SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

Final Environmental Assessment for:

Proposed Amended Rule 1113 - Architectural Coatings

SCAQMD No. 030925MK

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PREFACE

The Draft Environmental Assessment (EA) for the proposed amendments to Rule 1113 – Architectural Coatings was circulated for a 30-day public review and comment period from September 25, 2003 to October 24, 2003. Three public comment letters were received. Responses to the comment letters, as well as the comment letters, are included in this Final EA. Deletions and additions to the text of the EA are denoted using ~~strikethrough~~ and <u>underlined</u>, respectively.

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INTRODUCTION

Rule 1113 – Architectural Coatings, was originally adopted by the South Coast Air Quality Management District (SCAQMD) on September 2, 1977, to control volatile organic compound (VOC) emissions from architectural coatings and was amended 22 times since the adoption date. The current proposed amendments to Rule 1113 would implement, in part, the 2003 Air Quality Management Plan (AQMP) control measure CTS-07 – Further Emission Reductions from Architectural Coatings and Cleanup Solvents, which calls for further reduction of VOC emissions from various architectural coating categories used in this industry. This control measure was also part of the 1999 Amendment to the 1997 Ozone State Implementation Plan (SIP) Revision for South Coast Air Basin, which is also consistent with the settlement agreement for the 1997 litigation between the SCAQMD and the Natural Resources Defense Council (NRDC), the Coalition for Clean Air (CCA) and Communities for a Better Environment (CBE).

Rule 1113 was amended on November 2, 1996 to achieve approximately 17.5 percent (10.3 tons per day (tpd)) emission reductions. An additional 38 percent (21.8 tpd) emission reduction was achieved with the amendment of December 6, 2002. Between these two amendments, 55 percent emission reduction was achieved. A 20 percent (10 tpd) emission reduction, as required by CM#03 CTS-07, necessitates the development and commercialization of zero– and low-VOC architectural coatings in certain large-volume categories. SCAQMD staff identified stains, waterproofing sealers, and clear wood finishes as large-volume coatings that contribute over five tpd of VOC emissions to the atmosphere.

Proposed Amended Rule (PAR) 1113 would lower VOC content limits for the following coating categories: clear wood finishes (varnish and sanding sealers), waterproofing sealers, waterproofing concrete/masonry sealers, stains, and roof coatings. The proposed amendments also phase-out the one-quart or less usage exemption for clear wood finishes and expand the scope of the Averaging Compliance Option to include the categories that are proposed for a change of VOC limits.

Pursuant to the California Environmental Quality Act (CEQA) (California Public Resources Code §§21000 et seq.), a Draft Environmental Assessment (EA) was prepared to analyze potential adverse environmental impacts from implementing the amendments to Rule 1113. No environmental topic area was identified that could be significantly adversely affected by the proposed amended rule.

LEGISLATIVE AUTHORITY

The California Legislature created the SCAQMD in 1977 (Lewis-Presley Air Quality Management Act, Health and Safety Code §§40400 et seq.), as the agency responsible for developing and enforcing air pollution control rules and regulations within the SCAQMD's area of jurisdiction. By statute, the SCAQMD is required to adopt an AQMP demonstrating compliance with all state and national ambient air quality standards for the SCAQMD's area of jurisdiction [Health and Safety Code §40460(a)]. Furthermore, the SCAQMD must adopt rules and regulations that carry out the AQMP [California Health and Safety Code, §40440(a)] to ensure attainment of all the state and national ambient air quality standards for ozone by the timeframes mandated under state and federal law.

CALIFORNIA ENVIRONMENTAL QUALITY ACT

PAR 1113 is a "project" as defined by CEQA (California Public Resources Code §§21000 et seq.). The SCAQMD is the lead agency for the proposed project and is preparing the appropriate environmental analysis pursuant to its certified regulatory program (SCAQMD Rule 110). California Public Resources Code §21080.5 allows public agencies with regulatory programs to prepare a plan or other written document in lieu of an environmental impact report once the Secretary of the Resources Agency has certified the regulatory program. The Secretary of the Resources Agency certified the SCAQMD's regulatory program on March 1, 1989.

