastewater treatment systems at chemical manufacturing facilities are subject to emissions limitations under Rule 464.
- Fugitive emissions from equipment leaks: The facility has a large number of potential sources of fugitive leaks, including valves, pumps, compressors, flanges, agitators,

sampling connections, and pressure relief devices. Fugitive leaks at chemical manufacturing facilities are subject to emissions limitations under Rule 443

Note: The emissions of each unit described above are limited by local permits, regardless of whether they are subject to rule-based emission limits. Best Available Control Technology has been applied under New Source Review, where applicable.

RACT Discussion

The emission units at Procter and Gamble that are subject to SIP-approved rules are shown in the table below. These rules have been demonstrated to satisfy RACT in Appendices C and D.

Source Category	Applicable Rules
Process Heaters	411
Emergency Standby IC Engines	Exempt*
Fugitive Leaks	443
Organic Liquid Storage Tanks	446, 464
Organic Liquid Loading	464
Chemical Manufacturing Processes	464
Wastewater Treatment Systems	464

* Rule 412 is not applicable to Procter and Gamble because the facility is not a major source of NOx. However, Rule 412 exempts emergency standby engines from emissions standards.

Rule 411 does not directly limit the emissions of VOC from boilers and process heaters. VOC emissions limits are not specified in the rules of other nonattainment areas, California BACT determinations, or in the guidance reviewed. Some determinations in EPA's RACT/BACTLAER Clearinghouse set VOC emission limits that are based on good combustion practices. Rule 411 sets CO emission limits that ensure efficient fuel combustion for boilers and process heaters.

Conclusion

The RACT requirement has been satisfied for Procter and Gamble.

Major Source: RagingWire Enterprise Solutions, Inc.

VOC Emissions: Non-Major Source
NOx Emissions: Major Source

Facility Description

RagingWire Enterprise Solutions, Inc. (RagingWire) operates a data center in Sacramento. The facility contains data process servers that provide digital storage and computing capabilities to RagingWire's clients. Specific environmental and electrical parameters are required for housing the data process servers. To ensure uninterrupted operation of the data servers and HVAC equipment, the facility has 40 standby electrical generators, driven by diesel-fueled internal combustion (IC) engines, which can be used in the event of a loss of utility power.

This facility consists of the following NOx emission units:

- Emergency standby diesel engines (40): The emergency standby engines drive electrical generators and range in size from 2,876 to 2,922 horsepower. IC engines emit NOx and are subject to Rule 412. The engines are designated for emergency use, and are limited by permit to 50 hours of operation per year for maintenance purposes and 200 hours of operation per year including both maintenance and emergency use. They are exempt from emissions limits because they operate no more than 100 hours per year for maintenance purposes.

Note: The emissions of each unit described above are limited by local permits, regardless of whether they are subject to rule-based emission limits. Best Available Control Technology has been applied under New Source Review, where applicable.

RACT Discussion

All emission units at RagingWire are subject to SIP-approved rules, as shown in the table below. The rule has been demonstrated to satisfy RACT in Appendix D.

Source Category	Applicable Rules
IC Engines	412

Conclusion

All NOx emission units are subject to SIP-approved rules that have been determined to satisfy RACT. The RACT requirement has been satisfied for RagingWire.

Major Source: Sacramento Cogeneration Authority

VOC Emissions: Non-Major Source
NOx Emissions: Major Source

Facility Description

The Sacramento Cogeneration Authority is a combined cycle, cogeneration power plant with an electrical generating capacity of 171 MW. The facility also supplies up to 90,000 lb/hr of steam to a nearby chemical plant. This facility is a major source of NOx.

The plant consists of the following NOx emission units:

- Combined cycle gas turbines (2): The combined cycle turbines are rated at 50 MW (500 mmBtu/hr input) each, and fired with natural gas. NOx is emitted from the combustion process. The turbines are subject to emission limits under Rule 413.
- Heat recovery steam generator (2): The heat recovery steam generators incorporate a duct burner system, rated at 83.2 mmBtu/hr each, to produce steam from the hot turbine exhaust gas. NOx is produced from the combustion process. The duct burners fire into the hot turbine exhaust, forming a combined exhaust that is subject to emission limits under Rule 413.
- Simple cycle gas turbine (1): The simple cycle turbine is rated at 50 MW (500 mmBtu/hr input), and fired with natural gas. NOx is emitted from the combustion process. The turbine is subject to emission limits under Rule 413.
- Boilers (2): Two 108.7 mmBtu/hr auxiliary boilers provide steam when the combined cycle turbines are not operating. They are fueled with natural gas and produce NOx during the combustion process. The boilers are subject to emission limits under Rule 411.

