CHAPTER 1. INTRODUCTION

1.A. BACKGROUND

Architectural coatings are products that are applied to stationary structures and their accessories. They include house paints, stains, industrial maintenance coatings, traffic coatings, and many other products. When these coatings are applied, volatile organic compounds (VOCs) are emitted from the coatings and from solvents that are used for thinning and clean-up.

Control of VOC emissions from architectural coatings is primarily the responsibility of the local air pollution control and air quality management districts (APCD/AQMD or district). The Air Resources Board (ARB or Board) is responsible for serving as an oversight agency and providing assistance to the districts. One way that ARB provides assistance is by developing a Suggested Control Measure (SCM) for architectural coatings. The SCM serves as a model rule that can be used by districts throughout California. ARB approved a Suggested Control Measure (SCM) for architectural coatings in 1977 and, as technology advanced, amended it in 1985, 1989, and 2000. While ARB provides support to the districts by developing the SCM, the districts are ultimately responsible for adopting, implementing, and enforcing architectural coating rules in California.

Currently, 20 districts have architectural coating rules based on the SCM that the Board approved in 2000. In addition, the Ozone Transport Commission (OTC), which represents northeastern states, has developed a model rule for architectural coatings based primarily on the 2000 SCM. Environment Canada has also used the 2000 SCM as the basis for Canada's proposed architectural coatings regulation. The U.S. EPA is planning to update its national architectural coatings rule based on the OTC's version of the 2000 SCM.

The proposed SCM (see Appendix A) will update the current version of the SCM (see Appendix B). The proposed SCM lowers the VOC limits and improves definitions for many categories. Staff is also proposing the SCM to promote consistency and uniformity among district rules. This consistency makes it easier for manufacturers and painting contractors to comply with district rules. In this Technical Support Document, staff presents their rationale for the proposed updates to the 2000 SCM.

1.B. WHY REGULATE ARCHITECTURAL COATINGS?

Architectural coatings represent a significant source of VOC emissions throughout California. VOC emissions from architectural coatings can lead to the formation of ozone and particulate matter (PM), two of the most serious air pollutants in California. Ozone is a strong oxidizer that irritates the respiratory system, leading to a variety of adverse health effects. It also damages plant life

and property. Particulate matter less than 10 microns in diameter can be inhaled deep into the lungs. PM exposure has also been associated with a wide range of adverse health impacts, including hospitalization and premature death.

VOC emissions from architectural coatings use in California are estimated to be about 118 tons per day (tpd) on an annual average basis in 2004. This total includes almost 95 tpd emitted directly from coatings and more than 23 tpd from associated cleanup solvents, thinners, and additives. Total emissions from architectural coatings and associated materials represent almost 10% of the total VOC emissions from stationary and area sources, and almost 5% of all VOC emissions statewide. This 118 tpd is more than the combined VOC emissions from petroleum refining and marketing, and is comparable in size to the emissions from approximately 4.2 million passenger cars (ARB, 2005b; ARB, 2007).

California has extreme air quality problems that require unique strategies for meeting federal and State ambient air quality standards. In this section, we provide an overview of these air quality problems and the need for significant emission reductions from all sources of air pollution, including architectural coatings.

1.B.1. Ozone

In the presence of sunlight, VOCs and nitrogen oxides (NO_x) undergo a series of chemical reactions to form ozone. The rate of ozone generation is related closely to the concentration of VOCs in the atmosphere, the types of VOCs that are present, the availability of NO_x, and meteorological conditions (U.S. EPA, 1996; Seinfeld and Pandis, 1998). Ozone is a colorless gas with a pungent odor, and is the chief component of urban smog. It is one of the State's more persistent air quality problems. Air quality data has revealed that 93 percent of Californians, or 35 million people, live in areas designated as nonattainment for the federal 8-hour ozone standard (ARB, 2006a). In addition, California has six of the top ten areas in the United States with the highest levels of ozone (ARB, 2006b).

It is well documented that ozone adversely affects the respiratory functions of humans and animals. In some animal studies, changes to lung structure were observed with long-term exposure to ozone concentrations above ambient; these changes remained even after periods of exposure to clean air (U.S. EPA, 1996; U.S. EPA, 2006). Ozone is a strong irritant that can cause a number of adverse health effects. Human exposure studies show that 6.6- to 8-hour exposures to ozone at 0.08 ppm can induce acute reduction in lung function, airways inflammation, and symptoms of respiratory irritation such as cough and chest tightness, and increased asthma symptoms (ARB, 1997; ARB, 2000; U.S. EPA, 1996; U.S. EPA 2006). Ozone in sufficient doses can also increase the permeability of lung cells, rendering them more susceptible to toxins and

microorganisms. Other health effects that have been associated with ozone exposure include hospitalization for worsening of pre-existing heart and lung diseases, school absences, and premature death (ARB 2005).

Because the majority of ozone exposure occurs outdoors, the greatest risk is to people who are active outdoors during smoggy periods, such as children, athletes, and outdoor workers. Recent evidence also suggests that ozone may be linked to the onset of new asthma in very active children who reside in high ozone communities (McConnell 2002). Based on 2001 – 2003 data, ozone exposure is estimated to be a contributing factor to 630 premature deaths per year in California (ARB, 2005a).

Not only does ozone adversely affect human and animal health, but it also affects vegetation throughout most of California, resulting in reduced yield and quality in agricultural crops, disfiguration or unsatisfactory growth in ornamental vegetation, and damage and death to native plants. During the summer, ozone levels are often highest in the urban centers in Southern California, the San Joaquin Valley, and the Sacramento Valley. These are adjacent to the principal production areas in the State's multibillion-dollar agricultural industry (USDA, 2006). ARB studies indicate that ozone pollution damage to crops is estimated to cost agriculture over $500 million annually (ARB, 1987; ARB, 2006b).

1.B.2. Particulate Matter

VOC emissions from architectural coatings contribute to the formation of particulate matter (PM). PM is a complex mixture of tiny particles that consists of dry solid fragments, solid cores with liquid coatings, and small droplets of liquid. These particles vary greatly in size, shape, and chemical composition, and can be made up of many different materials such as metals, soot, soil, and dust. PM can be emitted directly from sources (e.g., diesel engine exhaust) or can be produced indirectly from sources emitting gases that are converted to PM by atmospheric processes. PM particles that are 10 microns or less in diameter are called "PM_{10}", while particles that are 2.5 microns or less in diameter are called "$PM_{2.5}$". PM, particularly $PM_{2.5}$, contributes significantly to regional haze and reduction of visibility in California. In addition, the acidic portion of PM (nitrates, sulfates) can harm crops, forests, aquatic environments, and other ecosystems (ARB, 2002).

Both PM_{10} and $PM_{2.5}$ can be inhaled deeply into the lungs. Extensive research indicates that exposure to PM is associated with increased risk of: hospitalization for worsening of chronic lung and heart diseases; emergency room and urgent care visits for asthma exacerbation; worsened asthma and bronchitis symptoms; and increased premature death, particularly in elderly people with pre-existing heart and lung disease. Certain populations, including the elderly, people with lung or heart disease, infants, children, and asthmatics, are at increased risk of experiencing adverse effects with exposure to PM. In children, several studies

have shown associations between chronic PM exposure and reduced lung function growth and increased school absenteeism. PM exposure can also lead to increased use of bronchodilator medications in asthmatic children (ARB, 2002).

1.C. AIR QUALITY STANDARDS

To protect California's population from the harmful effects of ozone and PM, the ARB and U.S. EPA have established air quality standards for these contaminants. Most of California's 35 districts are classified as "nonattainment", because they don't comply with State or federal air quality standards for ozone and PM. For nonattainment districts, clean air laws require districts to develop plans to describe how they will attain ambient air quality standards. Appendix C contains a detailed discussion of air quality standards and districts that have been designated as "nonattainment", because they exceed these standards. The California Clean Air Act requires nonattainment districts to prepare and submit plans for attaining and maintaining the State standards. The federal Clean Air Act requires districts to develop state implementation plans (SIPs) if they have not attained federal air quality standards. These SIPs include control measures that explain the districts' plans for adopting new or modified rules to achieve emission reductions.

In many of the nonattainment districts, substantial VOC emission reductions are needed to achieve and maintain air quality standards. Reductions are achieved by implementing rules that target sources of VOC emissions. The proposed SCM for architectural coatings is intended to assist districts by providing a model rule that will reduce VOC emissions and help them attain the ozone and PM standards.

The proposed SCM is primarily intended for the 20 districts that currently have a rule based on the 2000 SCM. In addition, the proposed SCM is intended for districts that may need to adopt a new architectural coating rule to achieve VOC emission reductions and meet air quality standards. The South Coast AQMD is not expected to adopt the proposed SCM because its architectural coatings Rule 1113 includes VOC limits that are, in most cases, at least as stringent as the proposed SCM. The 20 districts with an SCM based rule encompass about 53 percent of California's population, and the South Coast AQMD accounts for 44 percent. The remaining 3 percent of the State's population must comply with the U.S. EPA's national rule for architectural coatings.

Six districts in two federal ozone nonattainment areas included control measures for architectural coatings in their draft or final 2007 Ozone SIPs. These districts are:

- El Dorado AQMD[1]
- Feather River AQMD[1]
- Placer County APCD[1]
- Sacramento Metropolitan AQMD[1]
- San Joaquin Valley Unified APCD[2]
- Yolo-Solano AQMD[1]

1. The Sacramento Federal Ozone Nonattainment Area includes all of Sacramento and Yolo Counties, portions of Placer and El Dorado Counties, eastern Solano County and southern Sutter County.
2. San Joaquin Valley Unified APCD adopted its ozone SIP in April 2007

Table 1-1 lists the 2012 emission reduction commitments for architectural coatings for each of these districts. The numbers in this table represent the districts' goals for emission reductions from architectural coatings. The proposed SCM will help districts surpass these goals by achieving greater reductions than are listed in the districts' SIPs. Chapter 2 contains a discussion of VOC emissions and the expected emission reductions from the proposed SCM.

Table 1-1
2007 Ozone SIP Commitments For VOC Emission Reductions From Architectural Coating Measures

District	Implementation Year	2012 ROG Planning Inventory[2] (tpd)	Emission Reductions in 2012 (tpd)	% Reductions
El Dorado County AQMD[1]	2012	0.38	0.06	16%
Feather River AQMD	Pre-2012	0.02	0.003	15%
Placer County APCD[3]	2013	0.89	0.13	15%
Sacramento Metropolitan AQMD	2012	4.12	0.62	15%
San Joaquin Valley Unified APCD	2012	9.7	2.0	21%
Yolo-Solano County AQMD	2011	0.96	0.14	15%
TOTAL:		**16.1**	**2.95**	**18%**

1. El Dorado County had not yet adopted the 2000 SCM limits at the time that the draft 2007 SIP was developed. Therefore, their SIP Commitment value is actually larger, but for the purpose of this table we are only including the 2007 SCM commitment.
2. The 2012 ROG Planning Inventory is based on ARB's 2001 Architectural Coating Survey and does not reflect the data from ARB's 2005 Architectural Coating Survey that was used to develop the proposed SCM.
3. For Placer County, values represent the 2018 ROG Planning Inventory and the 2018 Emission Reductions.

1.D. ARCHITECTURAL COATINGS REGULATORY HISTORY

1.D.1. ARB's Suggested Control Measure (SCM)

Widespread regulation of emissions from architectural coatings in California began with the approval of the SCM for architectural coatings by the ARB in 1977. Subsequently, many of the districts adopted rules based on this SCM. ARB's SCM was amended in 1985, 1989, and 2000. Many districts adopted or amended their architectural coatings rules after these revisions to the SCM. Districts have also revised their rules independent of changes to the SCM.

Currently, 20 of California's 35 districts have an architectural coatings rule based on the 2000 SCM. The South Coast AQMD has its own architectural coatings rule, Rule 1113. These 20 districts, listed in Table 1-2, encompass about 53% of California's population and the South Coast AQMD accounts for 44%**.** Therefore, 97% of the State's population has an architectural coating rule that is more stringent than the U.S. EPA's National Architectural Coating Rule (See Section 1.D.4). Appendix D lists the current VOC limits for the 2000 SCM, South Coast AQMD Rule 1113, and the U.S. EPA National Rule.

Table 1-2
District Architectural Coatings Rules and Populations

	District	**Architectural Coating Rule**	**% of State Population**
1.	Antelope Valley AQMD	Rule 1113	0.9%
2.	Bay Area AQMD	Rule 8-3	18.8%
3.	Butte County AQMD	Rule 240	0.6%
4.	Colusa County	Rule 2-26	0.1%
5.	Feather River AQMD	Rule 3-15	0.4%
6.	Imperial County APCD	Rule 424	0.4%
7.	Kern County APCD	Rule 410.1	0.3%
8.	Mojave Desert AQMD	Rule 1113	1.2%
9.	Monterey Bay Unified	Rule 426	2.0%
10.	Northern Sonoma County APCD	Rule 485	0.5%
11.	Placer County APCD	Rule 218	0.8%
12.	Sacramento Metropolitan AQMD	Rule 442	3.7%
13.	San Diego County APCD	Rule 67.0	8.3%
14.	San Joaquin Valley Unified APCD	Rule 4601	9.8%
15.	San Luis Obispo County APCD	Rule 433	0.7%
16.	Santa Barbara County APCD	Rule 323	1.1%
17.	Shasta County AQMD	Rule 3-31	0.5%
18.	Tehama County	Rule 4:39	0.2%
19.	Ventura County APCD	Rule 74.2	2.2%
20.	Yolo-Solano AQMD	Rule 2.14	0.9%
			53%

ARB's 2000 SCM incorporated near-term VOC limits from the 1996 and 1999 amendments to SCAQMD's rule. When the ARB developed the 2000 amendments to the SCM, staff prepared a Program Environmental Impact Report (EIR) to ensure that California Environmental Quality Act (CEQA) requirements would be met when districts adopted or revised their architectural coatings rules. Districts referenced the Program EIR in their CEQA documentation and no lawsuits were filed to protest any of the rules that are based on the 2000 SCM. VOC emissions for architectural coatings were approximately 100 TPD in 1996 and they declined to 95 TPD in 2004, excluding emissions from thinning solvents, cleanup solvents, or additives. This decline occurred despite an increase in California's population from 32 million in 1996 to 36.5 million in 2004 (DOF, 2006). During that same time period, California housing units increased from 12 million in 1996 to 13 million in 2004
(U.S. Census, 1999; 2006).

1.D.2. South Coast Air Quality Management District's (SCAQMD) Rule 1113

The South Coast AQMD amended its rule in November 1996 to lower the VOC limits for several coating categories, including flats and lacquers, as well as to add an averaging provision. The South Coast AQMD also increased the VOC limits for other coating categories and reinstated higher VOC limits. These amendments implemented Phase I of the District's plan for reducing VOC emissions from architectural coatings.

The South Coast AQMD amended its rule again in May 1999 to implement Phase II of the District's plan for reducing VOC emissions from architectural coatings, and to readopt limits negated in 1990. These amendments lowered VOC limits for many categories and significantly amended the averaging provision. Several industry groups filed lawsuits challenging the 1999 amendments based on various legal challenges. These lawsuits were consolidated into one matter before the court and South Coast AQMD prevailed in the district court. The ruling was appealed on June 24, 2002, and the Court of Appeal of the State of California Fourth Appellate District, Division Three, reversed the lower court's decision stating that the 1999 amendments were not properly adopted. It directed the district court to issue a rule of mandate to the AQMD to vacate the 1999 amendments (SCAQMD, 2002).

