

**ECONOMIC ANALYSIS**

**Rule Citation Number:** 15A NCAC 02D .0902, Applicability, 15A NCAC 02D .0909, Compliance Schedules for Sources in Nonattainment Areas, 02D .0951 RACT For Sources of Volatile Organic Compounds, 15A NCAC 02Q .0102 Activities Exempted From Permit Requirements.

**Rule Topic:** Applicability and Compliance for Sources in Nonattainment Areas (484)

**DENR Division:** Division of Air Quality

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**Impact Summary:**

State government:	No
Local government:	No
Substantial impact:	No
Federal government:	No

**Authority:** G.S. 143-215.3(a)(1); 143-215.107(a)(5);

**Necessity:** These amendments are necessary to meet EPA requirements for redesignation of the Charlotte-Gastonia-Rock Hill Area for attainment of the 1997 8-hour ozone standard and to receive EPA approval for the State Implementation Plan (SIP).

**I. EXECUTIVE SUMMARY**

These proposed rule amendments respond to Environmental Protection Agency (EPA) comments on North Carolina’s redesignation demonstration and maintenance plan for the Charlotte-Gastonia-Rock Hill, NC 8-hour Ozone Nonattainment Area. In their comments on North Carolina’s submittal, EPA identified the need for an adjustment of applicability of the state’s reasonably available control technology (RACT) rules. Section 182(b)(2) of the Clean Air Act (CAA) requires RACT for all sources addressed by Control Technique Guidelines (CTGs) issued by EPA in areas classified as moderate nonattainment for ozone. North Carolina’s current RACT rule, 02D .0902, applies only to facilities that have the potential to emit (PTE) greater than or equal to 100 tons of volatile organic compounds (VOC) per year

located in the Charlotte-Gastonia-Rock Hill, NC 8-hour Moderate Ozone Nonattainment Area. The proposed amendments bring North Carolina into compliance with federal law by extending this applicability to all VOC sources covered by any CTG in the nonattainment area. This proposal also amends rule 02D .0909 to clarify compliance schedules for the newly affected facilities, makes conforming changes to 02D .0951, and a corresponding update to related language in 02Q .0102.

It is anticipated that EPA will approve the redesignation request and maintenance plan once the proposed applicability change has been made. Upon approval of the maintenance plan and redesignation request, EPA will publish a notice in the Federal Register designating the area as attainment for the 1997 ozone standard. Without this designation, the state's SIP plan may not be approved and businesses in the nonattainment area will still be required to undergo New Source Review (NSR) for moderate nonattainment areas. In extreme circumstances, failure to adopt these rules could lead to more federal regulation and eventually potential sanctions on highway transportation funding.

If redesignation occurs prior to the compliance date of the amendments, the proposed rule changes will apply only under the contingency plan and would become applicable only if: (1) the area later fails to meet the 1997 standard and (2) implementation of the proposed amendments would assist in bringing the area back into attainment as part of the contingency plan. This important administrative correction fixes the SIP inadequacy and would generate zero economic impacts. Based on current knowledge of the federal approval procedures, this is the most probable outcome.

The impacts estimated in this analysis were developed for a worst case scenario that is detailed in the risk analysis section. Although such impacts could be substantial, they are highly unlikely and not expected to occur.

Under the worst case scenario, DAQ estimates that private industry will have approximately \$1.4 million in one-time equipment costs and between \$5.9 and \$6.9 million recurring annual costs for compliance. In addition, these costs will be eclipsed by an annual cost savings to private industry of approximately \$15.9 million each year. Local government costs would be between \$9,733 and \$38,949 each year. The federal facility will expend between \$913 and \$3,652 to comply with these new regulations. The North Carolina Division of Air Quality will not experience new costs or benefits associated with these proposed rule changes.