Note: The emissions of each unit described above are limited by local permits, regardless of whether they are subject to rule-based emission limits. Best Available Control Technology has been applied under New Source Review, where applicable.

RACT Discussion

The emission units at Sacramento Cogeneration Authority that are subject to SIP-approved rules are shown in the table below. These rules have been demonstrated to satisfy RACT in Appendix D.

Source Category	Applicable Rules
Boilers	411
Gas Turbines	413

There is no EPA guidance on RACT that is applicable to the duct burners. There are, however, two New Source Performance Standards (NSPSs) that apply to duct burners in combined cycle systems: Subparts Da and Db of 40 CFR Part 60. In each of these subparts, the NOx standard for duct burners is 0.2 lb/mmBtu, which is equivalent to approximately 55 ppmv @15% O_2.

The duct burners fire into the hot turbine exhaust, and their emissions are therefore combined with the emissions from the turbines upstream of the emission controls. It is not feasible to operate the duct burners without operating the turbines. Therefore, the emissions from the duct burners are also subject to the NOx limit of Rule 413, 9 ppmv @ 15% O_2. This level of control satisfies the requirements of RACT for this source type.

Conclusion

The RACT requirements have been satisfied for the gas turbines and the boilers because these units are subject to SIP-approved rules that have been determined to satisfy RACT. Because the emissions from the duct burners cannot be separated from those of the turbines, they are also limited by a SIP-approved rule.

The RACT requirement is satisfied for Sacramento Cogeneration Authority.

Major Source: **Sacramento Municipal Utility District Financing Authority – Cosumnes Power Plant**

VOC Emissions: Major Source
NOx Emissions: Major Source

Facility Description

The SMUD Cosumnes Power Plant is a combined cycle power plant with an electrical generating capacity of 530 MW. This facility is a major source of VOC and NOx.

The plant consists of the following VOC and/or NOx emission units:

- Combined cycle gas turbines (2): The two combined cycle turbines are rated at 170 MW (1,865 mmBtu/hr input) each, and fired with a combination of natural gas and digester gas. VOC and NOx are emitted in the turbine exhaust. The turbines are subject to NOx emission limits under Rule 413.

Note: The emissions of each unit described above are limited by local permits, regardless of whether they are subject to rule-based emission limits. Best Available Control Technology has been applied under New Source Review, where applicable.

RACT Discussion

The emission units at SMUD Cosumnes Power Plant that are subject to SIP-approved rules are shown in the table below. The rule has been demonstrated to satisfy RACT in Appendix D.

Source Category	Applicable Rules
Gas Turbines	413

In addition to Rule 413, the gas turbines are also subject to the less stringent requirements of Title 40 of the Code of Federal Regulations, Part 60, Subpart GG – Standards of Performance for Stationary Gas Turbines. The applicable NOx limit from this regulation in 96 ppmv @ 15% O_2, based on a heat input rate of 11.3 kJ/w-hr.

The gas turbines at the facility are equipped with oxidation catalysts to control CO and VOC emissions, and are limited by permit conditions to emit no more than 1.4 ppmv VOC at 15% O_2. However, there are no District rules that limit the emissions of VOC from gas turbines. VOC emissions limits are not specified in the rules of other nonattainment areas or in the guidance reviewed. Some determinations in ARB's BACT Clearinghouse and in EPA's RACT/BACTLAER Clearinghouse set VOC emission limits that are based on control with oxidation catalysts. However, these determinations have been made in conjunction with BACT limits for CO emissions, for which oxidation catalysts are cost effective controls. For the control of VOC

emissions, oxidation catalysts are not cost effective and Staff does not consider them to be RACT for VOC.

Conclusion

The RACT requirements for NOx have been satisfied for the gas turbines because these units are subject to a SIP-approved rule that has been determined to satisfy RACT. There are no applicable RACT controls for VOC emissions from the gas-fired turbines.

