

**SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT**

**Draft Socioeconomic Assessment for  
Proposed Rule 1143—Consumer Paint Thinners and Multi-purpose Solvents**

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## EXECUTIVE SUMMARY

A socioeconomic analysis was conducted to assess the impacts of Proposed Rule 1143—Consumer Paint Thinners and Multipurpose Solvents. A summary of the analysis and findings is presented below.

<b>Elements of Proposed Rule</b>	Proposed Rule (PR) 1143 establishes an interim material VOC limit of 300 grams/liter (g/l), effective January 1, 2010, and a final material VOC limit of 25 g/l, effective January 1, 2011 for consumer paint thinners and multipurpose solvents. Manufacturers and distributors of these products will be required to submit an application to obtain an identification number as well as submit Annual Quantity and Emissions Reports (AQER) to the AQMD. The proposed rule would reduce VOC emissions by 9.75 tons per day by 2011, which is necessary to attain federal PM 2.5 and ozone standards in 2014 and 2024, respectively.
<b>Affected Facilities and Industries</b>	PR 1143 will affect approximately 107 manufacturers and 12 distributors of paint thinners and multipurpose solvents. The manufacturers and distributors belong to the industries of chemical manufacturing [North American Industrial Classification System (NAICS) Code 325] and wholesale trade (NAICS 42). All the users of thinners and solvents under PR 1143 are assumed to be the general public.
<b>Assumptions of Analysis</b>	The cost of PR 1143 is incurred either by consumers as price increases or by manufacturers who will have to reformulate their products to meet the requirement of PR 1143. The analysis herein is based on the final VOC limit of 25 g/l only. Since there are compliant products available currently, the price differences between compliant and non-compliant products are used as additional expenditures by consumers in Scenario A while they are used to approximate the reformulation, testing, and commercialization costs for manufacturers in Scenario B.
<b>Compliance Costs</b>	<p>The average annual total cost of PR 1143 is \$12 million for complying with the final VOC limit. The savings for the interim requirement cannot be quantified. In Scenario A, nearly all of the cost is incurred by consumers except for minor application fees for manufacturers and distributors to obtain an ID number to sell their products. Prices for products will increase by \$3-\$35 per gallon for consumers, which, represents a 14%-66% change from existing prices. However, the majority of the price increases are expected to be \$8 per gallon.</p> <p>In Scenario B, the cost incurred by consumers in Scenario A would now be borne by manufacturers of thinners and solvents, of which \$3 million would be borne by local manufacturers.</p>
<b>Jobs and Other Socioeconomic Impacts</b>	<p>Overall, 154 jobs could be foregone annually, on average, between 2011 and 2025 in the local economy under Scenario A. The retail sector is projected to have the majority of jobs forgone (36 jobs).</p> <p>For Scenario B, a total of 33 jobs could be foregone annually, on average,</p>

	<p>between 2011 and 2025 in the local economy. The chemical manufacturing industry where producers of paint thinners and solvents belong is projected to have five jobs forgone.</p> <p>There would be few impacts on the relative costs of production and the delivery prices in the local economy resulting from the implementation of PR 1143.</p>
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## INTRODUCTION

Proposed Rule (PR) 1143 seeks to reduce emissions of volatile organic compounds (VOCs) by establishing an interim material VOC limit of 300 g/l, effective January 1, 2010, and a final material VOC limit of 25 g/l, effective January 1, 2011 for consumer paint thinners and multi-purpose solvents. Manufacturers and distributors of these products are required to submit an application for an ID number to the AQMD by July 1, 2009. They are also required to submit Annual Quantity and Emissions Reports (AQER) to the AQMD. Staff estimates that VOC emissions will be reduced by 9.75 tons per day by 2011. The socioeconomic assessment herein analyzes the impacts of the proposed rule on affected facilities and the local economy.

## LEGISLATIVE MANDATES

The socioeconomic assessments at the AQMD have evolved over time to reflect the benefits and costs of regulations. The legal mandates directly related to the assessment of the proposed rule include the AQMD Governing Board resolutions and various sections of the California Health & Safety Code (H&SC).