All of the estimates in this analysis were made using worst case scenario assumptions that: (1) all VOC emissions from affected facilities are coming only from sources of VOC emissions covered by control techniques guidelines (CTG), (2) all affected facilities are currently not meeting RACT requirements, (3) EPA does not re-designate the area to attainment status prior to the compliance date, and (4) there is a violation of the 1997 Ozone Standard. In reality, DAQ expects compliance costs to be much lower because many facilities may already be meeting RACT requirements or not have emissions covered by CTG. In addition,

the current section .0900 provides a couple of simple, low-cost options for facilities that would need to achieve compliance with these new RACT requirements.

The anticipated effective date of these amendments is May 2013.

## II. BACKGROUND AND PURPOSE

The purpose of these amendments is to revise the applicability of the VOC RACT rules to meet all Clean Air Act and EPA requirements for redesignation of the Charlotte-Gastonia-Rock Hill Area for attainment of the 1997 8-hour ozone NAAQS to finalize NC SIP (State Implementation Plan) approval by EPA.

On November 15, 2011, EPA determined that the Charlotte-Gastonia-Rock Hill, NC 8-hour Moderate Ozone Nonattainment Area had attained the 1997 8-hour ozone standard. This determination (known as a Clean Data Determination) was based upon complete, quality-assured, quality controlled, and certified ambient air monitoring data from 2008–2010. This determination means the Division could request that EPA change its designation from nonattainment to attainment, making the area a maintenance area. In order for EPA to approve the Division of Air Quality's request for this area to be re-designated as attainment and thus a maintenance area, the state must amend the current rules to extend applicability of the RACT rules to facilities in CTG categories with less than 100 tons per year of VOC emissions. Under EPA procedures, once North Carolina makes the proposed rule changes the Charlotte area can be re-designated attainment for the 1997 8-hour ozone standard.

A "nonattainment" classification means that air quality in a particular region does not meet (or "attain") a federal air quality standard. Under the Clean Air Act, the EPA sets limits on how much pollution can be in the air. These pollution limits are called National Ambient Air Quality Standards (NAAQS). There are NAAQS for six common air pollutants including ground-level ozone (O<sub>3</sub>).

Ground level ozone, which we breathe, can harm our health. Even relatively low levels of ozone can cause health effects. People with lung disease, children, older adults, and people who are active outdoors may be particularly sensitive to ozone.

The Clean Air Act requires EPA to review its standards based on scientific evidence every five years to ensure they still effectively protect human health and the environment. When an area's monitored air pollution exceeds the NAAQS, EPA designates it as a nonattainment area. This designation is determined by a formula that uses the number of times the standard is exceeded each year. The formula includes three years of data to ensure that an area isn't designated as nonattainment because of one unusual year.

When an area is designated nonattainment for the ground level ozone, the state is required to develop a SIP and submit it to EPA. A SIP is a plan for restoring air quality and bringing the area back into attainment status as quickly as possible. The SIP must define what

actions will be taken to control air pollution, how these actions will lead to attainment, and project when air quality will meet the standard. EPA then evaluates the SIP for approval.

If a state doesn't complete a state plan (State Implementation Plan, or SIP) to improve air quality, the EPA may impose a federal plan (Federal Implementation Plan, or FIP). A federal plan may require solutions that are not the best to fit a particular area.

Nonattainment areas that don't clean up their air pollution could receive cuts in federal transportation funding if new highway projects could add to the air pollution problem. EPA could also withhold all or part of the grant funds it provides to the state to support air quality monitoring, planning, and control programs.

Once monitoring data show air quality has improved, the state can request that EPA redesignate an area from nonattainment to attainment making it a maintenance area. A maintenance area is an area that has been redesignated to attainment for a NAAQS. EPA can only approve this request if the following conditions are met: (1) air quality monitoring data shows the area meets the standard; (2) reductions in the area's emissions are permanent and enforceable; (3) the SIP developed for the area meets the requirements of the federal Clean Air Act and is fully approved by EPA; (4) EPA fully approves a 10-year maintenance plan for the area; and (5) the area meets requirements of the Clean Air Act for infrastructure SIPs and nonattainment areas.