Rule 110 requires an assessment of anticipated environmental impacts as well as an analysis of feasible methods to substantially reduce any significant adverse environmental impacts. To fulfill the purpose and intent of CEQA and Rule 110, the SCAQMD has prepared this Final EA to address the potential adverse environmental impacts associated with implementing PAR 1113. This Final EA is intended to: (a) provide the lead agency, responsible agencies, decision makers and the general public with information on the environmental effects of the proposed project; and (b) be used as a tool by decision makers to facilitate decision making on the proposed project.

All comments received during the public comment period on the analysis presented in the Draft EA will be responded to and included in the Final EA. Prior to making a decision on the proposed amendments, the SCAQMD Governing Board must review and certify the EA as providing adequate information on the potential adverse environmental impacts of the proposed amended rule.

SCAQMD's review of the proposed project shows that the project would not have significant adverse effects on the environment. Therefore, pursuant to CEQA Guidelines §15252, no alternatives or mitigation measures are included in this Final EA. The

analysis in Chapter 2 supports the conclusion of no significant adverse environmental impacts.

The current proposed amendments would implement, in part, the 2003 AQMP control measure CTS-07 – Further Reductions from Architectural Coatings and Cleanup Solvents. The goal of control measure CTS-07 is to further reduce VOC emissions from architectural coatings, thinning and clean-up solvents. The emission reduction objective of this control measure would be accomplished by amending two separate existing SCAQMD rules, Rule 1113 and Rule 1171 – Solvent Cleaning Operations, which are both currently undergoing rule amendment process. Therefore, the amendment promulgation projects are properly considered to be separate projects.

In general, there is little overlap between the proposed amendments for Rules 1171 and 1113 for the following reasons. Approximately 80 percent of the architectural coatings sold in California are waterbased coatings. Contractors using waterbased coatings typically use water to clean up equipment. Therefore, in practice, the proposed amendments to Rule 1171, which eliminate the exemption in Rule 1171 for architectural coatings, will have little affect on the cleanup practices for the majority of architectural coatings. Cleanup solvents used for water based coatings would likely already comply with the requirements in PAR 1171. Further, PAR 1171 will primarily affect the VOC content of cleanup solvents used for solvent-based coatings, which may result in greater use of cleanup materials formulated with exempt solvents. Potential adverse impacts of such solvents are analyzed in the Draft and Final EA prepared for PAR 1171. The Draft and Final EA for PAR 1171 are available by contacting the SCAQMD's Public Information Center or can be access online at the following internet address: http://www.aqmd.gov/ceqa.html.

For PAR 1113, a relatively small proportion of the affected coating is currently solvent-based. Based on the final VOC content requirements, these coatings will most likely be reformulated using waterbased coatings. The possible environmental effects of formulating affected coatings with waterbased technologies are analyzed in Chapter 2 of this document. As a result, the effects of the proposed amended rules are not expected to overlap to any appreciable extent. Where effects do overlap, the effects are typically beneficial. However, the cumulative effects of proposed amended Rules 1113 and 1171 are addressed in more detail in Chapter 2. Based on the preceding information, separate environmental analyses were prepared for the proposed amendments to Rules 1113 and 1171.

CEQA DOCUMENTATION FOR RULE 1113

In addition to this Final EA, a number of CEQA documents have been prepared for previous amendments to Rule 1113. The following subsections briefly summarize the major CEQA documents previously prepared for Rule 1113.

December 2002 – Final Subsequent Environmental Assessment (SEA) - Proposed Amendments to Rule 1113 - Architectural Coatings