### AQMD Governing Board Resolutions

On March 17, 1989 the AQMD Governing Board adopted a resolution that calls for preparing an economic analysis of each proposed rule for the following elements:

- Affected Industries
- Range of Control Costs
- Cost Effectiveness
- Public Health Benefits

On October 14, 1994, the Board passed a resolution which directed staff to address whether the rules or amendments brought to the Board for adoption are in the order of cost effectiveness as defined in the AQMP. The intent was to bring forth those rules that are cost effective first.

### Health & Safety Code Requirements

The state legislature adopted legislation that reinforces and expands the Governing Board resolutions for socioeconomic assessments. H&SC Sections 40440.8(a) and (b), which became effective on January 1, 1991, require that a socioeconomic analysis be prepared for any proposed rule or rule amendment that *"will significantly affect air quality or emissions limitations."* Specifically, the scope of the analysis should include:

- Type of Affected Industries
- Impact on Employment and the Economy of the district
- Range of Probable Costs, Including Those to Industries
- Emission Reduction Potential

- Necessity of Adopting, Amending or Repealing the Rule in Order to Attain State and Federal Ambient Air Quality Standards
- Availability and Cost Effectiveness of Alternatives to the Rule

Additionally, the AQMD is required to actively consider the socioeconomic impacts of regulations and make a good faith effort to minimize adverse socioeconomic impacts. H&SC Section 40728.5, which became effective on January 1, 1992, requires the AQMD to:

- Examine the type of industries affected, including small businesses; and
- Consider socioeconomic impacts in rule adoption

H&SC Section 40920.6, which became effective on January 1, 1996, requires that incremental cost effectiveness be performed for a proposed rule or amendment setting a Best Available Retrofit Control Technology (BARCT) requirement or a “feasible measure” relating to ozone, carbon monoxide (CO), oxides of sulfur (SO<sub>x</sub>), oxides of nitrogen (NO<sub>x</sub>), and their precursors. Incremental cost effectiveness is defined as the difference in costs divided by the difference in emission reductions between one level of control and the next more stringent control. Please see Section IX of the PR 1143 Staff Report for a detailed assessment of the incremental cost effectiveness.

## **AFFECTED INDUSTRIES**

PR 1143 will affect approximately 107 manufacturers and 12 distributors of consumer paint thinners and multi-purpose solvents, of which 15 manufacturers and four distributors are in the district. The manufacturers and distributors belong to the industries of chemical manufacturing and wholesale trade, respectively. All the users of thinners and solvents under PR 1143 are assumed to be the general public, since professional painting contractors and local stationary sources are already under similar requirements under Rule 1171—Solvent Cleaning Operations.

### **Small Businesses**

The AQMD defines a "small business" in Rule 102 as one which employs 10 or fewer persons and which earns less than \$500,000 in gross annual receipts. In addition to the AQMD's definition of a small business, the federal Small Business Administration (SBA), the federal Clean Air Act Amendments (CAAA) of 1990, and the California Department of Health Services (DHS) also provide definitions of a small business.

The SBA's definition of a small business uses the criteria of gross annual receipts (ranging from \$0.75 million to \$35.5 million), number of employees (ranging from 50 to 1,500), megawatt hours generated (4 million), or assets (\$175 million), depending on industry type (US SBA, 2008). The SBA definitions of small businesses vary by 6-digit North American Industrial Classification System (NAICS) code.

The CAAA classifies a facility as a "small business stationary source" if it: (1) employs 100 or fewer employees, (2) does not emit more than 10 tons per year of either VOC or NO<sub>x</sub>, and (3) is a small business as defined by SBA.

Dun and Bradstreet data on the facilities was available for sales for 15 facilities, and employees for 16 facilities, out of the 19 manufacturers and distributors in the district. Under the AQMD definition of a small business, there are three small businesses. Using the SBA definition of a small business, there are 10 small businesses. Under the CAAA definition of a small business, there are eight small businesses, assuming that all the facilities without the annual emission data emit less than 10 tons of VOC or NOx.