The South Coast AQMD has amended its rule five times since ARB adopted its 2000 SCM. The July 2001 amendment added a category for clear brushing lacquers at a VOC limit of 680 g/l in response to industry's argument that formulating a brushing lacquer at a lower VOC content was not technically feasible at that time. The VOC content of brushing lacquers was required to be reduced to 275 g/l by January 1, 2005 (SCAQMD, 2001). The December 2002 amendments re-adopted most of the 1999 amendments that were vacated in 2002. South Coast AQMD clarified the language to reflect the original intent and to address some ARB and U.S. EPA issues (SCAQMD, 2002). The December 2003 amendments implemented Phase III of the District's plan to reduce VOC emissions from architectural coatings. These amendments lowered the VOC limits of varnishes and sanding sealers, roof coatings, waterproofing sealers, and exterior stains, and set a phase-out date for the small container exemption for clear wood finishes. It also expanded the scope of the Averaging Compliance Option to include categories whose VOC limits were changing (SCAQMD, 2003). The July 2004 amendments clarified the recordkeeping requirements of the Averaging Compliance Option to address U.S. EPA concerns (SCAQMD, 2004). The last amendment in June 2006 clarified the definitions of several coating categories, exempted Tert-Butyl Acetate (TBAC) for use in industrial maintenance coatings, lowered the VOC limits for concrete curing compounds, dry-fog coatings, and traffic coatings, and set interim limits for nonflat high gloss, quick dry enamels, and specialty primer/sealer/undercoaters (SCAQMD, 2006).

The National Paint and Coatings Association (NPCA) sued South Coast AQMD in January 2004 asking for a writ of mandate to vacate the 2003 amendments to their rule. They alleged that the South Coast AQMD's rulemaking "was in excess of its authority", violated CEQA, and failed to adequately consider the socio-economic impacts. This matter was moved from Orange County Superior Court to the United States District Court-Central District of California and back to the State court early in 2004. NPCA was granted a motion in December 2004 to consolidate this case with a previous case challenging the technical feasibility and CEQA compliance of South Coast AQMD's 2002 amendments. The State court granted South Coast AQMD's motion to dismiss the CEQA claims in 2005. In 2006, the Ninth Circuit court returned the case to the U.S. District Court. The district court denied the writ of mandate in May 2007 stating that South Coast AQMD provided sufficient evidence that the limits were attainable and that they adequately considered the socio-economic impacts of the amendments (USDC-CDC, 2007).

1.D.3. Other States' Rules

In October 2000, the State and Territorial Air Pollution Program Administrators/ Association of Local Air Pollution Control Officials (STAPPA/ALAPCO) issued a model rule identical to ARB's 2000 SCM. The adoption of this rule was recommended for all states or local districts with the caveat that certain local conditions may not warrant the adoption of some of the SCM limits (STAPPA/ALAPCO, 2000).

The Ozone Transport Commission (OTC) adopted the STAPPA/ALAPCO model rule as its model rule in 2002 with some modifications. They set the VOC limit effective dates for January 1, 2005 to provide sufficient lead time for manufacturers. They also implemented a 340 g/l limit for industrial maintenance coatings rather than the 250 g/l, citing the need for a higher limit due to possible performance issues in the northeast, and modified the sell-through provision to allow for unlimited sell-through. They also created separate categories for conversion varnishes, concrete surface retarders, thermoplastic rubber and mastic coatings, calcimine recoaters, nuclear coatings, and impacted immersion coatings, with limits identical to those in the U.S. EPA National Rule, and exempted the latter four categories from the Most Restrictive VOC Limits provision (OTC, 2002). They intend to modify their model rule as appropriate for their local conditions based on the limits in this proposed SCM (OTC, 2007). Lake Michigan Air Directors Consortium/Midwest Regional Planning Organization (LADCO/MRPO) plans to adopt OTC's model rule in 2007, which would incorporate changes from this current SCM (LADCO/MRPO, 2006; OTC, 2007).

1.D.4. U.S. EPA's National Architectural Coatings Rule

In the 1990 Clean Air Act Amendments, the U.S. Congress enacted section 183(e), which established a new regulatory program for controlling VOC

emissions from consumer and commercial products. Section 183(e) directs the U.S. EPA Administrator to determine the ozone-forming potential of these products, and to prioritize the need for regulation of these products. Architectural coatings were in the first group of products to be regulated.

The U.S. EPA proposed a draft rule in June 1996 that established specific VOC limits for various categories of architectural coatings. The national architectural coatings rule was finalized in September 1998. The National Rule went into effect throughout the country, including all California districts, on September 13, 1999.

The National Rule contains over 20 categories that are not typically included in district rules. Almost all of the VOC limits listed in the National Rule are less stringent than those of the 2000 SCM. In addition, for many of the categories that are in both the district rules and the National Rule, the National Rule has definitions that differ significantly from those of the district rules. The applicable VOC limits in the National Rule are listed in Appendix D and are compared to the proposed SCM in Chapter 4.

The U.S. EPA is planning to update its national architectural coatings rule in 2007. The limits proposed in that update are expected to reflect those limits found in the 2002 OTC model rule (Page, 2007).

1.E. REFERENCES

Air Resources Board. Technical Support Document. "Effect of Ozone on Vegetation and Possible Alternative Ambient Air Quality Standard". March, 1987. (ARB, 1987)

Air Resources Board. Letter to Ms. Mary Nichols, United States Environmental Protection Agency. ARB Comments on U.S. EPA Proposal for New, National Clean Air Goals and Policies. March 11, 1997. (ARB, 1997)

Air Resources Board and Office of Environmental Health Hazard Assessment. "Adequacy of California Ambient Air Quality Standards: Children's Environmental Health Protection Act". Online, Internet at http://www.arb.ca.gov/research/rd-temp/am-ad-aaqs1.htm. December 22, 2000. (ARB, 2000)

Air Resources Board and Office of Environmental Health Hazard Assessment. Staff Report. "Public Hearing to Consider Amendments to the Ambient Air Quality Standards for Particulate Matter and Sulfates". Online, Internet at http://www.arb.ca.gov/research/aaqs/std-rs/pm-final/pm-final.htm. May 3, 2002. (ARB, 2002)

Air Resources Board. "Review of the California Ambient Air Quality Standard for Ozone". Online, Internet at http://www.arb.ca.gov/research/aaqs/ozone-rs/rev-staff/rev-staff.htm. October, 2005. (ARB, 2005a)

Air Resources Board. The California Almanac of Emissions and Air Quality, 2005 Edition. Online, Internet at http://www.arb.ca.gov/aqd/almanac/almanac.htm. 2005. (ARB, 2005b)

Air Resources Board, Planning & Technical Support Division, Air Quality Analysis Section. "Comparison of California's Ozone Problem to the Rest of the Country". July 29, 2006. (ARB, 2006a)

Air Resources Board. The California Almanac of Emissions and Air Quality, 2006 Edition. Online, Internet at http://www.arb.ca.gov/aqd/almanac/almanac.htm. 2006. (ARB, 2006b)

Air Resources Board. Population and Vehicle Trends Report. "2004 Statewide Vehicle Population – Passenger Cars." Online internet, at http://www.arb.ca.gov/ei/emissiondata.htm . September, 2007. (ARB, 2007)

Department of Finance. "E-7 California Population Estimates, with Components of Change and Crude Rates, July 1, 1900-2005." March 2006. (DOF, 2006)

LADCO/MRPO. Source Category: Architectural and Industrial Maintenance Coatings. Online, Internet at http://www.ladco.org/Regional_Air_Quality.html . March 6, 2006. (LADCO/MRPO, 2006)

Ozone Transport Commission. Model Rule Preamble: Architectural and Industrial Maintenance Coatings. Online, Internet at http://www.otcair.org/interest.asp?fview=stationary# . February, 2002. (OTC, 2002)

Ozone Transport Commission. Candidate Control Measures. Online, Internet at http://www.otcair.org/projects_details.asp?FID=93&fview=stationary#. June, 2007. (OTC, 2007)

Page, S. Memorandum. "Emission Reduction Credit for Three Federal Rules for Categories of Consumer and Commercial Products under Section 183(e) of the Clean Air Act." May 30, 2007. (Page, 2007)

Seinfeld, J. H., and Pandis, S. N. *Atmospheric Chemistry and Physics*. John Wiley & Sons, New York. 1998. (Seinfeld and Pandis, 1998)

South Coast Air Quality Management District. "Staff Report for Proposed Amended Rule 1113 – Architectural Coatings." July 20, 2001. (SCAQMD, 2001).

South Coast Air Quality Management District. "Staff Report for Proposed Amended Rule 1113 – Architectural Coatings." December 6, 2002. (SCAQMD, 2002).

South Coast Air Quality Management District. "Staff Report for Proposed Amended Rule 1113 – Architectural Coatings." December 5, 2003. (SCAQMD, 2003).

South Coast Air Quality Management District. "Staff Report for Proposed Amended Rule 1113 – Architectural Coatings." July 9, 2004. (SCAQMD, 2004).

South Coast Air Quality Management District. "Staff Report for Proposed Amended Rule 1113 – Architectural Coatings." June 9, 2006. (SCAQMD, 2006).

State and Territorial Air Pollution Program Administrators /Association of Local Air Pollution Control Officials. Regulating Air Emissions from Paint. Online, Internet at www.4cleanair.org. October, 2000. (STAPPA/ALAPCO, 2000)

United States Census Bureau. "(ST-98-51) Estimates of Housing Units, Households, Households by Age of Householder, and Persons per Household of States: Annual Time Series, July 1, 1991 to July 1, 1998." December 8, 1999. (U.S. Census, 1999)

United States Census Bureau. "Annual Estimates of Housing Units for the United States and States: April 1, 2000 to July 1, 2005 (HU-EST2005-01)". August 21, 2006. (U.S. Census, 2006)

United States Department of Agriculture. "Agricultural Outlook: Statistical Indicators", Table 34.-Cash Receipts from Farm Marketing, by State. Online, Internet at http://www.ers.usda.gov/Publications/Agoutlook/AOTables/. July, 2006. (USDA, 2006)

United States District Court – Central District of California. National Paint and Coatings Association vs. South Coast Air Quality Management District. Court Ruling. May, 2007. (USDC-CDC, 2007)

United States Environmental Protection Agency. Air Quality Criteria for Ozone and Related Photochemical Oxidants. July, 1996, Volume I and III. (U.S. EPA, 1996)

United States Environmental Protection Agency. Staff Paper – Second Draft. "Review of the National Ambient Air Quality Standards for Ozone: Policy Assessment of Scientific and Technical Information OAQPS". Online, Internet at

http://www.epa.gov/ttn/naaqs/standards/ozone/s_o3_cr_sp.html. July, 2006. (U.S. EPA, 2006)

CHAPTER 2. EMISSIONS & REDUCTIONS

2.A. ESTIMATED EMISSIONS FROM ARCHITECTURAL COATINGS

VOC emissions from the use of architectural coatings in California are estimated to be about 118 tons per day (tpd) on an annual average basis in 2004. Of this total, the South Coast AQMD accounts for 52 tons per day. The statewide total includes almost 95 tpd emitted directly from coatings and about 23 tpd from associated cleanup solvents, thinners, and additives. As shown in Table 2-1, total emissions from architectural coatings and associated materials represent almost 10 percent of the total VOC emissions from stationary and area sources, and almost 5 percent of all VOC emissions statewide. The VOC emissions from architectural coatings are more than the combined VOC emissions from petroleum refining and marketing, and are comparable to the emissions from approximately 5 million passenger cars. Detailed emissions data for individual coating categories are provided in Chapter 5.

Table 2-1
California Emission Inventory Data

Category	2004 VOC Emissions (tons/day, annual average)
Stationary Sources	
Fuel Combustion	45
Waste Disposal	22
Cleaning and Surface Coatings	222
Petroleum Production and Marketing	
Oil and Gas Production	49
Petroleum Refining	22
Petroleum Marketing	84
Industrial Processes	61
Area-Wide Sources	
Consumer Products	253
Architectural Coatings & Related Process Solvent	**118**
Pesticides/Fertilizers	55
Asphalt Paving/Roofing	32
Residential Fuel Combustion	56
Farming Operations	118
Fires	1
Managed Burning and Disposal	78
Cooking	6
Mobile Sources	1,299
Total – All Sources	**2,521**

Note:
Emissions data for architectural coatings are from the ARB 2005 Architectural Coating Survey (ARB, 2006). The remaining data are from ARB Almanac 2005 Table 2-1 and Table 2-2, which do not reflect the results from the ARB 2005 Architectural Coating Survey (ARB, 2005).

Emissions from architectural coatings are estimated from surveys of architectural coatings sales in California. ARB has conducted eight surveys over the past

30 years which collected sales and emissions data for coatings sold in California in 1975, 1980, 1984, 1988, 1990, 1996, 2000, and 2004.

In 2005, ARB conducted a survey to collect data on architectural coatings sold during calendar year 2004 (ARB, 2006). Almost 900 survey packages were mailed to companies that potentially sold architectural coating products in California. In some cases, multiple survey packages were sent to a company to ensure that all of the appropriate divisions and subsidiaries were informed of the survey requirements. We received responses from 57 percent of the mailouts, either survey data or a form to explain why they were not submitting data. Reasons for not submitting data included:

- They did not have any sales of architectural coatings in California during 2004;
- They did not manufacture architectural coatings; or
- Their sales were to be reported by another company.

Data were submitted for approximately 30 percent of the surveys that were mailed out. To ensure that these data were representative of the California market, ARB staff compared the sales from our survey to nationwide census data. Since California represents 12 percent of the nationwide population, we assumed that California shipments were approximately equal to 12 percent of the nationwide sales for architectural coatings and we found that our survey total is actually greater than the estimate based on census data. Therefore, staff believes the survey captures virtually all of the California sales of architectural coatings.

In many cases, parent companies submitted data for multiple divisions or for subsidiaries. When compiling our summary list of companies, we consolidated all submittals under one company name. In summary, a total of 197 companies submitted data. This represents an increase when compared to the previous five ARB surveys (conducted in 2001, 1998, 1993, 1989, 1985), that had an average of 156 companies responding with data. Approximately 11 percent of the companies on the mailing list had their surveys returned as undeliverable because they had changed their mailing addresses, changed company names, or had gone out of business. Thirty-two percent (32%) did not send in data or an explanation for their nonsubmittal. Draft survey data were compiled in a report that was made available for public review in September 2006.

Table 2-2 compares the ARB survey results for architectural coatings sold in 2000 and 2004. The sales volume for architectural coatings increased from more than 98 million gallons in 2000, to more than 110 million gallons in 2004. However, the total VOC emissions for architectural coatings decreased from 110 to 95 tpd from 2000 to 2004, due to implementation of rules with lower VOC limits. These emissions quantities do not include emissions from thinning solvents, cleanup solvents, or additives. The survey data indicate that architectural coatings in California are continuing to shift toward waterborne

products. From 2000 to 2004, the percent of total sales volume attributed to waterborne coatings increased from 83 to 88 percent. During this same time period, the architectural coating emissions per capita and the average amount of VOCs per gallon of coating decreased more than 20 percent. These declines occurred despite the fact that California's population increased 7 percent and housing units increased 5 percent from 2000 to 2004.