North Carolina has already met most of the requirements for EPA approval. Nevertheless, the EPA noted that in order to receive SIP approval DAQ must amend the RACT rule applicability requirements to cover facilities that have PTE of VOC emissions of less than 100 tons per year. This rulemaking is being undertaken to meet the CAA requirement and ensure approval of the state's SIP. There are four proposed changes to Rule 15A NCAC 02D.0902 Applicability for Sources in Nonattainment Areas:

1. The first set of changes in Paragraph (f) will extend RACT to apply to all sources addressed by CTGs in the Charlotte-Gastonia nonattainment area. The phrase "Except as provided in Paragraph (e) of this Rule," is included to clarify the provision that certain rules continue to apply statewide. The amendments to Rule 15A NCAC 02D .0902 would replace the phrases "with the potential to emit greater than or equal to 100 tons of volatile organic compounds per year" by "subject to Section 182(b)(2) of Clean Air Act with potential to emit 100 or more tons per year of VOC and to facilities with potential to emit less than 100 tons per year of volatile organic compounds in categories for which the United States Environmental Protection Agency has issued Control Technique Guidelines" in Paragraph (f). A statement is added to the end of Paragraph (f) clarifying that the applicable requirements are RACT requirements and referencing the rules for achieving compliance. In Paragraph (g) "subject to this Section before the redesignation to attainment" is replaced by "subject to Paragraph (f) of this Rule that achieved compliance in accordance with Rule .0909 of this Section" and "Facilities with the potential to emit less than 100

- tons of volatile organic compounds per year for which the compliance date in Rule .0909 of this Section has not passed before redesignation of the area to attainment for the 1997 ozone standard shall comply in accordance with Paragraph (h) of the Rule” in Paragraph (g) is added to define the range of applicable facilities in accordance with Section 182(b)(2) of the Clean Air Act and allow for transition of the requirements to contingency measures upon redesignation of the area consistent with EPA procedures.
2. This proposal would remove outdated language in Paragraph (h) to address a past potential scenario under which the area might have been bumped to a higher classification with a lower applicability threshold. Replacement language will address the contingency plan in the event that a violation of the 1997 ozone standard occurs. The phrase “If EPA reclassifies the nonattainment area as serious for ozone under Section 182 of the federal Clean Air Act, the rules in this Section shall apply to facilities in Cabarrus, Gaston, Lincoln, Mecklenburg, Rowan, and Union Counties and Davidson and Coddle Creek townships in Iredell County with the potential to emit at least 50 tons of volatile organic compounds per year. Within 60 days of the reclassification...” and the phrase “shall notice the applicability of these Rules to these facilities in the North Carolina Register and..” are replaced by “If a violation of the 1997 ambient air quality standard for ozone occurs in” the “maintenance “area, the Director shall initiate technical analysis to determine the control measures needed to attain and maintain the 1997 8-hour ambient air quality standard for ozone. By the following May 1, the Director shall implement the specific stationary source control measures contained in this Section that are required as part of the control strategy necessary to bring the area into compliance and to maintain compliance with the 1997 8-hour ambient air quality standard for ozone. The Director shall implement the rules in this Section identified as being necessary by the analysis by notice in the North Carolina Register. The notice shall identify the rules that are to be implemented and shall identify whether the rules implemented are to apply in the areas listed in Paragraph (f) of this Rule. At least one week before the scheduled publication date of the North Carolina Register containing the Director's notice implementing rules in this Section,” in Paragraph (h) to specify measures required by the CAA in case a violation of the 1997 ambient air quality standard for ozone would occur.
  3. The third group of the proposed changes makes several minor clarifications by adding the phrase “to facilities located” in Paragraph (e) and the word “located” in Paragraph (f).
  4. Finally, adding the phrase “unless provisions specified in Paragraph (d)(1) of this Rule are applied” in Paragraph (c) clarifies interaction of Paragraphs (c) and the exceptions in Paragraph (d) that exempt laboratories that emit less than 800 pounds of VOC per month from provisions of the Section.