## COMPLIANCE COST

Despite projected savings from complying with the interim (2010-2011) requirement of 300 g/l, the analysis below is based on the final material VOC limit of 25 g/l only, since the savings cannot be quantified.

### Scenario A

The annual average cost of the proposed rule is projected to be \$12.18 million between 2011 and 2025, based on the price differences between products that would comply with PR 1143—compliant products—and those that are currently above the proposed emission limits (Table 1). The compliant products can be reformulated with acetone or other exempt solvents including PCBTF, aqueous-based, or soy based technologies. Table 1 also shows the assumed penetration rates of different compliant products.

Table 1  
Penetration Rates and Additional Costs of Compliant Products

	<b>Acetone</b>	<b>Aqueous</b>	<b>Soy</b>	<b>PCBTF</b>
<b>Penetration</b>	0.5	0.3	0.15	0.05
<b>Price difference (\$/gallon)</b>	\$3.04	\$15.38	\$14.5	\$34.62

Based on a 2003 California Air Resources Board (CARB) survey of paint thinners and multi-purpose solvents, it is estimated that slightly over 1.2 million gallons of currently available high-VOC consumer paint thinners and solvents that are above the proposed emission limits are sold in the district. It is assumed that the usage will be kept at this level for future years because the current emission inventory is based on the 2003 CARB survey and may be updated. Furthermore, the market for solvent-based products has fluctuated, thus making the projection of future usage difficult. The gallon usage, together with the price differences and penetration rates in Table 1, yields an annual additional cost of \$12.18 million to consumers.

PR 1143 also requires manufacturers and distributors of low-VOC consumer paint thinners and multi-purpose solvents to apply for AQMD ID numbers before selling the products. The one-time application fee for obtaining an ID number is \$168.62. The total revenue from the fee is estimated to be \$20066.

Table 2 shows the distribution of the \$12.18 million cost of the proposed rule across affected industries and consumers.

Table 2  
Cost of Proposed Rule 1143 (in millions of dollars)

<b>Affected Industries</b>	<b>2011</b>	<b>Average Annual Cost (2011-2025)</b>
Consumers	\$12.18	\$12.18
Chemical Manufacturing	\$0.0025	\$0.0002
Wholesale Trade	\$0.0007	\$0.00004
<b>Total</b>	<b>\$12.18</b>	<b>\$12.18</b>

### Scenario B

Manufacturers of currently available high-VOC consumer paint thinners and solvents will need to reformulate their products to meet the interim and final VOC requirements of PR 1143. However, the specific reformulation cost is difficult to determine since different manufacturers may utilize different technologies to meet the VOC limits. Because of the availability of compliant products currently, the price differences between compliant and non-compliant products are used as proxies for the reformulation, testing, and commercialization costs. The \$12.18 million cost to consumers under Scenario A will thus be incurred by the manufacturers (in and out of the district) of paint thinners and multi-purpose solvents.

## JOBS AND OTHER SOCIOECONOMIC IMPACTS

The REMI model (version 9.5.26) is used to assess the total socioeconomic impacts of a policy change. The model links the economic activities in the counties of Los Angeles, Orange, Riverside, and San Bernardino. The REMI model for each county is comprised of a five block structure that includes (1) output and demand, (2) labor and capital, (3) population and labor force, (4) wages, prices and costs, and (5) market shares. These five blocks are interrelated. Within each county, producers are made up of 165 private non-farm industries, three government sectors, and a farm sector. Trade flows are captured between sectors and borders as well as across counties and the rest of U.S. Market shares of industries are dependent upon their product prices, access to production inputs, and local infrastructure. The demographic/migration component has 160 ages/gender/race/ethnicity cohorts and captures population changes in births, deaths, and migration.

The assessment here is performed relative to a baseline where there is no adoption of PR 1143. Direct effects of the policy change (the proposed rule) have to be estimated and used as inputs to the REMI model in order for the model to assess secondary and induced impacts for all the actors in the four-county economy on an annual basis and across a user-defined horizon (2011 to 2025). Direct effects of PR 1143 include additional costs to the affected industries and additional sales of materials by local vendors at the county (or finer) level and by industry.