Table 2-2
Summary Comparison Between 2001 and 2005 Surveys – Statewide Data

	2001 Survey (2000 Sales, including quarts)	2005 Survey (2004 Sales, including quarts)	Percent Change
COATING SALES VOLUME DATA			
Total Sales Volume Reported (gallons)	**98,455,172**	**110,407,721**	**12%**
Waterborne Coating Sales Volume	81,548,961	97,354,686	19%
Solventborne Coating Sales Volume	16,906,211	13,053,035	-23%
Percent Waterborne Sales	83%	88%	
Percent Solventborne Sales	17%	12%	
Coating Sales Volume Per Capita (gals per person)	2.9	3.1	
EMISSIONS DATA – COATINGS ONLY			
Total Coating Emissions (tons/day)	**110**	**95**	**-14%**
Waterborne Coating Emissions	45.5	45.7	0%
Solventborne Coating Emissions	64.2	49.0	-24%
Percent Waterborne Emissions	41%	48%	
Percent Solventborne Emissions	59%	52%	
Emissions per capita (lbs VOC emitted per person)	2.4	1.9	
Emission Factor - Coatings Only (lb VOC/gal)	**0.81**	**0.63**	**-23%**
Waterborne Coating Emission Factor	0.41	0.34	-16%
Solventborne Coating Emission Factor	2.77	2.74	-1%
EMISSIONS DATA – COATINGS, SOLVENTS & ADDITIVES			
Grand Total Emissions (tons/day)	**128**	**118**	**-8%**
Waterborne Coating Emissions	45.5	45.7	0%
Solventborne Coating Emissions	64.2	49.0	-24%
Thinning/Cleanup/Additive Emissions	18.5	23.6	27%
Percent Waterborne Emissions	35%	39%	
Percent Solventborne Emissions	50%	41%	
Percent Thinning/Cleanup/Additive Emissions	14%	20%	
Emissions per capita (lbs VOC emitted per person)	2.8	2.4	
Emission Factor with Thinning/Cleanup/Additives (lb VOC/gal coating)	**1.0**	**0.8**	**-18%**

Notes:

1. For the 2001 Survey, VOC emissions totals included emissions from:
   a) thinning solvents added to solventborne coatings; and
   b) cleanup solvents used for solventborne coatings only.
2. For the 2005 Survey, VOC emissions totals included emissions from:
   a) thinning solvents added to solventborne coatings;
   b) cleanup solvents used for both solventborne and waterborne coatings; and
   c) additives in waterborne coatings.
3. CA Population in 2000 = 34,099,000 (DOF, 2006); CA Housing Units in 2000 = 12,244,704 (U.S. Census, 2006)
4. CA Population in 2004 = 36,506,000 (DOF, 2006); CA Housing Units in 2004 = 12,807,257 (U.S. Census, 2006)
5. Emissions data are on an "Annual Average" basis.

Between 2000 and 2004, California's population climbed 7 percent and housing units increased 5 percent, which averages out to an annual growth rate of 1 to 2 percent per year. However, it appears that the growth rate in population lags behind the growth in architectural coating sales, both in California and nationwide. From 2000 to 2004, California's coating sales increased 12 percent, an average growth rate of 3 percent per year. Also, from 2000 to 2004, nationwide sales of architectural coatings increased 24 percent, an average growth rate of 6 percent per year (U.S. Census, 2005). This is similar to the difference in growth rates that occurred between 1996 and 2000, prior to implementation of the current VOC limits. From 1996 to 2000, California's population increased 5 percent while California's coating sales increased 13 percent. These trends seem to indicate that the growth in population and housing can be significantly less than the actual growth in coating sales.

2.B. ESTIMATED EMISSION REDUCTIONS FROM THE PROPOSED SCM

Because the proposed SCM is intended for districts outside of the South Coast AQMD, the estimated emission reductions exclude the South Coast AQMD. In addition, emission reductions are only calculated for large containers, because small containers (one liter or less) are exempt from the proposed VOC limits. In 2004, these small containers only represented three percent of architectural coating sales volume in California.

The baseline for determining emission reductions is the 2004 data from ARB's survey. For architectural coatings, the 95 tpd of statewide VOC emissions are apportioned to districts based on population. Districts outside of the South Coast AQMD represent 56 percent of the State's population which equates to 53 tpd of VOC emissions, including small containers. This does not include VOC emissions from cleanup solvents, thinners, or additives.

As shown in Table 2-3, the proposed SCM is expected to achieve 15.2 tpd in VOC emission reductions outside of the South Coast AQMD. This represents a 28 percent overall emission reduction. Table 2 only lists categories for which staff is proposing lower VOC limits. Although there are emission reductions from 19 categories, 95 percent of the emission reductions are from nine categories, which account for 80 percent of the emissions. These nine categories are highlighted in boldface in Table 2-3.

Table 2-3
VOC Emission Reductions By Product Category
(Large containers only, excluding the South Coast AQMD)

Coating Category	Existing VOC Limit (g/l)	Proposed VOC Limit (g/l)	Emissions in 2004 (excluding SCAQMD)[1] (tons/day)	Emission Reductions (excluding SCAQMD)[2] (tons/day)
Aluminum Roof	500	400	1.10	0.19
Basement Specialty Coating	400	400	0.01	0.00
Bituminous Roof	300	50	0.23	0.17
Bituminous Roof Primer	350	350	0.13	0.00
Bond Breakers	350	350	0.09	0.00
Concrete Curing Compounds	350	350	0.25	0.00
Concrete/Masonry Sealer	**250-400** [3]	**100**	**1.12**	**0.54**
Driveway Sealer	100	50	0.02	0.00
Dry Fog	**400**	**150**	**0.46**	**0.31**
Faux Finishing	350	350	0.11	0.00
Fire Resistive	350	350	0.01	0.00
Flat	**100**	**50**	**7.59**	**3.12**
Floor	250	100	0.39	0.07
Form Release Compounds	250	250	0.45	0.00
Graphic Arts	500	500	0.00	0.00
High Temperature	420	420	0.02	0.00
Industrial Maintenance	250	250	2.34	0.00
Low Solids	120	120	0.02	0.00
Magnesite Cement	450	450	0.05	0.00
Mastic Texture	300	100	0.29	0.10
Metallic Pigmented	500	500	0.05	0.00
Multi-Color	250	250	0.00	0.00
Nonflat - High Gloss	**250**	**150**	**3.00**	**0.91**
Nonflat	**150**	**100**	**10.42**[4]	**2.77**[4]
Pre-Treatment Wash Primer	420	420	0.00	0.00
Primer, Sealer, and Undercoater	**200**	**100**	**3.98**	**1.12**
Reactive Penetrating Sealer	250-400 [3]	350	0.01	0.00
Recycled	250	250	0.00	0.00
Roof	250	50	0.22	0.07
Rust Preventative	**400**	**250**	**3.44**	**1.57**
Shellacs – Clear	730	730	0.14	0.00
Shellacs – Opaque	550	550	0.44	0.00
Specialty Primer, Sealer, and Undercoater	**350**	**100**	**3.40**	**2.62**
Stains	250	250	2.14	0.00
Stone Consolidant	100-400 [3]	450	0.00	0.00
Swimming Pool	340	340	0.03	0.00
Traffic Marking	150	100	0.93	0.09
Tub and Tile Refinish	100-250 [3]	420	0.00	0.00
Waterproofing Membranes	250-400 [3]	250	0.65	0.09
Wood Coatings	**250-680** [3]	**275**	**3.52**	**1.41**
Wood Preservatives	350	350	0.32	0.00

Table 2-3
VOC Emission Reductions By Product Category
(Large containers only, excluding the South Coast AQMD)

Coating Category	Existing VOC Limit (g/l)	Proposed VOC Limit (g/l)	Emissions in 2004 (excluding SCAQMD)[1] (tons/day)	Emission Reductions (excluding SCAQMD)[2] (tons/day)
Zinc-Rich Primer	500	340	0.04	0.01
Total			**47.4**	**15.2**

Notes:
1. This table does not include emissions for the South Coast AQMD, which represents 44% of California's population. It also does not include emissions from small containers or emissions from thinning, cleanup, or additives.
2. This table does not include emission reductions for the South Coast AQMD, which represents 44% of California's population.
3. This is a proposed new category that includes coatings from various categories in the 2000 SCM. The "Existing VOC Limit" for this category represents the range of VOC limits for the coatings that were combined into this new category.
4. Upon the effective date of this rule, the Fire Retardant coating categories are eliminated and coatings with fire retardant properties will be subject to the VOC limit of their primary category (e.g., Flat, Nonflat, etc.). For the purposes of estimating emission reductions, it was assumed that Fire Retardant would be classified as Nonflat with a VOC limit of 100 g/l.
5. Boldface indicates the nine categories that account for 95 percent of the VOC emission reductions.

The emissions reductions in Table 2-3 are based on annual average data from 2004. Appendix E contains a detailed explanation of the methodology that was used to calculate emissions and emission reductions. To predict future emission reductions after the proposed SCM is implemented, ARB and district staff will "grow" the emission reductions by using established growth factors that depend on the demographic data for a given district. In addition, the reductions will be adjusted to represent average summer emissions, rather than annual average emissions. The emissions data used in ozone attainment plans (or SIPs) are usually presented as average summer emissions, since the peak ozone season in California is typically the summer. Also, the estimated emissions on an average summer day are greater than on an average annual day because more painting is done in May through October than the rest of the year, due to weather conditions. Annual average daily emissions spread out these higher summer emissions evenly throughout the year.

As shown in Table 2-3, ARB staff expects the proposed SCM to achieve about 15 tpd of emission reductions for districts outside of the South Coast AQMD. In Chapter 1, staff summarized the emission reduction goals for six districts that have SIP commitments related to architectural coatings. ARB staff has determined that the expected reductions from the proposed SCM will exceed the quantity needed by these six districts. As shown in Table 1-1, the districts have established a goal of achieving about 3 tpd of emission reductions in 2012. ARB staff estimates that the proposed SCM would achieve more than 4 tpd for these six districts, based on 2004 data. Table 2-4 illustrates the approach used to estimate emission reductions for the districts.

As shown in Table 2-4, staff estimated reductions for individual districts by using district population percentages. Each district is assigned a portion of the statewide emissions (95 tpd), based on their population percentage. ARB staff

then used information from district SIPs to determine their percentage reduction goals. For the non-SCAQMD portion of the State, which represents 56 percent of the population, total emission reductions are expected to be 15.2 tpd. ARB staff apportioned this 15.2 tpd to the districts, based on population, and found that the emission reductions from the SCM are estimated to be about 4.4 tpd for the six districts with SIP commitments and about 10.8 tpd from the remaining non-SCAQMD districts.

Table 2-4
Comparison of Estimated Emission Reductions From the Proposed SCM and the 2007 Ozone SIP Commitments

	[A]	[B] =[A]*[95 tpd]	[C]	[D] = [B]*[C]	[E] = [A]/[56%]	[F] =[E]*[15.2 tpd]
Districts with SIP Commitments	**% of CA Population[2]**	**Emission Inventory (TPD in 2004)[3]**	**SIP Commitment (%)**	**SIP Commitment (TPD in 2004)**	**% of Total SCM Reductions**	**Reductions From SCM (TPD in 2004)**
El Dorado (part)[1]	0.50%	0.48	16%	0.08	0.89%	0.14
Feather River	0.40%	0.38	15%	0.06	0.71%	0.11
Placer County	0.80%	0.76	15%	0.11	1.43%	0.22
Sacramento Metro	3.70%	3.52	15%	0.53	6.61%	1.00
San Joaquin	9.80%	9.31	21%	1.96	17.50%	2.66
Yolo-Solano	0.90%	0.86	15%	0.13	1.61%	0.24
TOTAL:	**16.1%**	**15.3**		**2.9**		**4.4**

1. El Dorado County had not yet adopted the 2000 SCM limits at the time that the draft 2007 SIP was developed. Therefore, their SIP Commitment value includes reductions from the 2000 SCM and the proposed 2007 SCM.
2. The "% of CA Population" may not represent the entire district population. For some districts in the Sacramento Nonattainment Area, only a portion of the district population is included for SIP planning purposes.
3. Emission Inventory data are based on data from ARB's 2005 Architectural Coating Survey. These data are for coatings only and do not include emissions from thinning solvents, cleanup solvents, or additives. Statewide emissions are 95 tpd, including the South Coast AQMD.

In addition to estimating emission reductions, ARB staff also used 2004 sales data to determine the portion of the market that complies with the VOC limits in the proposed SCM. Table 2-5 lists the complying marketshare, which represents the percentage of the 2004 sales volume that complies with the proposed VOC limits. The table also lists the number of complying products. Table 2-5 only includes coating categories whose VOC limit would decrease with the proposed SCM. Complying marketshares for all categories are provided in Chapter 5.

Table 2-5
Complying Marketshare and Number of Complying Products

Coating Category	Existing VOC Limit (g/l)	Proposed VOC Limit (g/l)	Complying Marketshare	# of Complying Products
Aluminum Roof	500	400	31%	13
Bituminous Roof	300	50	90%	35
Concrete/Masonry Sealer	250-400 [1]	100	41%	133
Driveway Sealer	100	50	100%	38
Dry Fog	400	150	42%	27
Flat	100	50	7%	358

Table 2-5
Complying Marketshare and Number of Complying Products

Coating Category	Existing VOC Limit (g/l)	Proposed VOC Limit (g/l)	Complying Marketshare	# of Complying Products
Floor	250	100	85%	168
Mastic Texture	300	100	79%	40
Nonflat - High Gloss	250	150	28%	94
Nonflat	150	100	28%	958
Primers, Sealers, and Undercoaters	200	100	36%	310
Reactive Penetrating Sealer	250-400	350	93%	20
Roof	250	50	83%	112
Rust Preventative	400	250	3%	52
Specialty Primers, Sealers, and Undercoaters	350	100	22%	25
Traffic Marking	150	100	74%	158
Waterproofing Membranes	250-400 [1]	250	68%	24
Wood Coatings	250-680 [1]	275	50%	307
Zinc-Rich Primer	500	340	54%	30

1. This is a proposed new category that includes coatings from various categories in the 2000 SCM. The "Existing VOC Limit" for this category represents the range of VOC limits for the coatings that were combined into this new category.

2.C. REACTIVITY

Traditionally, VOC limits for coatings have been based on the total VOC content in the coating, regardless of the chemical composition of the VOCs. Although a few compounds are excluded from the VOC content because they are designated as "exempt compounds", all other VOCs are treated equally when determining the VOC content of a coating. Mass-based VOC limits have been successfully used for many years to achieve VOC emission reductions.

However, VOCs don't necessarily behave the same when they are emitted into the atmosphere. Since VOCs have differing molecular structures, they may form ozone through varying chemical reactions at varying rates. This characteristic is called reactivity. A relative reactivity scale (the maximum incremental reactivity scale) was developed by Dr. William Carter to rank VOCs based on their tendency to form ozone (Carter, 1994). Each VOC in this scale is assigned an "ozone formation potential" value based on smog chamber studies or by comparison with similar VOCs. Such a relative reactivity scale is used in the ARB's existing Low Emissions Vehicle (LEV) program. This regulation first used the MIR scale to determine the ozone forming potential of vehicle exhaust by utilizing reactivity adjustment factors. By making a reactivity adjustment to the emissions, an alternatively fueled vehicle is able to emit more mass emissions, as long as they are less reactive than those from a gasoline fueled vehicle. ARB's Reformulated Gasoline program also uses the MIR scale to allow tradeoffs between various emission processes on a reactivity-adjusted basis.

In 2000, ARB staff used reactivity to develop the statewide aerosol coatings regulation, which includes reactivity-based limits instead of mass-based limits.

This reactivity-based approach was implemented because ARB staff determined that aerosol coatings had achieved the maximum reductions technically feasible with a mass-based approach. This approach was supported by the aerosol coatings industry and the regulation is being implemented and enforced by ARB staff. Since aerosol coatings are subject to a statewide ARB regulation, all of the aerosol coatings in California must comply with the same limits and the same requirements. For architectural coatings, this is not the case. Local air districts are responsible for controlling VOC emissions from architectural coatings, and three different sets of VOC limits apply in California, depending on which district has jurisdiction.

When the Board approved the SCM in 2000, they directed staff to investigate the use of a reactivity-based approach for architectural coatings. ARB staff has conducted detailed analyses to explore the potential for including reactivity-based limits in the SCM. Staff has published reports on reactivity analyses using the 2000 survey data and the 2004 survey data (ARB, 2005; ARB, 2007).