In December 2002, the SCAQMD Governing Board readopted amendments to Rule 1113 which were originally adopted in May 1999, but vacated by the Court of Appeals on June 24, 2002. In response to the Court's decision the SCAQMD staff proposed to readopt the 1999 amendments and incorporate the modifications to the 1999 amendments that were made after the notice of public hearing was published. In connection with readopting the 1999 amendments to Rule 1113 plus the modifications, the SCAQMD staff prepared a Draft SEA to evaluate potential adverse environmental impacts of the 1999 amendments as revised. Rule 1113 was amended in 1999 to implement, in part, both the 1994 and the 1997 AQMP control measure CTS-07 – Further Emission Reductions from Architectural Coatings, which called for a reduction of the allowable VOC content limit per liter of coating from the following coating categories: industrial maintenance (IM); non-flats; primers, sealers, and undercoaters; quick-dry enamels; quick-dry primers, sealers, and undercoaters; roof coatings; stains; and waterproofing wood sealers. The 1999 amendments to Rule 1113 also added several new coating categories, bituminious roof primers, floor coatings, high temperature industrial maintenance coatings, nonflats, quick-dry primers, sealers, and undercoaters, recycled coatings, rust preventative coatings, specialty primers, zinc-rich IM primers, and waterproofing concrete/masonry sealers, as well as expand and clarify the averaging provision to provide additional flexibility to manufacturers.

July 2001 – Final Environmental Assessment - Proposed Amendments to Rule 1113 - Architectural Coatings

In July 2001, the SCAQMD Governing Board adopted amendments to Rule 1113. The amendments included the creation of a new coating category for clear wood finish brushing lacquers with an allowable VOC content of 680 grams per liter until January 1, 2005, when the clear wood finish brushing lacquers would be limited to a VOC content of 275 grams per liter. The rule amendments also established labeling and reporting requirements for brushing lacquers to ensure their proper use and thus minimize emissions. By postponing compliance with the existing VOC content limit requirement for lacquers in general, the EA prepared for this amendment concluded that 162 pounds of anticipated VOC emission reductions per day would be foregone until the clear brushing lacquers are required to comply with the final VOC content limit in 2005.

May 1999 – Final Subsequent Environmental Assessment - Proposed Amendments to Rule 1113 - Architectural Coatings

In May 1999, the SCAQMD Board adopted amendments to Rule 1113. The amendments call for a reduction of the allowable VOC content limit per liter of coating from the following coating categories: industrial maintenance; non-flats; quick-dry enamels; primers, sealers, and undercoaters; quick-dry primers, sealers, and undercoaters; stains; roof coatings; and waterproofing wood sealers. The proposed amendments to Rule 1113 also added several new coating categories, high temperature industrial maintenance coatings, rust preventative coatings, bituminious roof coatings, recycled flats and nonflats, essential public service coatings, floor coatings, and waterproofing concrete/masonry sealers, as well as expanded and clarified the averaging provision to provide additional flexibility to manufacturers. At full implementation of the amendments, the overall VOC emission reductions are anticipated to be approximately 21.8 tons per day by year 2010. On June 24, 2002, the Court of Appeal vacated the SCAQMD's adoption of the 1999 amendments.

November 1996 – Final Subsequent Environmental Assessment - Proposed Amendments to Rule 1113 - Architectural Coatings

In November 1996, the SCAQMD Board adopted amendments to Rule 1113. These amendments reduced the VOC content limits of four coating categories: lacquers, flats (interior and exterior), traffic coatings, and multi-color coatings, resulting in an overall net reduction of 10.3 tons per day of VOC emissions from this source category. In addition, the amendments temporarily increased the VOC content limits for four coating categories. Other components of the proposed amendments included addition of and modification to some definitions, updating the analytical test methods, and establishing an averaging methodology for flats to provide flexibility for complying with future VOC content limits.

Subsequent to the adoption of the amendments to Rule 1113, industry filed three separate lawsuits, questioning the validity of the proposed future limits for the lacquer and flat coating categories. The SCAQMD has prevailed in all three cases.

August 1996 – Final Environmental Assessment - Proposed Amendments to Rule 1113 - Architectural Coatings

These amendments incorporated an exemption from the VOC limits for coatings sold in containers one-quart size or less. The analysis in the Final Environmental Assessment concluded that adopting a small container exemption would result in significant adverse air quality impacts.

February 1990 - Determination of No Significant Impacts - Proposed Amendments to Rule 1113 - Architectural Coatings.

In February 1990, the SCAQMD Governing Board adopted amendments to Rule 1113 - Architectural Coatings, that were based on the California Air Resources Board (CARB) and California and Air Pollution Control Officers Association (CAPCOA) Suggested Control Measure (SCM). The 1990 amendments included the following provisions: exemptions for 11 categories of specialty coatings were eliminated, leaving only exemptions for quart or smaller containers and emulsion type bituminous pavement sealers; lower VOC content limits for 15 new coating categories; technology-forcing low VOC limits for ten existing coating categories effective December 1, 1993; consolidation of the industrial maintenance coating categories from ten to three; and reorganization of the subdivisions of the rule.