Two different simulation methods reflecting the two scenarios mentioned before are used to examine the total impact of PR 1143 on the entire local economy. Scenario A focuses on the price differentials between lower and higher VOC thinners and solvents that consumers would have to pay and Scenario B uses the differentials to approximate the additional costs of reformulation, testing, and commercialization that manufacturers of thinners and solvents would face.

### Scenario A

The price differentials between lower and higher VOC paint thinners and solvents were modeled as an increase in the consumer price of non-durable expenditures. Also, the ID number application fees would lead to a slight increase in the additional cost of doing business for the chemical manufacturing industry (manufacturers of compliant products) and the wholesale trade sector (distributor of compliant products). There would also be an increase in local government demand (the AQMD) because of the revenue collected from manufacturers and distributors for their ID number applications. However, this amount will be very small, 0.17% of the total cost of PR 1143.

Overall, 154 jobs could be foregone annually, on average, between 2011 and 2025 in the local economy. Table 3 presents the estimated job impact by industry for the proposed rule. All the sectors would incur jobs forgone due to the reduction in purchasing power resulting from the increase in consumer prices. The retail sector is projected to have the majority of jobs forgone. On average, 36 jobs would be foregone from 2011 to 2025 in the retail trade sector.

Table 3  
Job Impacts of PR 1143 (Scenario A)

Industries	2011	2020	Average Annual (2011-2025)
Accommodation & Food Services	-10	-11	-10
Administrative & Waste Management	-8	-9	-9
Arts, Entertainment & Recreation	-2	-2	-2
Chemical Manufacturing	-2	-2	-2
Construction	-10	-12	-13
Educational Services	-3	-4	-4
Finance & Insurance	-5	-5	-5
Health Care & Social Assistance	-11	-17	-16
Information	-2	-2	-2
Management of Companies & Enterprises	-2	-1	-1
Other Manufacturing	-7	-7	-7
Other Services (excl Gov)	-7	-9	-8
Professional & Technical Services	-7	-9	-8
Real Estate, Rental & Leasing	-6	-5	-5
Retail trade	-40	-35	-36
Transportation & Warehousing	-3	-3	-3
Wholesale Trade	-7	-6	-6
Government	-3	-18	-15
<b>Total</b>	<b>-135</b>	<b>-157</b>	<b>-154</b>

There would be few impacts on the relative costs of production and the delivery prices in the local economy resulting from the implementation of PR 1143.

**Scenario B**

In this simulation approach the price differentials between the compliant lower, and the conventional higher-VOC paint thinners and solvents are used to approximate the additional costs of reformulation, testing, and commercialization that manufacturers of the lower VOC products may face under the requirements of PR 1143. For the purpose of this analysis, it is estimated that approximately 25 percent of the 1.2 million gallons total of paint thinners and solvents sold in the basin would be produced in the district. The number of manufacturers located in each county is used to distribute the total local production of thinners and solvents to each county. It is further assumed that 25 percent of the local production cost will be used for reformulation and the rest for testing and commercialization.

Local producers of paint thinners and solvents will increase demand for low-VOC technology in the chemical manufacturing industry needed to reformulate existing products and for product testing and commercialization services provided by the professional and technical services industry. On the other hand, local producers of paint thinners and solvents (part of chemical manufacturing industry) would incur additional costs of doing business for their expenditures.

The ID number application fees would lead to a slight increase in the additional cost of doing business for the chemical manufacturing industry (manufacturers of compliant products) and the wholesale trade sector (distributor of compliant products). There would also be an increase in local government demand (the AQMD) because of the revenue collected from manufacturers and distributors for their ID number applications.