In the Summer of 2006, ARB staff met with the districts and the U.S. EPA to discuss a potential reactivity-based approach. Since districts are responsible for architectural coatings rules, district personnel would be responsible for enforcing reactivity-based limits. Districts expressed concerns that implementation of a reactivity-based rule would require additional resources for enforcement. If district personnel wanted to determine the reactivity of a product for enforcement purposes, they would need to obtain detailed chemical formulation data to identify all of the volatile ingredients contained in the product. They would then need to identify the appropriate maximum incremental reactivity (MIR) value for each of these ingredients, so they could calculate the overall reactivity for the product. District personnel would also need to develop a system for updating MIR values to accommodate changes that result from research studies. Verifying compliance with a mass-based limit requires fewer resources, because it only involves a relatively simple measurement of total VOCs. Many districts do not have the resources to enforce a reactivity-based architectural coatings rule.

The South Coast AQMD staff in particular commented that they did not support reactivity-based architectural coating limits at this time, citing the increased resources and their belief that more research needs to be done. They also commented that reactivity-based limits are premature at this time. They believe that such limits should only be explored for achieving ozone reductions beyond their mass-based limits, which in some cases are more stringent than those in the proposed SCM (SCAQMD, 2006).

Only some industry representatives have been supportive of a reactivity-based approach. ARB staff met with industry groups in the Spring and Fall of 2006 to discuss reactivity. In addition, ARB conducted several meetings with individual coating manufacturers and raw material suppliers to discuss their concerns. No

consensus regarding reactivity-based limits could be achieved among coating manufacturers.

Another option that ARB staff considered was a rule that contained mass-based VOC limits, but included a flexibility option based on reactivity. In Spring 2007, the National Paint and Coatings Association (NPCA) suggested that an Innovative Product Exemption (IPE) for reactivity be included in the SCM. ARB's consumer products regulation contains an IPE for mass-based VOC limits, but this regulation is implemented and enforced by ARB staff. If an IPE flexibility provision were included in an architectural coating rule, district personnel would be responsible for implementation and enforcement.

NPCA proposed language for an IPE exemption in July 2007. Under the NPCA proposal, coating manufacturers could sell products that exceed mass-based VOC limits, if the products had a lower reactivity than a representative product that complied with the mass-based VOC limit. For each product submitted for an exemption, district personnel would need to determine the reactivity of the noncompliant product, identify a representative compliant product, and compare the reactivity of the two products. District personnel would also need to develop enforceable conditions for each exemption (e.g., laboratory test methods, reporting requirements, etc.). The U.S. EPA expressed concerns about how a reactivity-based IPE provision would be enforced, and about potential complications that could result from case-by-case, reactivity-based limits that might be adopted by one air district and not a neighboring district.

ARB staff concluded that many districts have insufficient resources to implement and enforce reactivity-based limits or the IPE provision, and that the U.S. EPA had concerns regarding the implementation and enforcement of the IPE provision. Based upon the lack of district resources, U.S. EPA's response, and the lack of industry consensus, staff decided to propose mass-based VOC limits. The proposed mass-based limits provide significant emission reductions and will be easier for the districts to implement and enforce. In addition, the districts have existing variance rules that can provide flexibility for coating manufacturers.

Even though staff is not proposing a reactivity-based approach at this time, the staff recognizes that reactivity-based regulations for this category may play a role in the future. Consequently, ARB staff will continue to work with industry, districts, and other stakeholders to explore a reactivity-based approach for architectural coatings.

2.D. WEIGHT PERCENT VOC

Architectural coatings are regulated on the basis of VOC content in units of grams per liter, less water and exempt compounds. For aerosol coatings, products are regulated on the basis of reactivity in units of grams ozone per gram product, with a maximum limit of 2.7 grams ozone per gram product. For

consumer products, items are regulated on the basis of percent VOC by weight, with a maximum of 85 percent. In the 2000 SCM, VOC limits for architectural coatings ranged from 100 g/l to 730 g/l which may seem relatively high when compared to a reactivity-based limit or a VOC limit that is expressed in weight percent. In reality, architectural coatings generally have a lower reactivity than aerosol coatings and a lower VOC weight percent than consumer products, but this may not be apparent based on the way VOC content is expressed. Therefore, ARB staff analyzed the sales-weighted average maximum incremental reactivity (SWAMIR) and the VOC weight percent for architectural coatings. These data are summarized in Table 2-6 and detailed data are provided in the survey report and the reactivity analysis report (ARB, 2006; ARB, 2007). This table only includes categories with lower proposed VOC limits. For the categories that have the highest sales volumes (Flat; Nonflat; and Primers, Sealers, and Undercoaters), the weight percent VOC is currently four percent or less.

Table 2-6
Reactivity and Weight Percent VOC

Coating Category	Existing Reactivity/ SWAMIR (g ozone/ g coating)	Existing VOC Weight Percent[1]	Existing VOC Limit (g/l)	Proposed VOC Limit (g/l)
Aluminum Roof	N/A [2]	N/A [2]	500	400
Bituminous Roof	0.08	2	300	50
Concrete/Masonry Sealer [3]	0.20-0.40	9-12	250-400	100
Driveway Sealer	0.00	0.2	100	50
Dry Fog	0.29	13	400	150
Flat	0.06	2	100	50
Floor	0.37	13	250	100
Mastic Texture	0.09	5	300	100
Nonflat - High Gloss	0.15	6	250	150
Nonflat	0.10	4	150	100
Primers, Sealers, and Undercoaters	0.12	4	200	100
Reactive Penetrating Sealer	0.20-0.40	9-12	250-400	350
Roof	0.06	2	250	50
Rust Preventative	0.54	30	400	250
Specialty Primers, Sealers, and Undercoaters	0.36	19	350	100
Traffic Marking	0.11	4	150	100
Waterproofing Membranes [3]	0.20-0.40	9-12	250-400	250
Wood Coatings [3]	0.31-1.49	26-74	250-680	275
Zinc-Rich Primer	N/A [2]	N/A [2]	500	340

1. These are Sales-Weighted Average Weight Percents based on the 2005 Architectural Coatings Survey (ARB, 2006).
2. N/A: This is a proposed new category. Therefore, reactivity and VOC weight percent were not provided in the survey report or reactivity analysis report.
3. This is a proposed new category that includes coatings from various categories in the 2000 SCM. The "Existing Reactivity" and "Existing VOC Limit" for this category represent a range of the data for the categories that were combined into this new category.

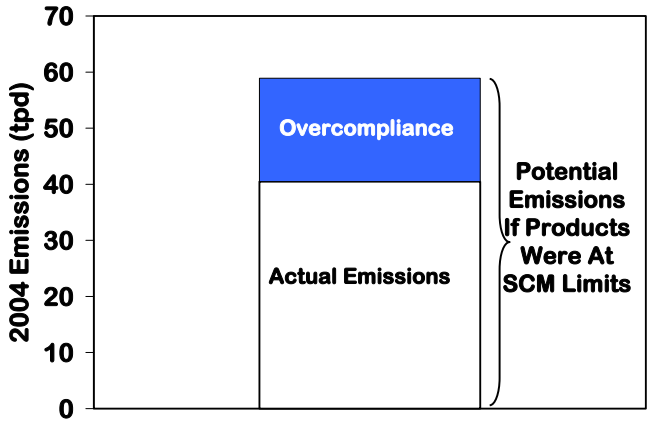
2.E. LIMIT-TO-LIMIT REDUCTIONS

To estimate emission reductions, ARB staff evaluates each product reported in the architectural coatings survey. For each product, we determine the current VOC emissions, as reported in the survey, and then we calculate the expected future VOC emissions at the new VOC limit in the proposed SCM. For the purposes of estimating emission reductions, it is assumed that all manufacturers will reformulate their products to be equal to the new VOC limit. However, in reality, many manufacturers actually reformulate their products below VOC limits to ensure compliance.

After 20 districts adopted rules based on the 2000 SCM, many manufacturers reformulated their coatings to be below the current VOC limits. Consequently, there was a certain amount of "overcompliance" and this was documented when ARB conducted the architectural coating survey. Since ARB's emission inventory is based on the results of the architectural coating survey, the "overcompliance" eventually gets incorporated into the emission inventory, but it is not necessarily documented in SCM staff reports. Many coating manufacturers requested that ARB include some documentation of their "overcompliance" while developing the proposed SCM.

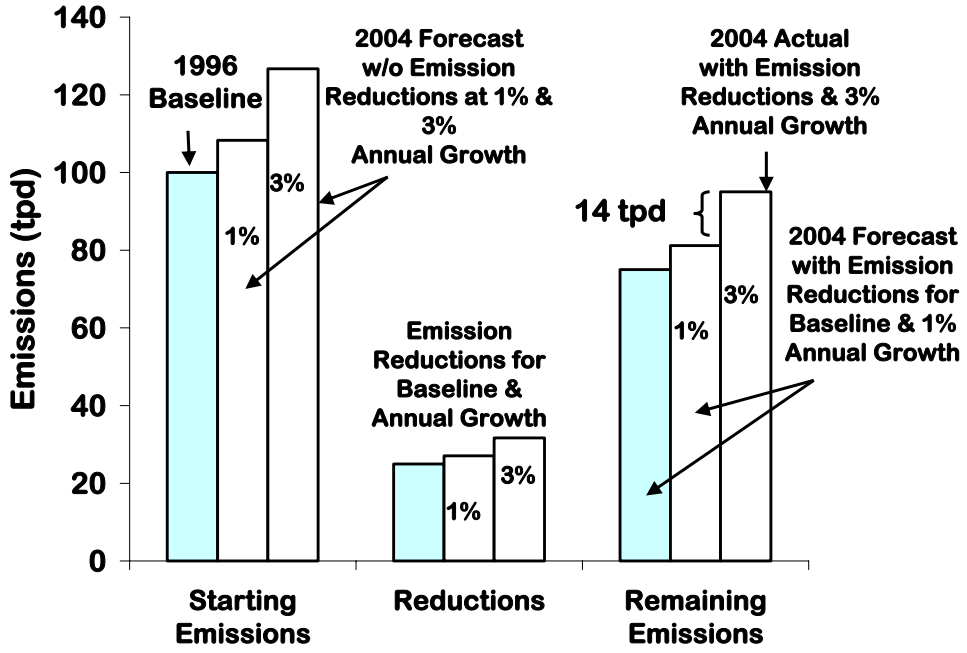
For the 2000 SCM, the following categories were targeted for emission reductions: Flat, Industrial Maintenance, Lacquers, Multi-Color, Nonflat-Low Gloss and Medium Gloss, Primer, Sealer, Undercoater, Quick Dry Enamel, Quick Dry PSU, Stains, and Traffic. Based on the ARB survey, the 2004 VOC emissions from these categories were approximately 41 tpd. If all of the products in these categories had VOC contents that were equal to the SCM limit, estimated emissions would have been 59 tpd. The difference of 18 tpd represents "overcompliance" by manufacturers (see Figure 2-1). This is a maximum estimate of "overcompliance", because there were products that were already below the 2000 SCM limits as far back as 1996.

Figure 2-1
Manufacturers' "Overcompliance" with 2000 SCM Limits



By 2004, the 2000 SCM was designed to achieve an emission reduction of 10 tpd, based on 1996 emissions data. Also by 2004, South Coast AQMD Rule 1113 was designed to reduce emissions approximately 16 tpd. However, reductions were overwhelmed by sales growth. Traditionally, it is assumed that the growth in architectural coating sales is closely tied to housing units and population, which grow about one percent each year. However, the actual sales growth for architectural coatings was higher than expected for both California and the U.S.. From 1996 to 2004, architectural coating sales increased an average of three percent a year for both California and nationwide. Thus, it was expected that the SCM and Rule 1113 would cause coating emissions to decline to 80 tpd in 2004, but they only declined to 95 tpd, due to higher than predicted sales growth, as shown in Figure 2-2.

Figure 2-2
Growth of Coating Sales Diminish Actual Reductions
(1996 – 2004)



2.FATMOSPHERIC AVAILABILITY

The NPCA has requested that ARB consider the atmospheric availability and fate of VOCs from architectural coatings stipulating that some VOCs may be retained in the coating and substrate. ARB staff has considered the available research.

A study was done on the emissions of 2,2,4-trimethyl-1,3-pentanediol monoisobutyrate (TMPD-MIB) from two modified latex paints (flat and semi-gloss) applied to gypsum board, aluminum, and concrete (a type used in China). The latex paint was modified to remove the small amount of glycols or glycol

ethers and no primer was used in the study. Air measurements were taken up to 15 months after application (Lin and Corsi, 2007). The coating applied on aluminum had greater emissions in the first 100 hours than those coatings applied to gypsum and concrete. The emissions from coatings applied to gypsum and concrete were significantly lower than the emissions from coatings on aluminum. This indicates that the type of substrate has an effect on emissions. Emissions decreased considerably for the coatings on gypsum board and concrete after the first 100 hours. Low, but measurable, emissions remained relatively constant for the remainder of the sampling period. The TMPD-MIB emissions from the wet film up to the first 100 hours were small compared to the integrated long-term emissions from the dry film (Lin and Corsi, 2007).

One coating sample on aluminum was analyzed for approximately eleven months. About 80 percent of the TMPD-MIB was emitted during this period. When coatings were applied on gypsum board, flat coatings had greater TMPD-MIB emissions than semi-gloss coatings. However, when coatings were applied on concrete, semi-gloss coatings had greater TMPD-MIB emissions than flat coatings.

Several coating samples on gypsum board were sacrificed at 3, 8, and 15 months to determine the amount of TMPD-MIB left in the paint film and substrate. At three months, about 73 percent of the TMPD-MIB in the semi-gloss and 72 percent in the flat remained in the samples. At eight months, these numbers declined to 51 percent in the semi-gloss and 24-26 percent in the flat samples. At 15 months, only 17 percent of the TMPD-MIB remained in the flat paint samples while 45 percent remained in the semi-gloss samples.

The above study shows that some TMPD-MIB remains in the paint and substrate after the paint film dries. However, the amount that remains is dependent on gloss level and substrate. Due to the preliminary nature of this information, more research is needed before ARB considers adjusting its emissions inventory to reflect the amount of TMPD-MIB retained in the paint and substrate.

2.G. REFERENCES

Air Resources Board. “The California Almanac of Emissions and Air Quality.” 2005. (ARB, 2005)

Air Resources Board. Draft Report. “2005 Architectural Coatings Survey.” September, 2006. (ARB, 2006)

Air Resources Board. “2005 Architectural Coatings Survey, Draft Reactivity Analysis.” January, 2007. (ARB, 2007)

Carter, W.P.L. "Development of Ozone Reactivity Scales for Volatile Organic Compounds". Journal of the Air and Waste Management Association 44:881-899. 1994 (Carter, 1994)

Department of Finance. "Table E-7. California Population Estimates, with Components of Change and Crude Rates, July 1, 1900-2005". March, 2006. (DOF, 2006)

Lin, C.–C. and Corsi, R.L. "Texanol® ester alcohol emissions from latex paints: Temporal variations and multi-component recoveries." Atmospheric Environment 41, 3225-3234. 2007. (Lin and Corsi, 2007)

South Coast Air Quality Management District. E-mail from Dr. Laki Tisopulos, Assistant Deputy Executive Officer, SCAQMD, to Jim Nyarady, ARB. September 12, 2006. (SCAQMD, 2006)

United States Census Bureau. "Current Industrial Reports, MA325, Paint and Allied Products: 2004," Table 1. September, 2005. (U.S. Census, 2005)

United States Census Bureau. "Annual Estimates of Housing Units for the United States and States: April 1, 2000 to July 1, 2005 (HU-EST2005-01)". August 21, 2006. (U.S. Census, 2006)

CHAPTER 3. PROPOSED SUGGESTED CONTROL MEASURE

3.A. INTRODUCTION

In this chapter, we provide a plain English discussion of the staff's proposed suggested control measure (SCM) for architectural coatings, which is contained in Appendix A. The proposed SCM is an update of the SCM that the Board approved in 2000. Where applicable, we discuss where the proposed SCM's provisions differ from those of the 2000 SCM. For comparison purposes, the 2000 SCM is contained in Appendix B.