The 1990 Court Order

In 1990, the Dunn-Edwards Corporation challenged the 1990 amendments to Rule 1113 in court (Dunn-Edwards Corporation, et. al. v. SCAQMD). That case challenged, in part, the CEQA document prepared for the amendments to Rule 1113 adopted in February 1990, specifically the amendments that lowered the VOC limits for the following six coating categories: industrial maintenance high temperature coatings; industrial maintenance anti-graffiti coatings; industrial maintenance primers and topcoats; lacquers; quick-dry primers and sealers; and quick-dry enamels. The lawsuit alleged that the CEQA document was inadequate because it did not fully analyze potential significant adverse air quality impacts in seven areas that were alleged to arise from implementing the lower VOC content limits. The SCAQMD prevailed in six of the seven alleged impact areas, but the lower court requested the SCAQMD to further study whether or not illegal thinning of coatings in the field resulted in a negative air quality impact before readopting the February 1990 amendments.

The results of an architectural coatings field study undertaken during the latter half of 1998 by CARB staff, with the help of local air pollution control and air quality management district personnel, suggest that there is not a significant amount of illegal thinning resulting in noncompliant architectural coatings. Thirty-six percent of the coatings sampled were solvent-borne. Fifty-three percent of these were thinned with material containing volatile organic compounds. However, of all of the solvent-borne coatings sampled, only 14 percent were thinned and noncompliant with district rules. Overall, solvent-borne thinned, noncompliant coatings made up only five percent of all the coatings observed.

While the SCAQMD agreed to study the illegal thinning issue, the plaintiff appealed the court's decision to dismiss their claims regarding the six other potential air quality impacts. In 1993, the Court of Appeals in a published decision (Dunn-Edwards Corporation, et. al. v. SCAQMD) rejected the plaintiffs' appeal. Plaintiffs then appealed

the appellate decision to the California Supreme Court that denied review on December 2, 1993.

Other Rule 1113 Amendments

Rule 1113 has been amended a number of times since January 1, 1990, as summarized in the following bullet points. For each amendment described below a Notice of Exemption was prepared.

- **March 8, 1996 -** These amendments established a definition for aerosol coatings consistent with the CARB, revised the definition of exempt compounds by referencing Rule 102 - Definition of Terms, and created an exemption for aerosol coatings.

- **September 6, 1991-** These amendments created a new coating category, low-solids stain, and also incorporated a calculation method for determining VOC content on a materials basis. The amendment also prohibited use of Group II exempt compounds, including ozone-depleting chlorofluorocarbons (CFCs) and several toxic solvents.

- **December 7, 1990 -** These amendments incorporated new definitions for specialty coatings and established a specific VOC content limit in the table of standards.

- **November 2, 1990 -** These amendments incorporated new definitions for specialty coatings and established a specific VOC content limit in the table of standards.

- **February 2, 1990 -** These amendments incorporated new definitions for specialty coatings and established a specific VOC content limit in the table of standards.

PROJECT LOCATION

The SCAQMD has jurisdiction over approximately 10,743 square miles (referred to hereafter as the district), consisting of the four-county South Coast Air Basin (Basin), the Riverside County portions of the Salton Sea Air Basin (SSAB) and the Mojave Desert Air Basin (MDAB). The Basin, which is a subarea of the district, is bounded by the Pacific Ocean to the west and the San Gabriel, San Bernardino, and San Jacinto mountains to the north and east. The Basin includes all of Orange County and the nondesert portions of Los Angeles, Riverside, and San Bernardino counties. The Riverside County portions of the SSAB and MDAB are bounded by the San Jacinto

Mountains in the west and spans eastward up to the Palo Verde Valley. The federal nonattainment area (known as the Coachella Planning Area) is a subregion of Riverside County and the SSAB that is bounded by the San Jacinto Mountains to the west and the eastern boundary of the Coachella Valley to the east (Figure 1-1).