There also are five changes to Rule 15A NCAC 02D .0909, Compliance Schedules for Sources in Nonattainment Areas:

1. First, a change would add the word “Moderate” in Paragraph (d), (f) and (g) and delete the phrase “and Charlotte ozone nonattainment area” in Paragraphs (f) and (g) to define the status of the nonattainment area in accordance with the current 8-Hour Ozone Classifications for the 1997 standard.
2. Subparagraphs (i) and (ii) in Paragraphs (c)(2)(B) and (d)(2)(B) are deleted as unnecessary because rules in Section .0900 that were amended in 2010 have already incorporated EPA CTG recommendations on VOC content limits.
3. Paragraph (c)(2)(C) is amended to allow two years for achieving compliance if low solvent coating technology is to be used.
4. Paragraph (d)(1)(C) and (D) are modified to reflect the compliance schedule for the newly affected facilities establishing a compliance date of May 1, 2015 for compliance via use of solvent coating technology and May 1, 2016 for compliance via control devices.
5. Finally, these proposed rule changes also make several minor clarifications to avoid ambiguity and confusion.

In addition, the amendment to Paragraph 2D .0902(h) clarifies that compliance with necessary contingency requirements will be initiated only after a violation of the 1997 ambient air quality standard for ozone occurs and the measures are determined to be necessary as part of the control strategy to bring the area into compliance and maintain compliance with the 1997 ozone standard.

Amendments to Rule 15A NCAC 02D .0951, RACT for Sources of Volatile Organic Compounds, give affected facilities covered by CTG recommended RACT rules of the Section .0900 a choice whether to apply the RACT requirements defined in .0900 Section rules or choose RACT requirements demonstrated to the Director to advance attainment.

Finally, Rule 15A NCAC 02Q .0102, Activities Exempted from Permit Requirements. Paragraph (b)(5) of the Rule 02Q .0102 is updated by replacing the old location of the nonattainment area which was limited to Mecklenburg County only with the defined moderate nonattainment area as designated in the Rule 15A NCAC 02D .0902(f)(1) through (7).

### III. COSTS IMPACTS BY AFFECTED PARTIES

If (1) the maintenance area later fails to meet the 1997 standard and (2) the Division of Air Quality Director implements the proposed amendments as part of the contingency plan to

bring the area back into attainment, there would be potential impacts. This scenario is highly unlikely because the air monitoring during the last three years has consistently shown compliance with the 1997 air quality standard for ozone. In addition North Carolina, like most of the southeastern United States, is in what is known as a “NOx (nitrogen oxides)-limited” environment with respect to the formation of ground level ozone. Ozone is formed through the photochemical reaction of VOCs , NOx and sunlight in the atmosphere. North Carolina has a large amount of biogenic VOCs emitted from trees and other living sources. Industrial and government facilities are smaller sources of VOC emissions that contribute to formation of atmospheric ozone. The amount of NOx available in the atmosphere is far less than needed to react with the abundance of VOC in the atmosphere and as a result is the limiting factor in how much ozone forms. As such, the Director would be unlikely to invoke the proposed amendments as part of the contingency plan because they would have little impact on ozone reduction. These estimates were developed to demonstrate a worst case scenario. In reality, the expected cost to these entities is zero.

The proposed amendments to Rules 15A NCAC 02D .0902, Applicability, 15A NCAC 02D .0909, Compliance Schedules for Sources in Nonattainment Areas, Rule 15A NCAC 02D .0951, RACT for Sources of Volatile Organic Compounds and Rule 15A NCAC 02Q .0102, Activities Exempted from Permit Requirements, have the potential to affect five entities: regulated private facilities, facilities operated by local governments, a federal facility, the regulatory programs that oversee this area and the general public. The costs and benefits are presented below, organized by entity.