Overall, 33 jobs could be foregone annually, on average, between 2011 and 2025 in the local economy. Table 4 presents the estimated job impact by industry for the proposed rule. Projected job gains in the industries of chemical manufacturing and professional and technical services in 2011 are due to the additional expenditures on low-VOC technology, as well as on testing and commercialization services. Other sectors also show slight job gains in 2011 as the local economy benefits from the additional demand for materials and services used in the reformulation process. Over time, the impact of the additional cost of doing business by the local manufacturers of thinners and solvents outweighs that of the additional demand, thus resulting in overall jobs forgone.

Table 4  
Job Impacts of PR 1143 (Scenario B)

Industries	2011	2020	Average Annual (2011-2025)
Accommodation & Food Services	20	-5	-3
Administrative & Waste Management	28	-4	-2
Arts, Entertainment & Recreation	4	-1	0
Chemical Manufacturing	6	-7	-5
Construction	10	-6	-4
Educational Services	6	-2	-1
Finance & Insurance	9	-2	-1
Health Care & Social Assistance	14	-6	-4
Information	3	-1	-1
Management of Companies & Enterprises	2	-1	-1
Other Manufacturing	7	-4	-2
Other Services (excl Gov)	10	-3	-3
Professional & Technical Services	202	-5	9
Real Estate, Rental & Leasing	11	-3	-2
Retail trade	20	-9	-7
Transportation & Warehousing	5	-2	-1
Wholesale Trade	5	-3	-2
Government	3	-4	-2
<b>Total</b>	<b>365</b>	<b>-66</b>	<b>-33</b>

As with Scenario A, there would be few impacts on the relative costs of production and the delivery prices in the local economy resulting from the implementation of PR 1143.

## **COST EFFECTIVENESS OF ALTERNATIVES TO THE RULE AND PROPOSED CONTROL MEASURES**

Under the California Health and Safety Code, a socioeconomic assessment should include a discussion of “[t]he availability and cost-effectiveness of alternatives to the rule or regulation,” and “the cost effectiveness of available and proposed control measures.” Cal. Health & Safety Code §§ 40440.8(b)(4), 40922(a). The Environmental Assessment for PR 1143 does not identify any alternatives to the proposed rule and, thus, a discussion of such alternatives is not included herein.

### **Cost Effectiveness of Available and Proposed Control Measures**

PR 1143 implements Control Measure CTS-04 from the 2007 Air Quality Management Plan. This rule, if adopted, will affect retail outlets that currently offer for sale high-VOC containing consumer paint thinners and multi-purpose solvents. The consumer will also be affected by the difference in cost of the substitute products used to replace the high-VOC containing solvents. Essentially, the low-VOC substitute consumer paint thinners and cleaners will displace the high-

VOC containing consumer paint thinners and multi-purpose solvents in all the retail outlets in the AQMD jurisdiction.

The AQMD estimates that 1,212,931.5 gallons of high-VOC paint thinners and multi-purpose solvents are sold by retail outlets in the AQMD jurisdiction per year. Based on the estimated 11,891 gallons of solvents that are proposed to meet the exemption in PR 1143, the volume for reformulated products is therefore estimated to be 1,201,040.5 gallons. AQMD staff surveyed prices for the high-VOC paint thinners and multi-purpose solvents, and then averaged the prices for quart size and gallon size containers, the standard size containers sold by the retail outlet stores. AQMD staff also calculated the sales weighted average for the high-VOC containing products and determined a value of 736 g/L of VOC. The average cost for the high-VOC containing products were determined to be,

$$\$7.18 / \text{Quart and } \$18.01 / \text{Gallon}$$

The emissions for one year, based on the 1,201,040.5 gallons estimate, are calculated as,

$$736 \text{ g/L} * (1 \text{ lb/gal}/119.83 \text{ g/L}) * 1,201,040.5 \text{ gal/yr} = 7,376,832.3 \text{ lbs/yr or } 3,688.4 \text{ tons/yr}$$

To determine emissions per day, the factor 365 days/yr is used because the retail outlets offer the high-VOC products for sale 7 days a week,

$$(3,688.4 \text{ tons/yr})/(365 \text{ days/yr}) = 10.1 \text{ tons/day}$$

The new technologies are based on three different chemistries, exempt solvents, exempt solvent based aqueous, and soy based products.