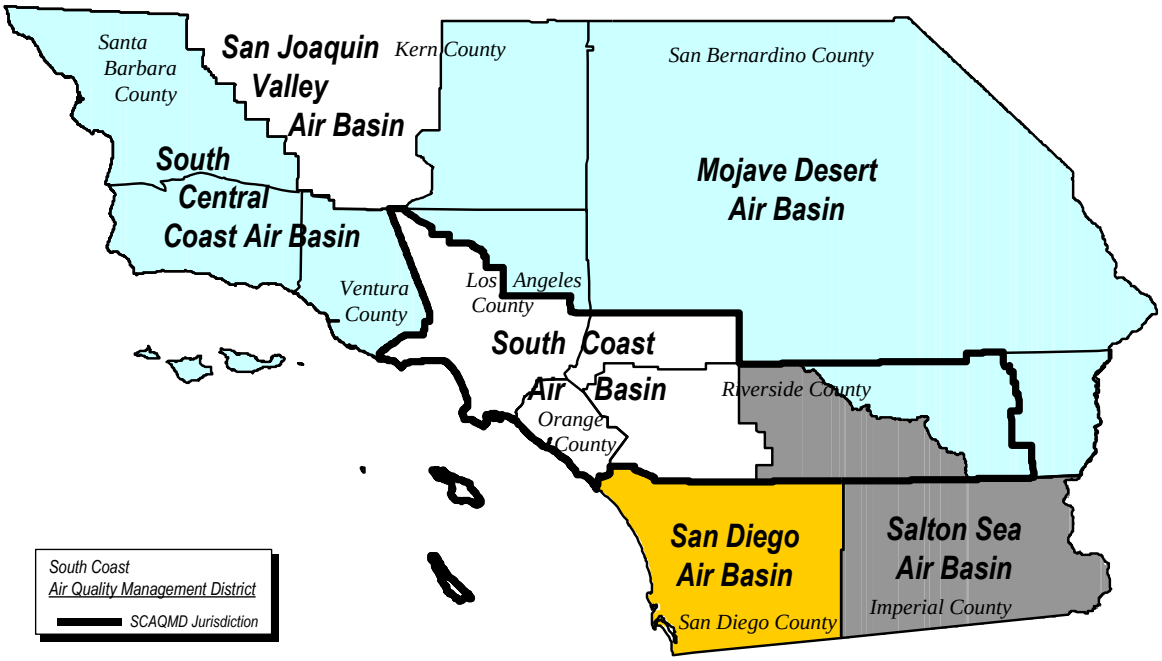

FIGURE 1-1

South Coast Air Quality Management District

PROJECT OBJECTIVES

The objective of the current proposed project is to implement, in part, control measure CTS-07 - Further Emission Reductions from Architectural Coatings and Cleanup Solvents, from the 2003 AQMP; achieving a reduction in VOC emissions from architectural and industrial maintenance (AIM) coatings to ensure attainment of the state and national ambient air quality standards for ozone by the timeframes mandated under state and federal law. Implementing this control measure also satisfies the settlement agreement for the 1997 litigation between the SCAQMD and the Natural Resources Defense Council, the Coalition for Clean Air and Communities for a Better Environment.

BACKGROUND

AIM coatings are used to beautify and protect homes, office buildings, factories, and their appurtenances on a variety of surfaces - metal, wood, plastic, concrete, wallboard, etc. For example, AIM coatings are applied to the interior and exterior of homes and offices, factory floors, bridges, stop signs, roofs, swimming pools, driveways, etc. AIM coatings may be applied by brush, roller or spray gun; by residents, painting contractors, or maintenance personnel.

AIM and other coatings are composed of: pigments, which give the paint its color and ability to hide the underlying surface, and are generally in the form of finely ground powders; binders (resins), in which the pigment particles are dispersed and that bind the pigment to the painted surface; carriers (solvents), used to keep the paint in a liquid state during application, and to otherwise aid in the application of the paint; and specialty chemicals (additives), necessary for other coating characteristics. The carriers and some specialty chemicals evaporate, leaving behind the film-forming components of the coating. The resins used in AIM coatings include acrylics, vinyls, alkyds, cellulosics, epoxies, urethanes, polyurethanes and several others. The carriers in solvent-based coatings are organic solvents such as alcohols, ketones, esters, glycols, glycol ethers, and aromatic or aliphatic hydrocarbons, and are usually VOCs. The carrier in a waterborne coating is water, although most waterborne coatings contain some VOCs, primarily glycols or texanol.