We adjusted EPA values from 2005 to current dollars by using the producer price index for inflating values since these chemicals are inputs to industrial processes

The current version of the rules 02D .0902, .0909, .0951, and 02Q .0102 serve as the baseline for these proposed amendments. Under this version all facilities with potential to emit less than 100 tpy of VOC emissions located in the Charlotte-Gastonia-Rock Hill 1997 8-hour ozone area are not subject to RACT requirements and are subject to work practice requirements under Rule 02D .0958 rule. The current versions of the rules 02D .0902, .0909, .0951, and 02Q .0102 also include older language relative to 1-hour ozone NAAQS requirements that has become outdated due to revocation of that standard.

#### Private Industry

The regulated community includes the owners or operators of approximately 150 facilities with potential to emit 100 tpy or less of VOC emissions located in the Charlotte-Gastonia-Rock Hill ozone area and covered by CTG documents. The Division of Air Quality estimates that more than 95 percent of the affected businesses are small businesses, or facilities with 500 or fewer employees. This estimation was made using the database presented at [www.referenceusa.gov](http://www.referenceusa.gov).

The proposed changes to the Rule .0902 will make facilities with the potential to emit VOC emissions less than 100 tpy located in the 8-hour Charlotte-Gastonia-Rock Hill ozone area

subject to the RACT requirements for sources in categories covered by CTGs. These requirements are established in rules .0909, .0918, .0919, .0922, .0923-.0924, .0930, .0931, .0935, .0937, .0943, .0944, .0947-.0949, .0951, .0952, .0959, .0961-.0968.

These rules have established requirements for achieving RACT by offering two alternatives: either by using materials with VOC content that is low enough to achieve the limits during application, or by reducing the amount of VOC emitted through the use of add-on controls. EPA noted in the CTGs' recommendations that pollution prevention, including product substitution/reformulation, is the most prevalent control technique being used by facilities subject to RACT requirements. Add-on control systems are available to these facilities, but EPA estimated during the development of the 2002 National Emission Standards for Hazardous Air Pollutants (NESHAP), that only a few facilities would install add-on control devices as a result of the standard. The capital cost and annual operation cost of add-on control devices usually make them less desirable than other compliance options for reducing VOC emissions from spray coating operations.<sup>1</sup>

Rule 02D .0902 also includes provisions that allow the requirements to be shifted to contingency measures upon redesignation of the area to attainment status.

The proposed changes to the Rule 02D .0909 will update language to better reflect the 1997 nonattainment area consistent with updates to the applicability rule and establish a compliance schedule for the newly affected sources.

The amendments to Rule 15A NCAC 02D .0951, RACT for Sources of Volatile Organic Compounds give affected facilities covered by CTG recommended RACT rules of Section .0900 a choice whether to apply the RACT requirements defined in .0900 Section rules or choose RACT requirements demonstrated to the Director to advance attainment.

The proposed changes to the Rule 02Q .0102 are of technical cross-reference correction nature. They correct the description of the nonattainment area for consistency with applicability in 02D .0902 and have no effect on cost estimation.

This cost analysis is based on EPA's control techniques guidelines (CTGs) published between 2006 and 2008. EPA noted that to develop these recommendations, it conducted a model plant analysis, in which it evaluated hazardous air pollutant (HAP) emissions associated with different kinds of coating processes, the emission reduction capabilities of various control options, and the costs of such controls. The model plants were developed to represent a range of sizes and emissions. EPA figures were reported using 2005 dollars. In this analysis, all EPA figures have been inflated into 2012 dollars using the Bureau of Labor Statistics' Producer Price Index for total manufacturing industries. This index inflated original 2005 figures by 38.3 percent.