#### ACETONE AND ACETONE-BASED TECHNOLOGY

Acetone is an exempt compound pursuant to District Rule 102 and is considered a zero VOC product. AQMD staff surveyed several acetone products and averaged the prices for quart container and one-gallon container sizes,

$$\$8.44/\text{quart and } \$21.05/\text{gallon}$$

The cost-effectiveness can therefore be calculated for the acetone quart size containers by using,

$$(\$Cost_{Acetone} - \$Cost_{High-VOC})/Qt / (VOC_{High-VOC} - VOC_{Acetone}),$$

$$(\$8.44 - \$7.18)/Qt / (736 \text{ g/L} - 25 \text{ g/L}) =$$

$$(\$8.44 - \$7.18)/Qt / (6.14 \text{ lb/Gal} - 0.21 \text{ lb/Gal}) * (4 \text{ Qt/gal}) = \$0.8494/\text{lb or } \$1,698.80/\text{ton of VOC}$$

$$\{ \text{Note: } 736 \text{ g/L (lb/gal)} / 119.83 \text{ g/l} = 6.14 \text{ lb/gal} \quad \& \quad 25 \text{ g/L (lb/gal)} / 119.83 \text{ g/l} = 0.21 \text{ lb/gal} \}$$

The cost-effectiveness can therefore be calculated for the acetone one-gallon size containers by using,

$$(\$Cost_{Acetone} - \$Cost_{High-VOC})/Gal / (VOC_{High-VOC} - VOC_{Acetone}),$$

$$(\$21.05 - \$18.01)/Gal / (6.14 \text{ lb/Gal} - 0.21 \text{ lb/Gal}) = \$0.5124/\text{lb or } \$1,024.80/\text{ton of VOC}$$

*AQUEOUS BASED CLEANERS*

There are aqueous products that meet the 25 g/L and less VOC limits that are currently available. Staff averaged the prices for quart container and one-gallon container sizes and found,

*\$7.25/quart and \$33.39/gallon*

The cost-effectiveness can therefore be calculated for the aqueous quart size containers by using,

$$(\$Cost_{Aqueous} - \$Cost_{High-VOC})/Qt / (VOC_{High-VOC} - VOC_{Aqueous}),$$

$$(\$7.25 - \$7.18)/Qt / (6.14 \text{ lb/Gal} - 0.21 \text{ lb/Gal}) * (4 \text{ Qt/gal}) = \$0.0472/\text{lb or } \$94.40/\text{ton of VOC}$$

The cost-effectiveness can therefore be calculated for the aqueous one-gallon size containers by using,

$$(\$Cost_{Aqueous} - \$Cost_{High-VOC})/Gal / (VOC_{High-VOC} - VOC_{Aqueous}),$$

$$(\$33.39 - \$18.01)/Gal / (6.14 \text{ lb/Gal} - 0.21 \text{ lb/Gal}) = \$2.5921/\text{lb or } \$5,184.20/\text{ton of VOC}$$

*SOY BASED CLEANERS*

There are soy based products that meet the 25 g/L and less VOC limits that are currently available. Staff averaged the prices for quart container and one-gallon container sizes and found,

*\$9.99/quart and \$32.51/gallon*

The cost-effectiveness can therefore be calculated for soy based quart size containers by using,

$$(\$Cost_{Soy} - \$Cost_{High-VOC})/Qt / (VOC_{High-VOC} - VOC_{Soy}),$$

$$(\$9.99 - \$7.18)/Qt / (6.14 \text{ lb/Gal} - 0.21 \text{ lb/Gal}) * (4 \text{ Qt/gal}) = \$1.8944/\text{lb or } \$3,788.80/\text{ton of VOC}$$

The cost-effectiveness can therefore be calculated for the soy based one-gallon size containers by using,

$$(\$Cost_{Soy} - \$Cost_{High-VOC})/Gal / (VOC_{High-VOC} - VOC_{Soy}),$$

$$(\$32.51 - \$18.01)/Gal / (6.14 \text{ lb/Gal} - 0.21 \text{ lb/Gal}) = \$2.4438/\text{lb or } \$4,887.60/\text{ton of VOC}$$