Control of emissions from architectural coatings is primarily the responsibility of the local air pollution control districts and air quality management districts, collectively referred to as districts. The proposed SCM is not an ARB regulation. It is a model rule that districts can follow when adopting and amending their local architectural coatings rules. If districts adopt the VOC limits in the proposed SCM, district personnel are responsible for enforcing those limits.

The proposed SCM controls VOC emissions by establishing limits on the VOC content of various architectural coating categories. These VOC limits are expressed in grams of VOC per liter of coating, less water and exempt compounds. To establish the limits in the proposed SCM, ARB staff conducted a detailed assessment of each coating category to determine the maximum emission reductions that are technically feasible and cost-effective. In general, manufacturers will comply with the VOC limits by reformulating their products to replace some of the VOC solvent with water or exempt compounds. Manufacturers may also modify their formulations by increasing the amount of resin and pigment solids contained in the coatings. However, many manufacturers already have large volumes of complying products, and no reformulation is required.

3.B. MAJOR PROPOSED CHANGES

Provided below is a summary of the major proposed changes between the 2000 SCM and the proposed SCM. Details of these changes are discussed in this chapter and Chapter 5.

- The proposed SCM deletes the following 15 categories from the table of VOC limits: Antenna; Antifouling; Clear Brushing Lacquer; Fire Retardant - Clear; Fire Retardant – Opaque; Flow; Lacquer; Quick Dry Enamel; Quick Dry Primer, Sealer, and Undercoater; Sanding Sealer; Swimming Pool Repair and Maintenance; Temperature Indicator Safety; Varnish; Waterproofing Concrete/Masonry Sealer; and Waterproofing Sealer.
- The proposed SCM adds the following ten categories to the table of VOC limits: Aluminum Roof; Basement Specialty Coating; Concrete/Masonry Sealer; Driveway Sealer; Reactive Penetrating Sealer; Stone Consolidant;

Tub and Tile Refinish; Waterproofing Membrane; Wood Coating; and Zinc-Rich Primer.

- The proposed SCM lowers VOC limits for 19 categories.
- In the proposed SCM, numerous definitions have been revised for clarification purposes or to make the definition more stringent. Definitions have also been revised to update referenced test methods and standards.
- The proposed SCM revises the provision for exceptions to the Most Restrictive VOC Limit.
- The proposed SCM deletes the Averaging Compliance Option that expired in January, 2005.
- The proposed SCM deletes all of the reporting requirements that were in the 2000 SCM, but it adds a reporting requirement to formalize the collection of architectural coating survey data.

3.C. APPLICABILITY

If adopted by the districts, the proposed SCM would apply to anyone who supplies, sells, offers for sale, or manufactures architectural coatings for use in those districts. It would also apply to anyone who applies or solicits the application of architectural coatings for use in those districts. Those who are subject to the SCM include, but are not limited to, the following:

- Manufacturers
- Distributors
- Retailers
- Importers
- Paint Contractors
- Construction Workers
- Maintenance Staff
- Public Works Personnel

3.D. SEVERABILITY

The Severability Section states that each provision of the proposed SCM is separate, in legal terms. If a judge determined that a particular section of the SCM was not valid, all of the other provisions of the SCM would still be in effect and enforceable. The Severability Section is a new addition to the SCM.

3.E. EXEMPTIONS

The Exemptions Section describes coatings that do not have to comply with the VOC limits and other requirements in the proposed SCM. In the previous version of the SCM, exemptions were included under the Applicability Section. For the proposed SCM, we've added a new Exemptions Section for clarification.

Since the SCM will become a district rule, it only applies to architectural coatings that are used within districts that have adopted the SCM. Architectural coatings that are manufactured in a district that has adopted the SCM are not subject to the SCM if they are sold and used in a district that has not adopted the SCM. If a district doesn't have a local rule, architectural coatings must comply with the U.S.

EPA's national rule for architectural coatings. Aerosol coatings are exempt from the proposed SCM, because they are not defined as architectural coatings, and are covered by the ARB's aerosol coatings regulation. Architectural coatings sold in small containers (one liter or less) are exempt from the VOC limits and most of the provisions of the proposed SCM. However, coatings in small containers are subject to the reporting requirements in Section 7 of the SCM. For example, manufacturers are required to provide survey data for small containers.

3.F. DEFINITIONS

To help clarify and enforce the proposed SCM, Section 4 of the proposed SCM provides new or revised definitions for terms that are not self-explanatory.

The following definitions are added for new product categories:

- Aluminum Roof
- Basement Specialty Coating
- Concrete/Masonry Sealer
- Driveway Sealer
- Reactive Penetrating Sealer
- Stone Consolidant
- Tub and Tile Refinish
- Waterproofing Membrane
- Wood Coatings
- Zinc-Rich Primer

For the Primers, Sealers, and Undercoaters category, the definition is revised for clarification purposes. Previously, separate definitions were listed for "Primer", "Sealer", and "Undercoater". For the proposed SCM, these separate definitions are combined under "Primer, Sealer, Undercoater" to be consistent with the table of VOC limits. In addition, the definition is modified to be more consistent with SCAQMD Rule 1113.

Some definitions are deleted, because the categories are no longer listed in the table of VOC limits. Categories were deleted because they were replaced by new categories or were unnecessary. Products from deleted categories are included in other categories in the proposed SCM. For example, the new Wood Coatings category will cover those products that were previously classified as Clear Brushing Lacquers; Lacquers; Sanding Sealers; and Varnishes. Definitions were deleted for the following categories:

- Antenna Coating
- Antifouling Coating
- Clear Brushing Lacquers
- Flow Coating
- Lacquer
- Quick Dry Enamel
- Quick Dry Primer, Sealer, and Undercoater
- Sanding Sealer
- Swimming Pool Repair and Maintenance
- Temperature Indicator Safety Coating
- Varnish
- Waterproofing Concrete/Masonry Sealer
- Waterproofing Sealer

In some cases, staff is proposing revised definitions for categories, either for clarification or to limit the types of products that qualify for inclusion in a category. Revised definitions are proposed for the following categories:

- Bituminous Roof Primer
- Concrete Curing Compound
- Faux Finishing Coating
- Fire-Resistive Coating
- Fire-Retardant Coating
- Floor Coating
- Graphic Arts
- Industrial Maintenance
- Low Solids Coating
- Metallic Pigment
- Multi-Color Coating
- Nonflat – High Gloss
- Primer, Sealer, Undercoater
- Recycled Coating
- Roof Coating
- Rust Preventative Coating
- Shellac
- Specialty Primer, Sealer, and Undercoater
- Stain
- Swimming Pool Coating

The proposed SCM has also added definitions for “VOC Actual” and “VOC Regulatory”. These terms were defined elsewhere in the previous version of the SCM and they were moved to the Definitions Section for clarification.

3.G. STANDARDS

The Standards Section of the proposed SCM differs significantly from the 2000 SCM. Changes are proposed for VOC limits, most restrictive limits requirements, and requirements for specified categories.

3.G.1. VOC Content Limits

As shown in Table 3-1 below, the proposed SCM (see Appendix A) will establish VOC content limits for more than 40 categories of architectural coatings. Items in boldface indicate VOC limits that are more stringent than the previous SCM. Compared to the 47 categories in the 2000 SCM, 15 categories were eliminated, ten were added, and the limits for 19 categories were lowered. Most of the proposed limits are consistent with the 2008 limits in SCAQMD’s Rule 1113. The proposed limits would become effective on January 1, 2010 for most of the categories. However, VOC limits for the following categories would not become effective until January 1, 2012: Rust Preventative and Specialty Primers, Sealers, and Undercoaters.

With the exception of the Low Solids category, the VOC limits are expressed in terms of VOC Regulatory, which is also referred to as “VOC, Less Water, Less Exempt Compounds” or “Coating VOC”. For the Low Solids category, the VOC limit is expressed in terms of VOC Actual, which is also referred to as “Material VOC”. In some cases, products in the Low Solids category are sold as concentrated solutions that need to be diluted prior to use. For those concentrated products, the VOC Actual value should be determined based on the manufacturer’s minimum recommendations for dilution.

Table 3-1
Proposed VOC Content Limits For Architectural Coatings

Limits are expressed as VOC Regulatory, thinned to the manufacturer's maximum recommendation, excluding any colorant added to tint bases. "Manufacturer's maximum recommendation" means the maximum recommendation for thinning that is indicated on the label or lid of the coating container.

Coating Category	Effective 1/1/2010	Effective 1/1/2012
Aluminum Roof	**400**	
Basement Specialty Coatings	400	
Bituminous Roof Coatings	**50**	
Bituminous Roof Primers	350	
Bond Breakers	350	
Concrete Curing Compounds	350	
Concrete/Masonry Sealers	**100**	
Driveway Sealers	**50**	
Dry Fog Coatings	**150**	
Faux Finishing Coatings	350	
Fire Resistive Coatings	350	
Flat Coatings	**50**	
Floor Coatings	**100**	
Form-Release Compounds	250	
Graphic Arts Coatings (Sign Paints)	500	
High Temperature Coatings	420	
Industrial Maintenance Coatings	250	
Low Solids Coatings[a]	120	
Magnesite Cement Coatings	450	
Mastic Texture Coatings	**100**	
Metallic Pigmented Coatings	500	
Multi-Color Coatings	250	
Nonflat Coatings	**100**	
Nonflat - High Gloss Coatings	**150**	
Pre-Treatment Wash Primers	420	
Primers, Sealers, and Undercoaters	**100**	
Reactive Penetrating Sealer	**350**	
Recycled Coatings	250	
Roof Coatings	**50**	
Rust Preventative Coatings		**250**
Shellacs: • Clear • Opaque	 730 550	
Specialty Primers, Sealers, and Undercoaters		**100**
Stains	250	
Stone Consolidant	450	
Swimming Pool Coatings	340	
Traffic Marking Coatings	**100**	
Tub and Tile Refinish	420	
Waterproofing Membranes	**250**	
Wood Coatings	**275**	
Wood Preservatives	350	
Zinc-Rich Primers	**340**	

a. Limit is expressed as VOC Actual.

The proposed table of VOC limits does not contain a listing for Fire Retardant coatings. ARB staff determined that coatings with fire retardant properties no longer required a special category with a higher VOC limit. Instead, these coatings will be covered by their primary categories. For example, if a product meets the definition for a Nonflat Coating and possesses fire retardant properties, it would be classified as a Nonflat coating and would need to comply with a 100 g/l VOC limit. Similarly, if a product meets the definition for Roof Coating and possesses fire retardant properties, it would be classified as a Roof Coating and would need to comply with a 50 g/l VOC limit.

3.G.2. Most Restrictive VOC Limit

If a coating is marketed for more than one coating category, the lowest, or most restrictive, VOC limit will apply. However, there are exceptions to the most restrictive limit requirement. The Most Restrictive Limit section of the proposed SCM was revised to include a table to clarify the situations where the most restrictive limit is not applicable. We've added a table to clarify the situations where the most restrictive limit is not required, as shown below in Table 3-2. For example, consider a coating that is marketed for use on concrete floors in industrial environments and is resistant to acids and other corrosive chemicals. This coating could be categorized as a Concrete/Masonry Sealer (VOC limit = 100 g/l) or an Industrial Maintenance Coating (VOC limit = 250 g/l). However, because the coating is designed to perform functions that require a higher VOC content for industrial environments, it meets the Industrial Maintenance Coating definition and should be classified as such. It is because of these types of situations that Industrial Maintenance is one of the categories that is exempt from the most restrictive limit requirement.

Table 3-2
Most Restrictive Limit Exceptions For Specialty Coatings

Coatings That Meet the Definitions in Section 4 of the SCM for This Category	**Are Not Subject to the Most Restrictive VOC Limit Requirement When They Are Also Recommended for These Uses**
Aluminum Roof Coatings	Bituminous Roof Primers; Bituminous Roof Coatings; Industrial Maintenance Coatings; or Roof Coatings
Basement Specialty Coatings	Concrete/Masonry Sealers; Floor Coatings; Industrial Maintenance Coatings; Primers, Sealers, and Undercoaters; or Specialty Primers, Sealers, and Undercoaters
Bituminous Roof Primers	Bituminous Roof; Industrial Maintenance Coatings; Primers, Sealers, and Undercoaters; Roof Coatings; or Specialty Primers, Sealers, and Undercoaters
Concrete Curing Compounds	Concrete/Masonry Sealers; Floor Coatings; Industrial Maintenance Coatings; or Primers, Sealers, and Undercoaters
Concrete/Masonry Sealers	Driveway Sealers
Faux Finishing Coatings	Primers, Sealers, and Undercoaters; Stains; or Wood Coatings
Fire Resistive Coatings	Industrial Maintenance; Primers, Sealers, and Undercoaters; or Specialty Primers, Sealers, and Undercoaters
Floor Coatings	Driveway Sealers

Table 3-2
Most Restrictive Limit Exceptions For Specialty Coatings

Coatings That Meet the Definitions in Section 4 of the SCM for This Category	Are Not Subject to the Most Restrictive VOC Limit Requirement When They Are Also Recommended for These Uses
Graphic Arts Coatings	Faux Finishing Coatings
High Temperature Coatings	Fire Resistive Coatings; Industrial Maintenance Coatings; Primers, Sealers, and Undercoaters; Rust Preventative Coatings; Specialty Primers, Sealers, and Undercoaters; or Zinc-Rich Primers
Industrial Maintenance Coatings	Concrete/Masonry Sealers; Floor Coatings; Mastic Texture Coatings; Primers, Sealers, and Undercoaters; or Specialty Primers, Sealers, and Undercoaters
Low Solids Coatings	All Categories in Table 1
Magnesite Cement Coatings	Concrete/Masonry Sealers or Floor Coatings
Metallic Pigmented Coatings	Aluminum Roof Coatings; Bituminous Roof Coatings; Bituminous Roof Primers; Faux Finishing Coatings; Fire Resistive Coatings; High Temperature Coatings; Industrial Maintenance Coatings; Primers, Sealers, and Undercoaters; Roof Coatings; Rust Preventative Coatings; Specialty Primers, Sealers, and Undercoaters; or Tub and Tile Refinish Coatings
Pre-Treatment Wash Primers	Industrial Maintenance Coatings; Primers, Sealers, and Undercoaters; or Rust Preventative Coatings
Reactive Penetrating Sealers	Concrete/Masonry Sealers; Floor Coatings; Industrial Maintenance Coatings; Primers, Sealers, and Undercoaters; or Specialty Primers, Sealers, and Undercoaters
Recycled Coatings	Primers, Sealers, and Undercoaters; or Specialty Primers, Sealers, and Undercoaters
Rust Preventative Coatings	Primers, Sealers, and Undercoaters; or Specialty Primers, Sealers, and Undercoaters
Shellacs	All Categories in Table 1
Stone Consolidants	Concrete/Masonry Sealers; Floor Coatings; Industrial Maintenance Coatings; Primers, Sealers, and Undercoaters; Reactive Penetrating Sealers; or Specialty Primers, Sealers, and Undercoaters
Swimming Pool Coatings	Concrete/Masonry Sealers; Primers, Sealers, and Undercoaters; or Specialty Primers, Sealers, and Undercoaters
Traffic Marking Coatings	Driveway Sealers
Tub and Tile Refinish Coatings	Primers, Sealers, and Undercoaters; or Specialty Primers, Sealers, and Undercoaters
Waterproofing Membranes	Concrete/Masonry Sealers; Floor Coatings; Primers, Sealers, and Undercoaters; or Specialty Primers, Sealers, and Undercoaters
Wood Coatings	Floor Coatings; Primers, Sealers, and Undercoaters; Specialty Primers, Sealers, and Undercoaters; or Stains
Wood Preservatives	Primers, Sealers, and Undercoaters; Specialty Primers, Sealers, and Undercoaters; Stains; or Wood Coatings
Zinc-Rich Primers	Industrial Maintenance Coatings; Primers, Sealers, and Undercoaters; Rust Preventative Coatings; or Specialty Primers, Sealers, and Undercoaters

3.G.3. Sell-Through of Coatings

Under the proposed SCM, an architectural coating listed in Table 3-1 and manufactured prior to the effective date of the VOC content limit for that coating category may be sold, supplied, or offered for sale for up to three years after the

effective date. This three-year time period is referred to as the "sell-through". The sell-through provision allows unlimited use of coatings manufactured prior to the effective dates of the proposed limits. It's important to note that coatings sold prior to the effective dates listed in Table 3-1 must comply with the VOC limits in effect at the time of manufacture. For example, if a Nonflat-High Gloss coating is manufactured in 2009, it would be subject to a VOC limit of 250 g/l.
If that coating complies with the 250 g/l limit, it could be sold until 2012 under the 3-year sell-through provision. However, if a Nonflat-High Gloss coating is manufactured in 2010, it must comply with the150 g/l limit.