The following assumptions were used to develop an algorithm of cost estimation for the

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1 ([Control Techniques Guidelines for Large Appliance Coatings](#)). [EPA 453/R-07-004, 2007/09](#)

facilities that could be affected by these changes in the event that the area is not redesignated prior to the proposed compliance date:

1. All VOC emissions of affected facilities are only from sources covered by control techniques guidelines (CTG).
2. DAQ assumes that the overwhelming majority of the affected facilities are most likely to choose the low-VOC materials alternative to implement the levels of control required by these rule changes. This assumption was made for two reasons. First, EPA's final rule "Approval and Promulgation of Implementation Plans and Designations of Areas for Air Quality Planning Purposes; Charlotte- Gastonia-Rock Hill, NC and SC; Determination of Attainment of the 1997 8-Hour Ozone Standard" published in 40 CFR Part 52 on November 15, 2011,<sup>2</sup> indicates that the 1997 8-hour ozone National Ambient Air Quality Standards (NAAQS) has been achieved without add-on control installation. Secondly, according to EPA calculations, the cost of low VOC content material is not significantly greater than the cost of materials with higher VOC contents. Thirdly, the use of add-on controls to reduce emissions from typical application processes is a more costly alternative.
3. Due to the fact that the current rules do not require any VOC reductions from the newly affected facilities, DAQ makes an assumption that the facilities have to reduce VOC emissions by 81 percent to comply with the RACT requirements.<sup>3</sup>
4. DAQ made a logical assumption that the facilities located in Mecklenburg County use the same VOC content material for similar production units as the facilities located in Mooresville Region.

Emission reductions are calculated separately for each type of operations: (1) industrial cleaning solvents; (2) coating and adhesive units; (3) lithographic printing and letterpress printing units; and (4) flexible printing units in accordance with EPA recommendations. All costs are calculated as the difference between cost of compliance with current rule requirements and a projected cost of compliance with the RACT requirements. Current rules require these facilities to maintain certain working standards to minimize VOC emissions. However, there are no limits required to maintain certain VOC content in material or VOC emissions for the newly affected facilities.

***Cost estimation for the facilities with the Industrial Cleaning Solvents.***

The number of the facilities with the industrial cleaning solvents affected by these amendments is calculated by using EPA data published in Control Techniques Guidelines for Industrial Cleaning Solvents, Appendix D.<sup>4</sup>

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<sup>2</sup> [Approval and Promulgation of Implementation Plans and Designations of Areas for Air Quality Planning Purposes; Charlotte- Gastonia-Rock Hill, NC and SC; Determination of Attainment of the 1997 8-Hour Ozone Standard](#)

<sup>3</sup> [May 18, 2006 Note Subject: RACT Qs & As](#)

<sup>4</sup> [Control Techniques Guidelines for Industrial Cleaning Solvents.](#)

According to this data, there are 154 facilities located in the 8-hour Charlotte-Gastonia-Rock Hill ozone area having a total 12,013Mg/yr (13,242 ton/yr) baseline level of VOC emissions from solvent utilization during cleaning operations. This number includes 15 facilities that have potential to emit 100 tons or more VOC emissions per year (total actual 2010 emissions of 1148 ton/yr) which already have been in compliance with the RACT requirements since 2010 when the compliance with these requirements became effective for such facilities. Thus, only 139 facilities with a total of 12,094 tons/yr of VOC emissions from solvent utilization during cleaning operations still need to comply with RACT requirements. These facilities are the subject of these cost estimations.

In accordance with EPA methodology, DAQ did not include in this analysis cleaning solvent emissions from CAA Section 183(e) sources; cleaning solvent emissions from research and development facilities; emissions from manufacturing and assembly of electrical and electronic components; and emissions from activities that are covered by provisions of other rules.

To estimate the cost of compliance, DAQ used EPA's assumption that eight percent of all industrial cleaning VOC emissions come from a "degreasing" or cold solvent cleaning/stripping classification and the remaining 92 percent comes from other solvent cleaning operations.

The American Coatings Association (ACA) estimated that facilities currently use solvents with an average VOC concentration of 500 gram/liter (4 lb/gal) for industrial cleaning operations. The RACT requirements limit VOC concentration to 50 grams of VOC per liter (0.421b/gal) of cleaning material. DAQ estimated baseline emissions and emission reductions from parts cleaners and other solvent cleaning operations by using EPA's figures presented in Control Techniques Guidelines for Industrial Cleaning Solvents<sup>4</sup>.