AIM coatings are usually purchased ready-to-use, although some come in two components that must be mixed prior to application. They are available in a wide range of colors, gloss, and performance characteristics. One important criterion for selecting coatings is durability. Coatings are expected to last from two to 10 years with the average expectation of five to seven years. Failure of coatings to stand up to the elements such as sunlight, weather, and cleaning can shorten the life of the coating and require more frequent recoating.

A solvent may sometimes be used to thin a coating if it is too thick to spray or brush. Application problems caused by low temperature and high humidity can also be overcome by the addition of solvent to the coating. Waterborne coatings are thinned with water only, whereas solvent-based coatings can only be thinned with organic solvents. Similarly, brushes, rollers, and spray guns used with waterborne coatings are cleaned with water, while such equipment used with solvent-based coatings use organic solvents for cleanup. Generally, coatings are sold as 'ready-to-use' to eliminate the need for thinning in the field.

VOC emissions from architectural coating operations are regulated by SCAQMD Rule 1113. Under this rule, emissions are controlled by limiting the VOC content, measured in grams per liter, of the architectural coatings sold and applied in the district.

Architectural coatings are defined by their application and use and include coatings which are applied to stationary structures including residential and commercial buildings; billboards; curbs and roads; and mobile homes. VOCs are emitted to the atmosphere from the evaporation of organic solvents used in industrial maintenance coatings, nonflats, flats, primers/sealers/undercoaters, waterproofing wood sealers, varnishes, wood preservatives, lacquers, fire retardant coatings, etc. The existing rule and PAR 1113 apply to those persons who supply, sell, apply, solicit the application of, and manufacture such coatings.

SCAQMD Architectural Coating Study with AVES and Adhesives Coating Company

The SCAQMD awarded a contract to AVES (RFP#9899-14 approved and released November 13, 1998 and closed on January 29, 1999), an affiliate of ATC Associates Inc., to develop new formulations of architectural coatings with a zero- or near-zero VOC content. The coatings developed under this contract included exterior opaque stains, exterior and interior semitransparent stains, waterproofing sealers (clear), clear wood finishes, (lacquers), varnishes and sanding sealers. Along with the development of the coatings, the contract also required comparative side-by-side testing for performance and repairability of the new coatings, and coatings currently in commercial use by the industry, as well as a field demonstration. AVES teamed with Adhesives Coating Company (ADCO) who developed and patented a zero-VOC water-based resin technology used in the new formulations. Since the start of this contract, major manufacturers have developed their own new resin technologies for low-VOC coatings compliant with future VOC content limits (see "Description of Affected Architectural Coatings Categories" section and Appendix B for a listing of such coatings).

Resin Technologies

During the 1990s, numerous manufacturers have developed and marketed acrylic-based, waterborne coatings that exhibit performance characteristics equivalent to or superior to the traditional solvent-based coatings. The first generation of waterborne coatings had stability, rheology, water-immersion, loss of gloss, lack of corrosion resistance, loss of drying capacity, and bacterial degradation problems. However, subsequent formulations, using a new generation of performance enhancing additives, as well as innovative resin technologies, have minimized the problems to a practical level, or completely eliminated them. Technology breakthroughs include the following:

- Flow and leveling agents that mitigate the flow problems, even on substrates like plastic, glass, concrete, and resinous wood. These additives even assist in overcoming flow and leveling problems when coating oily or contaminated substrates.

- Pigment-wetting agents have assisted in better dispersion of organic pigments in an aqueous media by altering their hydrophobic (ability to unite with water) nature. This results in better rheology (study of the change in form and flow of matter) characteristics.

- Defoamers and microfoam agents have mitigated the bubble retention problems, thereby eliminating the loss of drying capacity, and thus improving the film.