No changes are being proposed for the sell-through provision.

3.G.4. Painting Practices

The Standards Section of the proposed SCM also specifies that coating containers and any VOC-containing products used for cleaning or thinning are to be closed when not in use. No changes are being proposed for the painting practices provision.

3.G.5. Thinning

If a user adds thinners or other additives to a coating, the coating must still meet the VOC limits in Table 3-1. In many cases, manufacturers have formulated coatings just below the VOC limit and the addition of any thinning solvent can make a coating non-compliant. No changes are being proposed for the thinning provision.

3.G.6. Coatings Not Listed in Table 3-1

If a coating does not meet any of the definitions for the categories listed in Table 3-1, that coating will be classified as Flat, Nonflat, or Nonflat-High Gloss, based on its gloss level, and the corresponding VOC content limit will apply.
No changes are being proposed for the coatings not listed provision.

3.G.7. Deleted Standards

The 2000 SCM contained a special provision for Industrial Maintenance Coatings. Under this provision, there was a petition process which could allow for the use of 340 g/l Industrial Maintenance Coatings in areas with persistent fog and cold temperatures. This petition process was eliminated because it was only used once and ARB staff determined that it was no longer necessary.

The 2000 SCM specifically prohibited the use of Rust Preventative Coatings for industrial use, unless they complied with the 250 g/l VOC limit for Industrial Maintenance Coatings. This provision was intended to limit the use of high-VOC Rust Preventative Coatings to their intended applications. Rust Preventative

Coatings were intended for application by homeowners and maintenance personnel in non-industrial settings, so the 2000 SCM included a high VOC limit of 400 g/l to allow for user-friendly, single-component products. The 2000 SCM did not intend to allow for the use of 400 g/l products in industrial areas where multi-component products could provide sufficient corrosion protection and meet a VOC limit of 250 g/l. In the proposed SCM, the VOC limit for Rust Preventative Coatings has been lowered from 400 g/l to 250 g/l. Since Rust Preventative and Industrial Maintenance Coatings have the same proposed VOC limit, it is no longer necessary to maintain the prohibition provision and it is proposed for elimination.

The 2000 SCM contained a special provision for Lacquers where a person could add VOC to a lacquer to avoid blushing of the finish, if certain conditions were met. In the proposed SCM, products that were formerly classified as Lacquers would be included in the new Wood Coatings category and the VOC limit was lowered from 550 g/l to 275 g/l. ARB staff has evaluated formulations and manufacturer information for Lacquers that comply with the proposed 275 g/l limit and staff has determined that the lacquer blushing provision is no longer necessary. Therefore, it has been proposed for elimination.

The 2000 SCM contained an averaging compliance option, which expired in 2005 and was administered by ARB staff. Based on staff's experience with the averaging program, we believe that many districts do not have sufficient resources to manage an averaging program. In addition, while averaging is a viable option for a small number of large businesses, it is difficult for small businesses to participate because they have fewer products. Therefore, ARB staff does not believe that it is appropriate or necessary to include an averaging program in the proposed SCM. ARB staff has worked extensively with stakeholders to develop categories and VOC limits that are technologically feasible, without the need for an averaging program.

3.H. CONTAINER LABELING REQUIREMENTS

The proposed SCM describes labeling requirements and specifies where information should be placed on coating containers. Many of the container labeling requirements in the proposed SCM are similar to those in the 2000 SCM. However, some revisions are proposed, as noted below. For details of all the container labeling requirements, please refer to section 6.1 of the proposed SCM.

3.H.1. Date Code

The proposed SCM continues the requirement for each manufacturer to label all coating containers with the date that the coating was manufactured or a code that represents the date of manufacture. No changes are being proposed for the date code labeling requirement.

3.H.2. Thinning Recommendations

The proposed SCM continues the requirement for each manufacturer to label all coating containers with the manufacturer's recommendations regarding the addition of thinning solvents. This requirement does not apply to the use of water as a thinner. No changes are being proposed for the thinning recommendations labeling requirement.

3.H.3. VOC Content

The proposed SCM requires each manufacturer to label all coating containers with the VOC content. If the manufacturer does not recommend thinning, the label must display the VOC content as supplied. If the manufacturer recommends thinning, the label must display the VOC content including the maximum amount of thinning solvent recommended by the manufacturer. If the coating is a multi-component product, the label must display the VOC content as mixed or catalyzed. VOC content can be based on formulation data or the results of laboratory analysis based on specified test methods. VOC content must be displayed in grams of VOC per liter of coating. The format of the VOC content labeling requirement has been changed for clarification purposes, but the requirements have not been changed in the proposed SCM.

3.H.4. Faux Finishing Coatings

The proposed SCM contains a new labeling requirement for Faux Finishing Coatings. Effective January 1, 2010, the labels of all Faux Finishing Coatings must display the statement "This product can only be sold or used as part of a Faux Finishing coating system".

3.H.5. Industrial Maintenance Coatings

The proposed SCM continues the requirement that all Industrial Maintenance Coating containers be labeled with the phrase "For industrial use only" or the phrase "For professional use only". The proposed SCM deletes the option of using the phrases "Not for residential use" or "Not intended for residential use". These options related to residential uses have been eliminated in the proposed SCM, because the SCM does not contain a provision against residential use. Industrial Maintenance coatings are not intended for use by typical homeowners, but there may be some residential settings that require an Industrial Maintenance coating.

3.H.6. Rust Preventative Coatings

The proposed SCM continues the requirement that all Rust Preventative Coating containers be labeled with the phrase "For Metal Substrates Only". However, if a

product meets the definition for Industrial Maintenance Coatings and it is used for corrosion prevention purposes, it is not required that the container be labeled with this phrase.

3.H.7. Specialty Primers, Sealers, and Undercoaters

The proposed SCM requires that all Specialty Primers, Sealers, and Undercoaters (SPSU) containers be labeled with one or more of the following descriptions: “For fire-damaged substrates”; “For smoke-damaged substrates”; or “For water-damaged substrates”. This is similar to the 2000 SCM, but the 2000 SCM also allowed the option of using the phrases “For blocking stains” and “For excessively chalky substrates”. These labeling options related to stain blocking and chalkiness have been eliminated, because the SPSU definition in the proposed SCM has been revised to eliminate criteria related to stain blocking and chalkiness.

3.H.8. Reactive Penetrating Sealers

The proposed SCM contains a new labeling requirement for the new Reactive Penetrating Sealer category. Effective January 1, 2010, the labels of all Reactive Penetrating Sealers must display the statement “Reactive Penetrating Sealer”.

3.H.9. Stone Consolidants

The proposed SCM contains a new labeling requirement for the new Stone Consolidant category. Effective January 1, 2010, the labels of all Stone Consolidants must display the statement “Stone Consolidant – For Professional Use Only”.

3.H.10. Nonflat – High Gloss Coatings

The proposed SCM continues the requirement that all Nonflat – High Gloss Coating containers be labeled with the phrase “High Gloss”. However, if a product meets the definition for Nonflat High Gloss and it is classified under another category (e.g., Rust Preventative, Wood Coating, etc.), it is not required that the container be labeled as “High Gloss”.

3.H.11. Wood Coatings

The proposed SCM contains a new labeling requirement for the new Wood Coating category. Effective January 1, 2010, the labels of all Wood Coatings must display the statement “For Wood Substrates Only”.

3.H.12. Zinc-Rich Primers

The proposed SCM contains a new labeling requirement for the new Zinc-Rich Primer category. Effective January 1, 2010, the labels of all Zinc-Rich Primers must display the statement "For Professional Use Only".

3.H.13. Deleted Labeling Requirements

The 2000 SCM included labeling requirements for Clear Brushing Lacquers and Quick Dry Enamels. These requirements are deleted in the proposed SCM, because these categories have been proposed for deletion from the table of standards.

3.I. REPORTING REQUIREMENTS

The proposed SCM contains reporting requirements which are significantly different from those in the 2000 SCM.

3.I.1. Sales Data

The proposed SCM contains a new requirement to submit sales data. Although this is a new requirement in the SCM, it is intended to implement existing practices. Since 1975, ARB has conducted surveys to collect sales data for architectural coatings. Collection of these data is authorized in the California Health and Safety Code which requires submission of data to estimate emissions. Prior to conducting a survey, ARB staff works with industry representatives to identify appropriate time periods for submittal of survey data. While most manufacturers submit data promptly, some take more than a year to submit survey data. This delay in obtaining the survey data inhibits ARB's efforts to analyze the data and provide it to the districts in a timely fashion. Several states in the Ozone Transport Commission have adopted rules that are based on the 2000 SCM, but they contain an added provision which requires submittal of survey data (DE, 2006; ME, 2006; NH, 2006; NJ, 2004; NY, 2007).
This provision appears to be an effective method of encouraging prompt submittal of survey data. Therefore, the proposed SCM includes a similar provision that is intended to expedite the collection of survey data for architectural coatings. Under this provision, survey data must be provided within 180 days. Failure to do so could result in the issuance of a Notice of Violation or a Notice to Comply from the air district.

3.I.2. Deleted Reporting Requirements

All of the reporting requirements that were contained in the 2000 SCM are proposed for elimination. The intent of these requirements was to track shifts in coating sales that were associated with the changes resulting from the 2000 SCM. ARB staff has reviewed the accumulated data and has incorporated this information when developing the proposed SCM. Staff believes that ARB's

periodic architectural coating surveys are adequate for future tracking of coating sales. Therefore, it is no longer necessary to have annual reporting requirements.

Annual reports have been deleted for the following: Clear Brushing Lacquers; Rust Preventative Coatings; Specialty Primers, Sealers, and Undercoaters; Toxic Exempt Compounds (perchloroethylene and methylene chloride); Recycled Coatings; Bituminous Roof Coatings; and Bituminous Roof Primers.

3.J. COMPLIANCE PROVISIONS AND TEST METHODS

This section of the proposed SCM designates acceptable methods for determining compliance with the requirements contained in the SCM.

3.J.1. VOC Content

The proposed SCM designates acceptable methods for determining compliance with the requirements. The proposed SCM contains revisions to the section that describes how to determine VOC content. For clarification purposes, there is new text to explain that VOC content must reflect the amount of recommended thinning solvent. In addition, equations for calculating VOC contents have been moved to the Definitions Section of the SCM.

Traditionally, U.S. EPA Method 24 has been designated as the official way of verifying the VOC content for architectural coatings. ARB is currently funding a research project to develop an expanded test method that is intended to improve the accuracy for laboratory tests involving waterborne coatings, multi-component coatings, and others that may be difficult to analyze with Method 24. Since this research is not yet completed, it has not been included in the proposed SCM. However, it is ARB's intent that districts allow for the use of the expanded method under development, if the research data indicate that it is a valid alternative. The proposed SCM allows for the use of alternative test methods, but manufacturers must first obtain written approval from the district, ARB, and the U.S. EPA. If an alternative test method is approved, the results of the alternative method will govern, if there are discrepancies between the results of the alternative method and formulation data. Similarly, if there are discrepancies between VOC content based on formulation data and the results of a Method 24 test, Method 24 test results will prevail.

3.J.2. New Test Methods

The proposed SCM contains new test methods to verify compliance with proposed changes in the Definitions Section. New test methods have been added for Basement Specialty Coatings, Reactive Penetraing Sealers, Stone Consolidants, Tub and Tile Refinish Coatings, and Waterproofing Membranes.

3.J.3. Deleted Test Methods

In the proposed SCM, the test method has been deleted for determining drying times, because the Quick Dry categories have been proposed for elimination and there is no need to verify drying times for the other coating categories. In addition, the test method for determining surface chalkiness has been deleted, because chalkiness has been removed from the criteria in the Specialty Primer, Sealer, and Undercoater category.

3.K. REFERENCES

Delaware Administrative Code, Title 7, Section 1141, "Limiting Emissions of Volatile Organic Compounds From Consumer and Commercial Products, 1.0 Architectural and Industrial Maintenance Coatings". (DE, 2006)

Code of Maine Rules, 06 096 Department of Environmental Protection, Chapter 151, "Architectural and Industrial Maintenance (AIM) Coatings". (ME, 2006)

New Hampshire Code of Administrative Rules, Chapter Env-A 4200, "Architectural and Industrial Maintenance Coatings". (NH, 2006)

New Jersey Administrative Code, Title 7, Chapter 27, Subchapter 23, "Prevention of Air Pollution from Architectural Coatings". (NJ, 2004)

New York Codes Rules and Regulations, Title 6, Part 205, "Architectural and Industrial Maintenance (AIM) Coatings". (NY, 2007)

CHAPTER 4. PROCESS FOR DEVELOPING PROPOSED SCM

In 2005, ARB staff initiated activities to develop the proposed SCM. These activities have included:

- Conducting a survey of architectural coatings;
- Meeting with district and U.S. EPA Region IX representatives;
- Hosting public workshops;
- Meeting with industry trade groups and individual manufacturers;
- Meeting with essential public services agencies;
- Evaluating the South Coast AQMD Rule 1113 and the U.S. EPA's National Architectural Coatings Rule;
- Conducting technology assessments of all the coating categories;
- Evaluating durability and performance research for several coating categories;
- Preparing an environmental impact analysis; and
- Conducting an economic impacts survey and preparing an economic analysis.

4.A. 2005 ARCHITECTURAL COATINGS SURVEY

In early 2005, ARB staff began working with manufacturers and industry groups to develop a new survey of architectural and industrial maintenance coatings sold in California. The last such ARB survey was undertaken in 2001 (ARB, 2003a) and surveyed sales and VOC contents of coatings sold in 2000. In April 2005, the ARB sent out the latest survey seeking 2004 sales data. The survey due date was September 1, 2005, but manufacturers submitted data as late as August 2006.

Data entry and quality assurance checking were completed in September 2006, and a draft survey report was posted for public review (ARB, 2006). Notifications were e-mailed or mailed to all survey respondents and other interested parties that were subscribers to the ARB Architectural Coatings ListServe. A discussion of the survey results is included in Chapter 5.

4.B. INFORMAL MEETINGS WITH DISTRICTS, U.S. EPA, AND INDUSTRY

In October 2006, ARB and district personnel established a District Working Group to discuss the update of the 2000 SCM. This working group also includes representatives from U.S. EPA Region IX. ARB had five conference calls with this group to discuss items including: district SIP commitments for emission reductions from architectural coatings; findings of the 2005 architectural coatings survey; the possibility of a reactivity-based approach; specific SCM language; the environmental impact analysis; and flexibility options for manufacturers to comply with the SCM. The U.S. EPA was involved in the meetings to keep them abreast of the SCM developments, and to increase the likelihood that the district rules

based on the SCM will be approvable as SIP revisions. In addition to meeting with the District Working Group, ARB staff participated in four meetings with California Air Pollution Control Officers Association (CAPCOA) committees.