*PCBTF BASED CLEANERS*

There are PCBTF products that meet the 25 g/L and less VOC limits that are currently available. AQMD staff surveyed several PCBTF products and found several examples with less than 25 g/L of VOC content. Staff averaged the prices for quart container and one-gallon container sizes and found,

*\$16.95/quart and \$52.63/gallon*

The cost-effectiveness can therefore be calculated for PCBTF quart size containers by using,

$$(\$Cost_{PCBTF} - \$Cost_{High-VOC})/Qt / (VOC_{High-VOC} - VOC_{PCBTF}),$$

$$(\$16.95 - \$7.18)/Qt / (6.14 \text{ lb/Gal} - 0.21 \text{ lb/Gal}) * (4 \text{ Qt/gal}) = \$6.5902/\text{lb or } \$13,180.44/\text{ton of VOC}$$

The cost-effectiveness can therefore be calculated for PCBTF one-gallon size containers by using,

$$(\$Cost_{PCBTF} - \$Cost_{High-VOC})/Gal / (VOC_{High-VOC} - VOC_{PCBTF}),$$

$$(\$52.63 - \$18.01)/Gal / (6.14 \text{ lb/Gal} - 0.21 \text{ lb/Gal}) = \$5.8348/\text{lb or } \$11,669.60/\text{ton of VOC}$$

Staff assumes a weighted market penetration for the various technologies and using the cost-effectiveness figures noted above for one-gallon size containers only, the overall cost-effectiveness is as follows:

$$\{(0.50 * \text{Acetone technology}) + (0.30 * \text{Aqueous technology}) + (0.15 * \text{soy based technology}) + (0.05 * \text{PCBTF technology})\},$$

$$\{(\$1,024.80 * 0.50) + (\$5,184.20 * 0.30) + (\$4,887.60 * 0.15) + (\$11,669.60 * 0.05)\}/\text{ton},$$

$$(\$512.40 + 1,555.26 + 733.14 + 583.48)/\text{ton} = \$3,384.28/\text{ton of VOC average}$$

Therefore, the overall cost-effectiveness is estimated to be \$3,384/ton of VOC.

The interim VOC limit of 300 g/l is expected to result in cost savings, since approximately 1/3 of the solvent is used in combination with 2/3 water in an emulsion, compared to conventional products that utilize 100% solvents.

## **RULE ADOPTION RELATIVE TO THE COST EFFECTIVENESS SCHEDULE**

On October 14, 1994, the Governing Board adopted a resolution that requires staff to address whether rules being proposed for adoption are considered in the order of cost effectiveness. The 2007 Air Quality Management Plan (AQMP) ranked, in the order of cost effectiveness, all of the proposed control measures for which costs were quantified. It is generally recommended that the most cost-effective actions be taken first.

PR 1143 implements Control Measure CTS-04 in the 2007 AQMP. Its cost effectiveness was not assessed due to unavailability of cost data at the time. Staff estimates that the overall cost effectiveness of PR 1143 is approximately \$3,384 per ton of VOC, which would have been in the top quarter of the cost effectiveness ranking for stationary and area sources in the 2007 AQMP.

**REFERENCES**

Regional Economic Modeling Inc. (REMI). Policy Insight<sup>®</sup> for the South Coast Region (169 sector model). Version 9.5.26.

South Coast Air Quality Management District (AQMD). Proposed Rule 1143—Consumer Paint Thinners and Multipurpose Solvents, December, 2008.

AQMD. Draft Staff Report for Proposed Rule 1143—Consumer Paint Thinners and Multipurpose Solvents, December, 2008.

AQMD. Rule 1171—Solvent Cleaning Operations, February, 2008.

AQMD. Rule 314—Fees for Architectural Coatings, June 2006.

U.S. Small Business Administration (US SBA). “Small Business Size Standards.” August 2008.