- Biocides that are not susceptible to degradation by hydrolysis have provided good stability and eliminated the settling problems.

With the development of these additives, some waterborne coatings now perform better than solvent-based coatings. The biggest issue with waterborne coatings is the dry time. Water, with its slower evaporation rate and higher latent heat of evaporation, does not have the latitude that solvents do with their wide range of evaporation rates and boiling points. On a warm, dry day, waterborne coatings dry faster than the high-solids, solvent-based coatings, but the dry times can be significantly extended on cold, humid days, which cause problems in some areas. However, with the development of non-volatile, reactive diluents combined with hypersurfactants, performance of these nearly zero-VOC coatings has equaled, and in some characteristics, outperformed traditional, solvent containing coatings.

The durability of a coating is governed by the nature of the binder (also known as film formers or resins) used in its formulation. Typical coated substrates are exposed to a variety of influences of daily life, including mechanical stresses, chemicals and weathering, against which they serve to protect the substrate. The major impact on the exterior coating film is oxidation by exposure to light, causing the film to first lose color and gloss, and gradually become brittle and incoherent. This is mainly caused by a process known as photochemical degradation. This is especially the case for coatings used for exterior painting.

The coatings industry has developed a variety of additives that act as ultraviolet light (UV) absorbers or free-radical scavengers that ultimately slow down the photo-oxidative process, thereby increasing the coating life. Antioxidants and sterically hindered amines are two classes of free-radical scavengers, also known as hindered amine light stabilizers (HALS). These can be used with solvent-free or waterborne coatings. Other additives that have positive effect on durability of coatings include adhesion promoters, corrosion inhibitors, curing agents, reactive diluents, optical brightners, and algaecides/mildewcides.

Formulating Candidate Coatings

The goal of the project was to develop and demonstrate zero-VOC or low-VOC coatings (varnish, lacquer, interior and exterior stains, waterproofing sealers, waterproofing concrete/masonry sealers and sanding sealers) to further reduce VOC emissions in the Basin. The current amendment to Rule 1113 is proposing to lower VOC content limit requirements for the same coatings.

The task to develop these coatings was focused on making the necessary formulation adjustments to ADCO's patented polymer emulsion. This emulsion was used as the basis for formulating the required stains, sealers, and clear wood finishes while producing products with VOCs less than ten g/l (calculated from GC/MS analysis results).

The target in developing the coatings was to achieve a performance level equal to, or better than that of similar coatings widely used by the industry. The performance characteristics in the new coatings were focused on the following areas: hardness, hot/cold check, adhesion, printing/blocking, household chemical resistance, drying time, moisture resistance, UV resistance, freeze/thaw, orange peel, leveling, sagging, film thickness, mildew/fungus resistance, dirt pick-up, substrate penetration, stain blocking, water repellant efficiency, beading, swelling, moisture vapor transmission, scrape/mar resistance, color change, sprayability, clarity, depth, gloss, graininess, etc.

The characteristics of the raw materials are of great importance to the creation of a waterborne resin system that dries quickly and exhibits good initial film properties without coalescing solvents. Particle size, minimum film forming temperature, glass transition temperature, resin polarity, and dynamic surface tension are among the most important factors to consider in the formulation.

Conclusions from the AVES Study

The following conclusions from the side-by-side comparison testing and field demonstrations were extracted from the Final Report on the "Development and Demonstration of Zero-and Low-VOC Resin Technology for Advanced Control Measure Development" (SCAQMD, March 29, 2001):

1. Most performance characteristics of the new no-VOC wood coating system (including adhesion, beading, chemical resistance, coating penetration, dirt pick-up, mar resistance, moisture vapor transmission, swelling, water uptake, and overall appearance) were equivalent to those of commercial coatings based on the side-by-side comparative testing results. Advantages of these no-VOC coatings include better grain raising for varnish, less color change (for lacquer, varnish, and sanding sealer), better moisture/UV resistance for exterior semitransparent stain, and better water repellent efficiency for waterproofing sealer. However, the dry time, freeze/thaw

properties, pot life, mildew/fungus resistance, printing resistance, and stain blocking properties of these no-VOC waterborne coatings were not as good as those of solvent-based coatings.