Also in October 2006, ARB and coating industry representatives established an Industry Working Group, similar to the District Working Group. ARB had four conference calls with the Industry Working Group to discuss items including: revisions of coating category definitions; proposed VOC limits; the possibility of a reactivity-based approach; the use of tertiary Butyl Acetate (TBAc); and flexibility options for manufacturers to comply with the SCM.

In addition to the meetings with the Industry Working Group, ARB hosted meetings with industry trade groups. ARB also had meetings and conference calls with individual manufacturers about their particular concerns and to share data. About 40 such meetings with manufacturers or trade groups have occurred.

4.C. FORMAL PUBLIC MEETINGS

In developing the proposed SCM, ARB hosted three public workshops in Sacramento on December 12, 2006; March 13, 2007; and June 6, 2007. Participants included representatives from industry (coatings manufacturers, ingredient manufacturers, coatings contractors, user groups, and trade associations); local districts; the U.S. EPA; and other interested parties. The first workshop focused on general discussions regarding the SCM update, the project timeline, and the technical approach. At the second workshop, ARB staff presented draft VOC limits and draft revised definitions for several major coating categories. At the third workshop, ARB staff presented draft regulatory language for the SCM. Comments were submitted to ARB from manufacturers, trade associations, and other agencies. ARB's responses to those comments are contained in Chapter 5.

Staff posted draft SCM materials on ARB's Internet site and sent List Serve notices to over 900 subscribers to announce the availability of these materials. Posted items included: workshop announcements; draft SCM revisions; survey data; reactivity analysis data; workshop slide presentations; and lists with examples of compliant coating products. Copies of workshop announcements are contained in Appendix F.

4.D. EVALUATION OF OTHER ARCHITECTURAL COATING RULES

4.D.1. U.S. EPA National Architectural Coating Rule

On August 14, 1998, the U.S. EPA promulgated the final version of their National Volatile Organic Compound Emission Standards for Architectural Coatings (National Rule) (U.S. EPA, 1998a). The National Rule took effect on

September 13, 1999 and it was adopted in accordance with section 183(e) of the Federal Clean Air Act, which allows U.S. EPA to regulate manufacturers and importers to obtain VOC emission reductions. Section 183(e) does not give U.S. EPA the authority to regulate end users, so the National Rule only applies to manufacturers and importers of architectural coatings (U.S. EPA, 1998a; 1998b). ARB's SCM applies to a broader range of entities, including manufacturers, distributors, retailers, and users of architectural coatings.

The National Rule, section 59.410, specifically allows states or local governments to adopt more stringent emission limits for architectural coatings. The VOC limits in the 2000 SCM and the proposed SCM are equal to or more stringent than those in the National Rule, as shown in Table 4-1. In California, approximately 3% of the population lives in areas that are governed by the National Rule. The remainder of the population is subject to the 2000 SCM or South Coast AQMD Rule 1113.

The U.S. EPA is planning to update its national architectural coatings rule in 2007. The limits proposed in that update are expected to reflect those limits found in the 2002 OTC model rule (Page, 2007), which was based on the 2000 SCM, with some modifications. The 2000 SCM has become the model rule that is spreading across the country. Therefore, we must be aware that the limits we set in the proposed SCM may have similar impacts across the country.

Table 4-1
Comparison Between National Rule and Proposed SCM

EPA Category	EPA VOC Limit (g/l)	Potential Corresponding Categories in Proposed SCM	Proposed SCM VOC Limit (g/l)
Antenna Coatings	530	Industrial Maintenance	250
Anti-Fouling Coatings	450	Industrial Maintenance	250
Anti-Graffiti Coatings	600	Industrial Maintenance	250
Bituminous Coatings and Mastics	500	Bituminous Roof Coatings Bituminous Roof Primers Concrete/Masonry Sealers Driveway Sealers Industrial Maintenance Waterproofing Membranes	50 350 100 50 250 250
Bond Breakers	600	Bond Breakers	350
Calcimine Recoaters	475	Flat Specialty PSU	50 100
Chalkboard Resurfacers	450	Industrial Maintenance	250
Concrete Curing Compounds	350	Concrete Curing Compounds	350
Concrete Curing and Sealing Compounds	700	Concrete Curing Compounds Concrete/Masonry Sealers	350 100
Concrete Protective Coatings	400	Concrete/Masonry Sealers	100
Concrete Surface Retarders	780	Concrete Curing Compounds	350
Conversion Varnish	725	Wood Coatings	275
Dry Fog Coatings	400	Dry Fog Coatings	150
Extreme high durability coatings	800	Industrial Maintenance	250
Faux Finishing/Glazing	700	Faux Finishing Coatings	350

Table 4-1
Comparison Between National Rule and Proposed SCM

EPA Category	EPA VOC Limit (g/l)	Potential Corresponding Categories in Proposed SCM	Proposed SCM VOC Limit (g/l)
Fire-Retardant/Resistive Coatings:			
Clear	850	Fire Resistive [1]	350
Opaque	450	Fire Resistive [1]	350
Flat Coatings:			
Exterior	250	Flat	50
Interior	250	Flat	50
Floor Coatings	400	Floor Coatings	100
Flow Coatings	650	Industrial Maintenance	250
Form Release Compounds	450	Form Release Compounds	250
Graphic Arts Coatings (Sign Paints)	500	Graphic Arts Coatings (Sign Paints)	500
Heat Reactive Coatings	420	Industrial Maintenance	250
High Temperature Coatings	650	High Temperature Coatings	420
Impacted Immersion Coatings	780	Industrial Maintenance	250
Industrial Maintenance Coatings	450	Industrial Maintenance Tub and Tile Refinish	250 420
Lacquers (including lacquer sanding sealers)	680	Wood Coatings	275
Magnesite Cement Coatings	600	Magnesite Cement Coatings	450
Mastic Texture Coatings	300	Mastic Texture Coatings	100
Metallic Pigmented Coatings	500	Metallic Pigmented Coatings Aluminum Roof Zinc-Rich Primers	500 400 340
Multi-Colored Coatings	580	Multi-Color Coatings	250
Nonferrous Ornamental Metal Lacquers and Surface Protectants	870	Rust Preventative Nonflat – High Gloss Primers, Sealers, Undercoaters	250 150 100
Nonflat Coatings:			
Exterior	380	Nonflat Coatings	100
Interior	380	Nonflat Coatings	100
Nuclear Coatings	450	Industrial Maintenance	250
Pretreatment Wash Primers	780	Pretreatment Wash Primers	420
Primers and Undercoaters	350	Primers, Sealers, Undercoaters Specialty PSU	100 100
Quick-Dry Coatings:			
Enamels	450	Nonflat – High Gloss	150
Primers, Sealers, and Undercoaters	450	Primers, Sealers, Undercoaters Specialty PSU	100 100
Repair and Maintenance Thermoplastic	650	Industrial Maintenance	250
Roof Coatings	250	Roof Coatings	50
Rust Preventative Coatings	400	Rust Preventative Coatings	250
Sanding Sealers (other than lacquer sanding sealers)	550	Wood Coatings	275

Table 4-1
Comparison Between National Rule and Proposed SCM

EPA Category	EPA VOC Limit (g/l)	Potential Corresponding Categories in Proposed SCM	Proposed SCM VOC Limit (g/l)
Sealers (including interior clear wood sealers)	400	Primers, Sealers, Undercoaters Specialty PSU Wood Coatings Concrete/Masonry Sealers	100 100 275 100
Shellacs:		Shellacs:	
Clear	730	Clear	730
Opaque	550	Opaque	550
Stains:			
Clear and Semitransparent	550	Stains (Semitransparent) Wood Coatings (Clear Stains)	250 275
Opaque	350	Stains	250
Low Solids	120[2]	Low Solids	120[2]
Stain Controllers	720	Wood Coatings	275
Swimming Pool Coatings	600	Swimming Pool Coatings	340
Thermoplastic Rubber Coatings and Mastics	550	Roof Coatings	50
Traffic Marking Coatings	150	Traffic Marking Coatings	100
Varnishes	450	Wood Coatings	275
Waterproofing Sealers and Treatments	600	Concrete/Masonry Sealers Wood Coatings Basement Specialty Coating Driveway Sealers Waterproofing Membrane	100 275 400 50 250
Wood Preservatives:			
Below Ground Wood Preservatives	550	Wood Preservatives	350
Clear and Semitransparent	550	Wood Preservatives	350
Opaque	350	Wood Preservatives	350
Low Solids	120[2]	Low Solids	120[2]
Zone Marking Coatings	450	Traffic Marking Coatings	100

1. In the proposed SCM, the "Fire Resistive" category would be retained for those products that are certified in accordance with ASTM E119-07. However, the "Fire Retardant" category would be eliminated and coatings with fire retardant properties would fall under their primary categories (e.g., Flat, Nonflat, etc.)
2. Units are grams of VOC per liter of coating, including water and exempt compounds, thinned to the maximum thinning recommended by the manufacturer.

The National Rule contains flexibility provisions that are not in the proposed SCM: (1) an exceedance fee provision; (2) a tonnage exemption; and (3) a recycled coatings compliance option. For compliance with these provisions, manufacturers and importers must keep specified records and submit annual reports to the appropriate regional U.S. EPA office.

The exceedance fee provision allows manufacturers and importers to comply with the rule by paying a fee, in lieu of meeting the VOC content limits. The tonnage exemption allows manufacturers and importers to sell or distribute limited quantities of architectural coatings that do not comply with the VOC content limits and for which no exceedance fee is paid.

The recycled coatings compliance option allows calculation of an adjusted VOC content for coatings that contain a certain percentage of post-consumer coating. Containers of recycled architectural coatings must include labeling that shows the percentage, by volume, of post-consumer coating content.

ARB staff did not include an exceedance fee or tonnage exemption in the proposed SCM, because we need to maximize emission reductions, due to the severe air quality problems in California. The National Rule's recycled coating option was not included in the proposed SCM, because we believe having a Recycled Coatings category with a VOC limit of 250 g/l accomplishes the same goal of encouraging recycling without the need for an adjusted VOC content credit.

It is important to remember that the proposed SCM is intended for the non-SCAQMD portion of California. It is not intended to be a model for the entire United States. There are some VOC limits that may be inappropriate for other parts of the country. Because many parts of the country have significantly higher precipitation, both rain and snow, and significantly lower temperatures, architectural coating categories that are sensitive to application temperature may need to have higher VOC limits to allow for more solventborne products. Examples of such categories are: Bituminous Roof Coatings, Driveway Sealers, Roof, and Industrial Maintenance Coatings. Other categories that may need higher VOC limits would include coatings that are specific to different parts of the country, such as some categories that have already been identified in the OTC model rule, and coatings for historical renovation, including some clear wood floor coatings, such as conjugated tung oil varnishes.

4.D.2. South Coast AQMD Rule 1113

On November 8, 1996 and May 14, 1999, the South Coast AQMD revised Rule 1113, their architectural coating regulation (SCAQMD, 1996; 1999). These revisions of Rule 1113 contained interim VOC limits that were largely adopted in the 2000 SCM. Since that time, the South Coast AQMD has revised Rule 1113 in 2001, 2002, 2003, 2004, and 2006 (SCAQMD, 2001; 2002a; 2003; 2004; 2006b). While developing the proposed SCM, ARB staff considered the feasibility of proposing the Rule 1113 VOC limits that are scheduled to be fully implemented by 2008. In many cases, ARB staff determined that the final South Coast AQMD limits would be feasible for implementation beyond the South Coast AQMD. However, there are some categories for which staff determined that a higher VOC limit would be more appropriate at this time. The most significant of these categories are Aluminum Roof Coatings, Industrial Maintenance Coatings, Nonflat Coatings, Nonflat-High Gloss Coatings, Rust Preventative Coatings, and Exterior Stains. The primary reasons for having a higher limit in the proposed SCM include the following:

The Proposed SCM Needs to be Suitable for a Variety of Climates

Rule 1113 applies to coating activities that occur within the boundaries of the South Coast AQMD, which has a relatively mild, warm climate. This type of climate provides advantages for developing low-VOC coatings with acceptable performance and durability. However, in Northern California and other parts of the State, the climate can have far greater extremes of temperature and humidity. For these areas outside of the South Coast, coatings have to withstand harsher climates and it can be more difficult to develop low-VOC products. As South Coast AQMD staff has said in public meetings, some of the VOC limits in their rule, specifically for Nonflat and Nonflat-High Gloss Coatings, are not intended necessarily for areas outside of the South Coast AQMD (SCAQMD, 2006a). There are concerns with freeze/thaw stability and dirt pick up due to removal of VOCs to meet the lower limits. This concern also applies in varying degrees to Aluminum Roof Coatings, Industrial Maintenance Coatings, Rust Preventative Coatings, and Exterior Stains.

The Proposed SCM Does Not Contain an Averaging Provision

Rule 1113 contains an averaging provision, but the proposed SCM does not allow averaging. In the South Coast AQMD, coating manufacturers can sell products that exceed the VOC limits in Rule 1113, if they can demonstrate that emissions from the high-VOC products are being offset by emissions from ultra low-VOC products. These ultra low-VOC products must have VOC levels that are below the allowable limits. Participants in the averaging program must prepare detailed plans and reports to verify their emissions data. Management of an averaging program can require significant staff resources for detailed recordkeeping and auditing. All of the categories mentioned above can be averaged.

The 2000 SCM contained a temporary averaging provision, which expired in 2005 and was administered by ARB staff. When districts submitted their 2000 SCM rules to U.S. EPA for approval, U.S. EPA disapproved the averaging provision, primarily due to issues regarding recordkeeping. While administering the averaging program, ARB staff found that it was a viable option for a small number of large companies that have a wide variety of product lines. However, it was generally difficult for small businesses to take advantage of this flexibility provision because they had far fewer products available for averaging. ARB also found that management of the averaging program required significant staff resources, and most districts did not have the resources to manage and enforce such a program.

Based on ARB's experience with the averaging program, staff determined that it would be preferable to establish VOC limits that wouldn't require the need for an averaging program to allow for the sale of higher VOC products in limited instances. ARB staff has worked extensively with stakeholders to develop categories and VOC limits that are technologically feasible, without the need for

an averaging program. Therefore, ARB staff does not believe that it is appropriate or necessary to include an averaging program in the proposed SCM.

The Proposed SCM Does Not Contain a VOC Exemption for TBAc

Rule 1113 contains a limited VOC exemption for TBAc to allow for its use in Industrial Maintenance Coatings only. Under this exemption, manufacturers do not have to include TBAc when calculating the VOC content of Industrial Maintenance coatings. Because they've allowed for the use of TBAc as an exempt solvent, South Coast AQMD determined that it was technologically feasible to establish a VOC limit of 100 g/l for Industrial Maintenance Coatings. ARB staff has not yet proposed a similar exemption for TBAc, due to health concerns about toxicity identified by the Office of Environmental Health Hazard Assessment (OEHHA). Also, ARB staff found that essential public service agencies are having difficulty certifying products that can comply with the 100 g/l limit and meet their specifications for projects throughout the State, even with the TBAc exemption. Since the proposed SCM does not allow for the use of TBAc as an exempt solvent, staff determined that it was appropriate to retain the 250 g/l VOC limit for the Industrial Maintenance category.

The Proposed SCM Does Not Contain Small Business Exemptions

Rule 1113 contains small business exemptions for manufacturers of Lacquers; Flats; Nonflats; Primers, Sealers, and Undercoaters; Quick Dry Enamels; Waterproofing Concrete/Masonry Sealers; and Rust Preventative Coatings. For example, manufacturers of Flat coatings are exempt from the Rule 1113 VOC limits, if they meet designated small business criteria. For the other categories under these exemptions, manufacturers can have up to two additional years to comply with VOC limits, if they meet designated small business criteria. The proposed SCM does not contain any small business exemptions, because most districts do not have the resources to manage and enforce this type of flexibility option. In addition, ARB staff believes that this type of exemption can be inequitable because it excludes companies that don't meet the criteria for a small business, but have niche product lines with small sales volumes.