The RACT requirement is satisfied for SMUD Cosumnes Power Plant

Major Source: Sacramento Power Authority

VOC Emissions: Non-Major Source
NOx Emissions: Major Source

Facility Description

Sacramento Power Authority (SPA) is a cogeneration plant which generates electricity for the Sacramento Municipal Utility District (SMUD) and is also capable of supplying process steam to a steam host. The cogeneration plant consists of a combined cycle unit, its associated emission control equipment and a cooling tower. This facility is a major source of NOx

The plant consists of the following NOx emission units:

- Combined cycle gas turbine (1): The combined cycle turbine is rated at 103 MW and is fired with natural gas. NOx is emitted from the combustion process. The turbine is subject to emission limits under Rule 413.
- Heat recovery steam generator (1): The heat recovery steam generator incorporates a 200 mmBtu/hr duct burner system to produce steam from the hot turbine exhaust gas. NOx is produced from the combustion process. The duct burners fire into the hot turbine exhaust, forming a combined exhaust that is subject to emission limits under Rule 413.

Note: The emissions of each unit described above are limited by local permits, regardless of whether they are subject to rule-based emission limits. Best Available Control Technology has been applied under New Source Review, where applicable.

RACT Discussion

The emission units at Sacramento Power Authority that are subject to SIP-approved rules are shown in the table below. The rule has been demonstrated to satisfy RACT in Appendix D.

Source Category	Applicable Rules
Gas Turbines	413

There is no EPA guidance on RACT that is applicable to the duct burners. There are, however, two New Source Performance Standards (NSPSs) that apply to duct burners in combined cycle systems: Subparts Da and Db of 40 CFR Part 60. In each of these subparts, the NOx standard for duct burners is 0.2 lb/mmBtu, which is equivalent to approximately 55 ppmv @15% O_2.

The duct burners fire into the hot turbine exhaust, and their emissions are therefore combined with the emissions from the turbines upstream of the emission controls. It is not feasible to operate the duct burners without operating the turbines. Therefore, the emissions from the duct burners are also subject to the NOx limit of Rule 413, 9 ppmv @ 15% O_2. This level of control satisfies the requirements of RACT for this source type.

Conclusion

The RACT requirements have been satisfied for the gas turbine because it is subject to a SIP-approved rule that has been determined to satisfy RACT. Because the emissions from the duct burners cannot be separated from those of the turbine, they are also limited by a SIP-approved rule.

The RACT requirement is satisfied for Sacramento Power Authority.

Major Source: SFPP, L.P. Bradshaw Terminal

VOC Emissions: Major Source
NOx Emissions: Non-Major Source

Facility Description

The SFPP Bradshaw Terminal is a bulk terminal that receives refined fuels via SFPP's 10" pipeline. These fuels are held temporarily in storage tanks and then loaded into tank trucks to resupply surrounding retail gas stations and public/private businesses. Additional product can be transferred by 4" pipeline to the property that was formally Mather Air Force Base but is now a non-military airport. The petroleum products stored and dispensed at Bradshaw Terminal are not owned by SFPP. SFPP only stores and provides tank truck loading equipment for the amount of petroleum products requested by the companies that use its services. The facility is a major source of VOC.

The SFPP Bradshaw Terminal consists of the following VOC emission units:

- Storage tanks, internal floating roof (5): The internal floating roof tanks, ranging in capacity from 193,284 to 1,515,318 gallons, store organic liquid with a vapor pressure greater than 1.5 psia. The tanks are subject to emission limits under Rule 446.
- Storage tanks, external floating roof (6): The external floating roof tanks, ranging in capacity from 547,092 to 1,986,390 gallons, store organic liquid with a vapor pressure greater than 1.5 psia. The tanks are subject to emission limits under Rule 446.
- Organic liquid loading racks (3): Three loading racks provide 14 loading spots for gasoline, diesel fuel, transmix, and jet fuel. The loading racks are vented to a vapor recovery system. The loading racks are subject to emission limits under Rule 447.
- Tank truck unloading system (1): The facility has an unloading system that transfers organic liquids from tank trucks into stationary storage tanks. It is equipped with a vapor balance system. The unloading operation is subject to emission limits under Rule 448.

Note: The emissions of each unit described above are limited by local permits, regardless of whether they are subject to rule-based emission limits. Best Available Control Technology has been applied under New Source Review, where applicable.