#### Parts Cleaners

The total VOC Emissions from Parts Cleaners used by the facilities with less than 100 tpy potential VOC emissions located in the 8-hour Charlotte-Gastonia-Rock Hill ozone area are equal to eight percent of all VOC emissions from cleaning operations:

$$12,094\text{tons/yr} \times 8\% = 968 \text{ tons/yr}$$

In accordance with ACA information, the average VOC concentration (density) of the solvents used by these facilities is 500 g/liter. After the replacement of the organic solvent that these facilities are currently using with a cleaning solution that has 50 g/liter VOC content (concentration) the VOC emissions would be as follows:

$$968 \text{ tons/yr} * (50 \text{ g/liter}/500 \text{ g/liter}) = 96.8 \text{ tons/yr}$$

The actual emission reduction from switching to low content VOC material is:

$$968 \text{ tons/yr} - 96.8 \text{ tons/yr} = 871.2 \text{ tons/yr}$$

Using the EPA assumption that reduction of each ton of VOC emissions costs on average \$2,301 the cost of switching to low VOC content solvents for parts cleaners is:

$$\$2,301/\text{ton reduced} * 871.2 \text{ tons/yr} = \$2,004,631$$

2. Other Solvent Cleaning Operations

Other solvent cleaning operations is the method of cleaning a surface by physically rubbing it with a material such as a rag, paper, sponge or a cotton swab moistened with a solvent. The total VOC emissions from other solvent cleaning operations used by these facilities are equal to 100% - 8% = 92% of all VOC emissions from cleaning operations:

$$12,094 \text{ tons/yr} * 92\% = 11,126.5 \text{ tons/yr}$$

In accordance with the ACA information, the average VOC concentration (density) of the solvents used by these facilities is 500 g/liter. If we replace the organic solvent that these facilities are currently using with a cleaning solution that has 50 g/liter VOC content (concentration), the controlled emissions would be as follows:

$$11,126.5 \text{ tons/yr} * (50 \text{ g/liter}/500 \text{ g/liter}) = 1,112.6 \text{ tons/yr}$$

The actual emission reduction from switching to low content VOC material is:

$$11,126.5 \text{ tons/yr} - 1,112.6 \text{ tons/yr} = 10,014 \text{ tons/yr}$$

Using the EPA assumption that a reduction of one ton of VOC emissions saves companies - \$1,832.5, the costs of switching to low VOC content solvents for industrial cleaning operations is:

$$-\$1,832.5/\text{ton reduced} * 10,014 \text{ tons/yr} = - \$18,350,405 \text{ (savings)}$$

These savings are derived from the significantly lower cost of recycling material with low VOC content material as opposed to high VOC materials.

In accordance with the ACA information, application of low VOC content material for industrial cleaning will increase the material (acetone) usage by approximately 5 tons/yr. The cost of low VOC content material is \$500 per ton. The final savings are:

$$5 \text{ tons} * \$692 * 139 \text{ facilities} = \$480,593 \text{ per year}$$

Adding all three of these costs and benefits together leads to an industrial cleaning estimate of:

$$\$480,593 + \$2,004,631 - \$18,350,405 = -\$15,865,182$$

These savings are supported by EPA’s study published by the Bay Area AQMD to estimate the cost of compliance for the measures recommended in this CTG<sup>5</sup>. According to these estimates, EPA believes that affected sources may either incur minimal additional costs or realize a savings on a case - by - case basis, depending primarily on facts such as how much they currently spend to operate high-VOC content solvent - based parts cleaners, and the cost of organic solvent disposal. The Bay Area AQMD studies indicate that there is a cost savings associated with replacing high-VOC cleaning materials with low-VOC, water-based cleaning materials.

However, the DAQ industrial cleaning estimate result may differ from estimations that EPA provided as an example in the CTG due to the fact that DAQ used 500 g/liter as the current average VOC concentration (density) of the solvents as provided by American Coating Association (ACA). EPA used 900g/liter in its example.