The Proposed SCM Does Not Contain an Exemption for High Elevations

Rule 1113 contains an exemption for all stains and lacquers that are used in areas with elevations of 4,000 feet or greater above sea level. Stains and lacquers that are used at these high elevations are exempt from VOC limits and all other requirements of Rule 1113. The proposed SCM does not include an exemption for high elevations.

The Proposed SCM Needs to Be Enforceable by Small Districts

Many of the flexibility provisions contained in Rule 1113 require considerable staff resources to implement and enforce. Significant staff time is often needed to gather data, perform analyses, compile reports, and conduct audits to validate the proper use of flexibility provisions. Many of California's air districts have limited staff available to enforce flexibility provisions in architectural coating rules.

Since these districts will need to enforce the proposed SCM, ARB staff has determined that the rule will be more effective with a limited use of flexibility provisions. Accordingly, the proposed SCM does not contain an averaging provision or the exemptions mentioned above, all of which require resources for recordkeeping and auditing. Larger air districts can provide added flexibility by using their existing variance rules, if they choose to do so.

Table 4-2 contains a comparison between South Coast AQMD's Rule 1113 and the proposed SCM VOC limits.

Table 4-2
Comparison Between South Coast Rule 1113 and Proposed SCM

South Coast Rule 1113 Category	Rule 1113 Ceiling Limit [1] (g/l)	Rule 1113 VOC Limit (g/l)	Potential Corresponding Categories in Proposed SCM	Proposed SCM VOC Limit (g/l)
Bond Breakers	350	350	Bond Breakers	350
Clear Wood Finishes	350	275	Wood Coatings	275
Varnish	350	275	Wood Coatings	275
Sanding Sealers	350	275	Wood Coatings	275
Lacquer	680	275	Wood Coatings	275
Clear Brushing Lacquer	680	275	Wood Coatings	275
Concrete-Curing Compounds	**350**	**100**	**Concrete Curing Compounds**	**350**
Concrete-Curing Compounds For Roadways and Bridges	350	350	Concrete Curing Compounds	350
Dry-Fog Coatings	400	150	Dry Fog Coatings	150
Fire-Proofing Exterior Coatings	450	350	Fire Resistive Coatings	350
Flats	250	50	Flat Coatings	50
Floor Coatings	**420**	**50**	**Floor Coatings**	**100**
Graphic Arts (Sign) Coatings	500	500	Graphic Arts Coatings (Sign Paints)	500
Industrial Maintenance Coatings	**420**	**100 [2]**	**Industrial Maintenance Coatings**	**250**
High Temperature IM Coatings	420	420	High Temperature Coatings	420
Zinc-Rich IM Primers	**420**	**100**	**Zinc-Rich Primers**	**340**
Japans/Faux Finishing Coatings	700	350	Faux Finishing Coatings	350
Low-Solids Coating	-	120 [3]	Low Solids Coatings	120 [3]
Magnesite Cement Coatings	600	450	Magnesite Cement Coatings	450
Mastic Coatings	**300**	**300**	**Mastic Texture Coatings**	**100**
Metallic Pigmented Coatings	500	500	Metallic Pigmented Coatings	500
Multi-Color Coatings	420	250	Multi-Color Coatings	250
Nonflat Coatings	**250**	**50**	**Nonflat Coatings**	**100**
Nonflat High Gloss	**250**	**50**	**Nonflat - High Gloss**	**150**
Pigmented Lacquer	680	275	Wood Coatings	275
Pre-Treatment Wash Primers	780	420	Pre-Treatment Wash Primers	420
Primers, Sealers, and Undercoaters	350	100	Primers, Sealers, and Undercoaters	100
Quick-Dry Enamels	**400**	**50**	**Nonflat - High Gloss**	**150**

Table 4-2
Comparison Between South Coast Rule 1113 and Proposed SCM

South Coast Rule 1113 Category	Rule 1113 Ceiling Limit [1] (g/l)	Rule 1113 VOC Limit (g/l)	Potential Corresponding Categories in Proposed SCM	Proposed SCM VOC Limit (g/l)
Quick-Dry Primers, Sealers, and Undercoaters	350	100	Primers, Sealers, and Undercoaters	100
Recycled Coatings	-	250	Recycled Coatings	250
Roof Coatings	300	50	Roof Coatings Bituminous Roof Coatings	50 50
Roof Coatings, Aluminum	**500**	**100**	**Aluminum Roof Coatings**	**400**
Roof Primers, Bituminous	350	350	Bituminous Roof Primers	350
Rust Preventative Coatings	**420**	**100**	**Rust Preventative Coatings**	**250**
Shellac			Shellacs	
Clear	730	730	Clear	730
Pigmented	550	550	Opaque	550
Specialty Primers	350	100	Specialty Primers, Sealers, and Undercoaters	100
Stains	**350**	**100**	**Stains**	**250**
Stains, Interior	250	250	Stains	250
Swimming Pool Coatings				
Repair	650	340	Swimming Pool Coatings	340
Other	340	340	Swimming Pool Coatings	340
Traffic Coatings	**250**	**100**	**Traffic Marking Coatings** **Driveway Sealers**	**100** **50**
Waterproofing Sealers	**400**	**100**	**Concrete/Masonry Sealers** **Wood Coatings** **Basement Specialty Coatings** **Waterproofing Membranes** **Reactive Penetrating Sealer**	**100** **275** **400** **250** **350**
Waterproofing Concrete/Masonry Sealers	**400**	**100**	**Concrete/Masonry Sealers** **Basement Specialty Coatings** **Waterproofing Membranes** **Reactive Penetrating Sealer** **Stone Consolidant**	**100** **400** **250** **350** **450**
Wood Preservatives				
Below-Ground	350	350	Wood Preservatives	350
Other	350	350	Wood Preservatives	350
Default	**-**	**250**	**Form-Release Compounds** **Stone Consolidant** **Tub and Tile Refinish** **Default**	**250** **450** **420** **50-150**

1. Ceiling Limit: The maximum allowable VOC content for coatings that are included in the Rule 1113 averaging program.
2. For Industrial Maintenance Coatings, Rule 1113 allows for the use of TBAc as an exempt solvent to help achieve the 100 g/l VOC limit.
3. Units are grams of VOC per liter of material (i.e., including water and exempt compounds).

Traditionally, architectural coating rules have contained an exemption for products sold in small containers (“one liter or less”). This exemption has served as a safety valve for small volume, niche applications that may need a higher

VOC product. Based on data from several ARB surveys, small containers have consistently accounted for a very small percentage of architectural coating sales. In 2004, small containers only accounted for three percent of the total sales volume, and less than half of those sales exceeded the VOC limits for large containers. Therefore, ARB staff does not believe that the small container exemption needs to be amended or deleted.

In December 2003, South Coast AQMD revised their small container exemption to eliminate the small container exemption for varnishes, sanding sealers, clear lacquers, and pigmented lacquers, effective July 1, 2006. In addition, the South Coast AQMD requires manufacturers to submit an annual report to document sales of products sold in small containers. The proposed SCM does not contain a requirement for annual reporting, because ARB already conducts periodic surveys that gather data on coating sales volumes. The proposed SCM also retains the small container exemption for wood coatings, because staff has found it to be an effective way of addressing niche applications and providing flexibility without a significant loss of emission reductions.

4.E. TECHNOLOGY ASSESSMENT

To ensure that the proposed SCM is technologically and commercially feasible, ARB staff conducted a technology assessment for all of the coating categories. Details of these assessments are provided in Chapter 5. Some of the sources of information utilized in the technology assessments included: the ARB 2005 survey data; manufacturers' product data sheets; Internet websites; books and trade magazines; technical reports; test results and specifications; U.S. EPA's Background Information Document (U.S. EPA, 1998a); discussions with manufacturers and users of coatings; and information from trade associations. Based on their technical analyses, staff has concluded that the overall performance of the reformulated products in each category will be similar to the performance of their higher VOC counterparts. To confirm this analysis, ARB staff will conduct technology reviews for the proposed VOC limits that are lower than current limits, prior to their effective dates.

4.F. LABORATORY AND FIELD TESTING

When evaluating technological feasibility for low-VOC coatings, ARB staff reviewed laboratory and field testing data that compared the performance characteristics for low- and high-VOC coatings. Table 4-3 summarizes the formal testing projects that were included in our evaluation. ARB staff also reviewed confidential test data provided by some coating manufacturers. In general, most of the data indicate that low-VOC coatings can perform comparably to high-VOC coatings. Detailed descriptions of testing results are contained in Chapter 5 for the applicable categories.

Table 4-3
Test Data That Were Reviewed for the Proposed SCM

Study Name	Project Sponsor	Study Conducted By	Report Date	Categories Studied
"Development and Demonstration of Zero-And Low-VOC Resin Technology For Advanced Control Measure Development"	SCAQMD	AVES	March 2001	Lacquers; Sanding Sealers; Stains; Varnishes; Waterproofing Sealers
"KTA-Tator Study"	SCAQMD	KTA-Tator	July 2002	Floor; Nonflat High Gloss; Primer, Sealer, Undercoater; Stains
"Testing Industrial Maintenance Coatings For Wastewater Environments"	Southern California Alliance of Publicly Owned Treatment Works (SCAP)	KTA-Tator	August 2003	Industrial Maintenance
"Phase II Assessment Study of Architectural Coatings"	SCAQMD/ ARB	National Technical Systems (NTS)	December 2003	Industrial Maintenance; Nonflat
"Essential Public Service Agency Technology Assessment"	Essential Public Service Agencies (EPSA)	Metropolitan Water District of Southern California (MWD)	December 2005	Industrial Maintenance
"Architectural & Industrial Maintenance Coatings Technology Assessment"	SCAQMD	University of Missouri, Rolla	May 2006	Industrial Maintenance; Lacquers; Nonflat; Nonflat – High Gloss; Primer, Sealer, Undercoater; Rust Preventative; Sanding Sealers; Stains; Varnishes; Waterproofing Concrete/Masonry Sealer

(ARB, 2003b; AVES, 2001; MWD, 2005; SCAP, 2003; SCAQMD, 2002b; UMR, 2006)

4.G. ENVIRONMENTAL IMPACT ANALYSIS

Both the California Environmental Quality Act (CEQA) and ARB policy require ARB to evaluate the potential adverse environmental impacts of proposed projects. For the 2000 SCM, staff prepared a formal environmental impact report (EIR), which is incorporated by reference herein (ARB, 2000). The EIR included an analysis of environmental impacts that could potentially result from the implementation of the 2000 SCM throughout California (excluding the South Coast AQMD). Staff investigated the potential for environmental impacts in six

main areas: air quality; water demand and quality; public services; transportation and circulation; solid and hazardous waste; and health hazards. The analysis concluded that implementing the 2000 SCM would have no significant adverse impacts, but would have a net air quality benefit.

For the proposed SCM, staff has addressed potential environmental impacts in Chapter 6. Staff believes that districts can use this information and the EIR from the 2000 SCM to support their environmental impact analyses when they adopt local rules based on the proposed SCM.

4.H. ECONOMIC ANALYSIS

Chapter 7 of the Staff Report discusses the economic impacts ARB anticipates from implementation of the proposed SCM. ARB staff quantified the economic impacts to the extent feasible, but economic impact analyses can be inherently imprecise by nature. Therefore, some projections are necessarily qualitative or semi-quantitative, based on general observations about the architectural coatings industry. The economic impacts analysis for the proposed SCM provides a general picture of the economic impacts that typical businesses might encounter, but staff recognizes that individual companies may experience impacts different than those projected in this analysis.

The staff evaluation included a cost-effectiveness analysis and a business impacts analysis. The cost-effectiveness analysis measured how cost-efficient the proposed SCM will be in reducing VOCs relative to other regulatory programs. The business impacts analysis evaluated the impacts on profitability, employment, and competitiveness to California businesses, consumers, and government agencies (ARB, 2007).

4.I. REFERENCES

Air Resources Board. Final Report. “2001 Architectural Coatings Survey.” October, 2003. (ARB, 2003a)

Air Resources Board. “Summary of Phase II Assessment Study of Architectural Coatings, EMMAQUA Accelerated Weathering, 24 Month Real Time Exposure.” Prepared for ARB’s 2003 Update on the Architectural Coatings Suggested Control Measure. December, 2003. (ARB, 2003b)

Air Resources Board. Draft Report. “2005 Architectural Coatings Survey.” September, 2006. (ARB, 2006)

Air Resources Board. “Economic Impacts Survey for the Air Resources Board’s Proposed Architectural Coatings Suggested Control Measure.” April, 2007 (ARB, 2007)

AVES, an affiliate of ATC Associates, Inc. "Development and Demonstration of Zero- And Low-VOC Resin Technology For Advanced Control Measure Development, Final Report." Prepared for the South Coast AQMD, AQMD Contract #99143. March 29, 2001. (AVES, 2001)

Metropolitan Water District of Southern California. Letter from MWD to the South Coast AQMD, regarding "Essential Public Service Agency Technology Assessment Information". December 12, 2005. (MWD, 2005)

Page, S. Memorandum. "Emission Reduction Credit for Three Federal Rules for Categories of Consumer and Commercial Products under Section 183(e) of the Clean Air Act." May 30, 2007. (Page, 2007)

Southern California Alliance of Publicly Owned Treatment Works. Letter from SCAP to the South Coast AQMD, regarding "Final Report, Testing Industrial Maintenance Coatings for Wastewater Environments." August 27, 2003. (SCAP, 2003)

South Coast Air Quality Management District. Draft Staff Report. "Proposed Amendments to Rule 1113 – Architectural Coatings." September 26, 1996. (SCAQMD, 1996)

South Coast Air Quality Management District. Draft Staff Report. "Proposed Amendments to Rule 1113 – Architectural Coatings." May 14, 1999. (SCAQMD, 1999)

South Coast Air Quality Management District. "Staff Report for Proposed Amended Rule 1113 – Architectural Coatings". July 20, 2001. (SCAQMD, 2001)

South Coast Air Quality Management District. "Staff Report For Proposed Amended Rule 1113 – Architectural Coatings". December 6, 2002. (SCAQMD, 2002a)

South Coast Air Quality Management District. "Annual Status Report on Rule 1113 – Architectural Coatings, Appendix B, KTA-Tator Study." Prepared under South Coast AQMD Contract #01123. July 12, 2002. (SCAQMD, 2002b)

South Coast Air Quality Management District. "Final Staff Report For Proposed Amended Rule 1113 – Architectural Coatings". December 5, 2003. (SCAQMD, 2003)

South Coast Air Quality Management District. "Final Staff Report For Proposed Amended Rule 1113 – Architectural Coatings". July 9, 2004. (SCAQMD, 2004)

South Coast Air Quality Management District. Board Hearing Webcast. Online, Internet at www.aqmd.gov/aqmd/webcast/webcast_calender.htm, January 6, 2006. (SCAQMD, 2006a)

South Coast Air Quality Management District. "Final Staff Report For Proposed Amended Rule 1113 – Architectural Coatings". June 2, 2006. (SCAQMD, 2006b)

UMR Coatings Institute, University of Missouri Rolla. Final Report. "Architectural & Industrial Maintenance Coatings Technology Assessment." RFP #P2004-24. May 22, 2006. (UMR, 2006)

United States Environmental Protection Agency. "National Volatile Organic Compound Emission Standards for Architectural Coatings." 63 *Federal Register* No. 176. September 11, 1998. (U.S. EPA, 1998a)

United States Environmental Protection Agency. "National Volatile Organic Compound Emission Standards for Architectural Coatings – Background for Promulgated Standards." EPA-453/R-98-0006b. August, 1998. (U.S. EPA, 1998b)