RACT Discussion

All emission units at the SFPP Bradshaw Terminal are subject to SIP-approved rules, as shown in the table below. These rules have been demonstrated to satisfy RACT in Appendix C.

Source Category	Applicable Rules
Organic Liquid Storage Tanks	446
Organic Liquid Loading	447
Tank Truck Unloading	448

Conclusion

All VOC emission units are subject to SIP-approved rules that have been determined to satisfy RACT. The RACT requirement has been satisfied for the SFPP Bradshaw Terminal.

Major Source: Silgan Can Company

VOC Emissions: Major Source
NOx Emissions: Non-Major Source

Facility Description

Silgan Can Company manufactures steel cans for the food canning industry. Silgan produces both two-piece and three-piece cans. The facility is a major source of VOC. The three-piece can manufacturing process no longer produces air pollutant emissions and is exempted from the District's permitting requirements. The two-piece can manufacturing process produces the majority of the facility's emissions.

The two-piece can manufacturing process is also known as the Drawn and Ironed (D and I) can manufacturing process. It begins with the receipt of steel coil stock. The coil is unwound, fed through the lubricator, and finally fed through the cupping press. The formed cups are fed to the bodymakers where, through a punch and ring assembly, the can body is formed by the draw and ironing technique with an integral bottom. Lubrication oils are applied to facilitate the mechanical action and act as a coolant.

Following this operation, the cans enter the trimmer where excess metal around the can rim is removed to give a uniform height to the can body. After trimming, the unfinished can is transported to the washer where the lubricator oils are removed. The can body is then treated by a flow coating application of a water borne enamel. This is referred to as the wash coating. After the wash coating, the enameled can body enters the wash coat oven.

After the oven, the can body goes to the flanger where the rim of the can body is flanged. The can then goes to the beader where concentric rings are impressed on the side wall of the can. The can body is then passed to the test area to approve the integrity of the container.

The next step of the process is to apply a water-borne enamel to the inside of the can body. This coating is similar in composition to the washcoat enamel. This coating is applied in an enclosed machine, where overspray and solvent flash-off is captured and ducted to the thermal oxidizer. The cans are then conveyed in a covered conveyor to the inside bake oven. Both ovens, the spray machine manifold, and the covered conveyor are vented to the thermal oxidizer.

Silgan Can Company consists of the following emission units:

- Drawn and Ironed Can Manufacturing Process consisting of:
  - Various bodymaking equipment
  - Washcoat application equipment
  - Inside spray coating equipment (vented to thermal oxidizer)

  This process is subject to emission limits under Rule 452.

- Natural Gas-Fired Washcoat Oven with a rated heat input of 6.4 mmBtu/hr (vented to thermal oxidizer). NOx RACT is not required because Silgan is not a major source of NOx.
- Natural Gas-Fired Inside Bake Oven with a rated heat input of 14 mmBtu/hr (vented to thermal oxidizer). NOx RACT is not required because Silgan is not a major source of NOx.
- Thermal Oxidizer with a rated heat input of 4.8 mmBtu/hr. The oxidizer reduces VOC from the coating operation. NOx RACT is not required, both because Silgan is not a major source of NOx and because RACT is not applicable to secondary pollutant emissions from control devices.

Note: The emissions of each unit described above are limited by local permits, regardless of whether they are subject to rule-based emission limits. Best Available Control Technology has been applied under New Source Review, where applicable.

RACT Discussion

All VOC emission units at Silgan are subject to SIP-approved rules, as shown in the table below. These rules have been demonstrated to satisfy RACT in Appendix C.

Source Category	Applicable Rules
Can Coating	452

Conclusion

All VOC emission units are subject to SIP-approved rules that have been determined to satisfy RACT. The RACT requirement has been satisfied for Silgan.

Major Source: University of California, Davis Medical Center

VOC Emissions: Major Source
NOx Emissions: Major Source

Facility Description

The University of California, Davis (UC Davis) operates the UC Davis Medical Center in Sacramento. The UC Davis Medical Center is a health care provider for the community and a teaching hospital for the UC Davis School of Medicine. The facility is a major source of both VOC and NOx.