**Cost estimation for the facilities with the coating, adhesive and printing units.**

The number of facilities affected by the amendments to rule .0902 was estimated by analyzing data provided by Mooresville Regional Office (MRO) and Mecklenburg County Air Quality local program. MRO regulates 77 facilities with total VOC emissions of 636 tons/year and Mecklenburg County has 73 facilities with total actual VOC emissions of 636 tons/year. These facilities were selected from both databases by cross-referencing the following criteria: (1) facilities with VOC emissions more than 15 lb/day (2.74 ton/year) and less than 100 ton/year potential to emit; (2) facilities with the units covered by the CTG.

These facilities are divided in two categories: (1) printing facilities and (2) coating and adhesive facilities, in accordance with EPA recommendations.

Total VOC Emissions from the Affected Facilities Located in Mooresville Region and Mecklenburg County.						
Database	Number of Facilities		Total	Emissions (tpy)		Total Tons per year
	Printing	Coating		Printing	Coating	
Mooresville Region	4	73	77	107	529	636
Mecklenburg	18	55	73	187	449	636
Total	22	128	150	294	978	1,272

Printing facilities consists of twenty one (21) offset lithographic and letterpress printing units and one (1) flexible package printing unit. Coating and adhesive facilities consist of 128 units with different types of coatings, and adhesive applications. Accordingly, there is

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<sup>5</sup> [Control Techniques Guidelines for Industrial Cleaning Solvents](#)

necessarily some uncertainty in material estimation in any prediction of costs and emission impacts associated with the fact that the CTG's recommendations are based on multiple EPA assumptions.

Cost estimation for lithographic printing and letterpress printing units

DAQ has chosen to adopt the CTG's approach to estimate cost of compliance with the RACT requirements for the offset lithographic printing and letterpress printing units. These recommendations are based on EPA model plant analysis in which it evaluated VOC emissions associated with different kinds of printing processes, the VOC emission reduction capabilities of various control options, and the costs of such controls. The model plants were developed to represent a range of sizes and emissions.

Because of the similarities between offset lithographic printing and letterpress printing, in terms of the nature of the processes at issue, the sources of VOC emissions and available control approaches, EPA made an assumption that the cost-effectiveness for control of VOC from heatset inks and control of VOC from cleaning materials apply equally to the letterpress printing industry. Finally, EPA came up with four different numbers for total annual cost of control per facility for four different types of model plants<sup>6</sup>.

To estimate cost of compliance with the RACT requirements for printing facilities located in the 8-hour Charlotte-Gastonia-Rock Hill ozone area, DAQ averaged the costs of four different types of EPA's model plants. The result was estimated as \$248,525.

Printing facilities' population consists of 21 offset lithographic printing and letterpress printing units and one facility with three flexible printing units.

DAQ calculated the total cost for 21 lithographic printing and letterpress printing facilities located in the 1997 8-hour Charlotte-Gastonia-Rock Hill ozone area as:

$$21 \text{ facilities} * \$248,525 = \$5,219,027$$

Cost estimation for flexible printing units

Due to insufficient information about flexible printing units in the database, DAQ has chosen to adopt the EPA recommended algorithm to estimate the cost for the flexible package printing units. The cost is for a fixed bed catalytic oxidizer with 95 percent destruction efficiency likely to be used to control emissions to comply with the RACT requirements at a typical or average facility with individual presses for flexographic printing. EPA estimated the total capital investment (TCI) for the fixed bed catalytic oxidizer as \$471,603 per press<sup>7</sup>. The database indicated that only one facility with three flexible printing units is affected by these amendments. TCI for three presses is:

$$\$471,603 * 3 = \$1,414,809$$

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<sup>6</sup> [Control Techniques Guidelines for Offset Lithographic Printing and Letterpress Printing](#)

<sup>7</sup> [Control Techniques Guidelines for Flexible Package Printing](#)





