The facility consists of the following VOC and/or NOx emission units:

- Gas turbine (1): An on-site cogeneration plant includes a gas turbine with an input capacity of 260 mmBtu/hr (approximately 26 MW). The turbine is fired on natural gas and provides electrical power to the facility. Heat from the hot turbine exhaust is used to produce steam for the facility. VOC and NOx are emitted in the turbine exhaust. The turbine is subject to NOx emission limits under Rule 413.
- Large boilers (4): Four natural gas-fired boilers, rated at 31.5 mmBtu/hr each, provide steam when the gas turbine capacity is exceeded or the gas turbine is out of service. Boilers emit NOx and VOC and are subject to Rule 411. The four large boilers are subject to emission limits under Rule 411.
- Small boilers (8): Eight natural gas-fired boilers, rated at 0.4 mmBtu/hr each, are used for hot water heating. Boilers emit NOx and VOC. The small boilers are not subject to Rule 411 because they are rated less than 1 mmBtu/hr each. Rule 414 applies to units less than 1 mmBtu/hr, but it is a “point-of-sale” rule that does not apply to existing units.
- Emergency standby diesel engines (7): The seven emergency standby engines drive emergency electrical generators and range in size from 890 to 2,876 horsepower. IC engines emit VOC and NOx and are subject to Rule 412. The engines are designated for emergency use, and are limited by permit to either 40 or 50 hours of operation per year for maintenance purposes and either 200 or 750 hours of operation per year including both maintenance and emergency use. They are exempt from emissions limits because they operate no more than 100 hours per year for maintenance purposes.
- Gasoline dispensing facility (1): The gasoline dispensing facility emits VOC. The dispensing operation is subject to emission limits under Rule 448 and 449 and is equipped with Phase I and Phase II vapor recovery systems for VOC control.

Note: The emissions of each unit described above are limited by local permits, regardless of whether they are subject to rule-based emission limits. Best Available Control Technology has been applied under New Source Review, where applicable.

RACT Discussion

The emission units at UC Davis Medical Center that are subject to SIP-approved rules are shown in the table below. These rules have been demonstrated to satisfy RACT in Appendices C and D.

Source Category	Applicable Rules
Boilers	411
IC Engines	412
Gas Turbines	413
Gasoline Dispensing Facility	448, 449

Rule 411 does not directly limit the emissions of VOC from boilers and process heaters. VOC emissions limits are not specified in the rules of other nonattainment areas, California BACT determinations, or in the guidance reviewed. Some determinations in EPA's RACT/BACTLAER Clearinghouse set VOC emission limits that are based on good combustion practices. Rule 411 sets CO emission limits that ensure efficient fuel combustion for boilers and process heaters.

The gas turbine at the facility is equipped with an oxidation catalyst to control CO and VOC emissions. However, Rule 413 does not limit the emissions of VOC from gas turbines. VOC emissions limits are not specified in the rules of other nonattainment areas or in the guidance reviewed. Some BACT determinations in ARB's BACT Clearinghouse and in EPA's RACT/BACTLAER Clearinghouse set VOC emission limits that are based on control with oxidation catalysts. However, these determinations have been made in conjunction with BACT limits for CO emissions, for which oxidation catalysts are cost effective controls. For the control of VOC emissions, oxidation catalysts are not cost effective and Staff does not consider them to be RACT for VOC.

The eight 0.4 mmBtu/hr boilers are exempt from the requirements of Rule 411 because they have heat input ratings less than 1 mmBtu/hr. No California district or other nonattainment area rules reviewed have a rule requirement applicable to existing boilers of this size, and there is no federal guidance for such controls. Staff is not aware of any cost effective controls for existing boilers of this size. If these boilers are replaced in the future, District Rule 414 – Water Heaters, Boilers and Process Heaters Rated Less than 1,000,000 Btu per Hour, will require the replacement units to meet the NOx emissions standards at the time they are purchased and installed.

Conclusion

The RACT requirements for NOx have been satisfied for the gas turbine, boilers, and emergency standby engines at the UC Davis Medical Center, because all emission units are subject to or exempt from SIP-approved rules that have been determined to satisfy RACT for NOx.

The RACT requirement for VOC has been satisfied for the gasoline dispensing facility and engines because they are subject to SIP-approved rules that have been determined to satisfy RACT for VOC. There are no applicable RACT controls for VOC emissions from the gas-fired boilers and turbine.

The RACT requirement is satisfied for the UC Davis Medical Center.