2. Three popular commercially available waterborne and solvent-based coating systems (both lacquer and varnish) were tested side-by-side with no-VOC lacquer and varnish topcoat systems for repair and refinishing. The new no-VOC varnish system showed the best overall appearance after repair, but had the highest coating usage because the two-component coating resulted in a limited pot life. The new no-VOC Lacquer system was the easiest to repair and showed the best gloss difference after repair.

3. In order to obtain the impartial opinion of experienced painters on the performance of the new coatings, the painters of Commercial Casework, Inc. in Fremont, California conducted a field demonstration of the new coating system as part of this study. The personnel from Commercial Casework were impressed with the new wood coatings due to faster dry times, ease of use, good appearance qualities, and the safer working environment resulting from the absence of solvents.

Case Studies (USEPA and Midwest Research Institute)

In cooperation with Midwest Research Institute, in May of 2000 the United States Environmental Protection Agency (USEPA) published a work of case studies (EPA-600/R-00-043) regarding the conversion of 25 wood furniture facilities to less polluting coating technologies including high-solids conversion varnishes, waterborne technologies, ultra-violet curable and powder coating. Because of the proposed VOC limits for clear wood finishes for (sealers and varnishes) and of future existing VOC limits for clear and pigmented lacquers, architectural wood coating operations will be limited in choice of higher solids (30-45 percent solids), exempt solventborne catalyzed topcoats, sealers and stains, and may not choose their use because of flammability concerns of the exempt solvents of acetone and methyl acetate. Ultra-violet curable and powder coating operations are simply not applicable to the realm of architectural wood finishing applications. It is then nonflammable the waterbornre acrylic and urethane finishes (stains, primers, sealers and topcoats) that wood product manufacturers have converted to have applicability to Rule 1113. Out of the 25 conversions, nine converted from high-VOC wood finishes to waterborne finishing systems. Several different reasons for converting to low HAP (hazardous air pollutant), low-VOC material are cited. Four apply to Rule 1113: (1) less hazardous materials; (2) a commitment to the environment; (3) a desire for a high-quality finish; and (4) a reduction in emissions.

The application of waterborne stains, sealers and topcoats is different than solventborne ones and may give rise to difficulties. However with proper training all problems encountered by the facilities of the USEPA report that switched to waterborne materials were minimized if not solved. For instance, waterborne coatings cannot be flooded on as

standard nitrocellulose products are, they should be applied in thinner films to prevent coating softness and sagging. The USEPA document states that grain raise issues were also minimized, and for some conversions resulting sanding steps were the same as that used with high solvent coatings and stains, they just came in a different order. Once proper drying and sanding has occurred, waterborne systems have harder films than standard one-component nitrocellulose systems and can be tinted to achieve an amber look if desired.

Color matching was pointed out in the document as being more difficult with waterborne stains, however, with respect to Rule 1113 staff is not recommending lowering the VOC limit for high solids stains (formulated both in solvent and in water at 250 grams VOC per liter, less water and less exempt compounds). Restrictions for stains purchased in small containers are not being recommended either, which will allow the use of high VOC low-solids stains for maximum depth of penetration and color uniformity. In the USEPA case study paper a close association with coatings manufacturers usually remedies waterborne stain problems satisfactorily primarily with the addition and optimization of surfactants. Waterborne dye stains are also available which improve color uniformity.

Kitchen Cabinet Manufacturer's Association Standards

The Kitchen Cabinet Manufacturer's Association (KCMA) sets standards for the strength of cabinetry and the durability of applied coatings under the American National Standards Institute Approved ANS/KCMA A161.1-2000. In order to pass the KCMA test and carry the KCMA approval rating the coating is subject to the following:

(1) Finishes must withstand 120 degrees F@ 70 percent relative humidity for 24 hours without showing appreciable discoloration and not showing evidence of blistering, checking, or other film failures.

(2) A similar hot and cold cycle (120 degrees F to room temperature and then to -5 degrees F) repeated five times without film failures

(3) Exposure to vinegar, lemon, orange and grape juices, catsup, coffee, olive oil, and 100 proof liquor for 24 continuous hours and mustard for one hour, without showing discoloration, stains, or whitening (that will not be dispersed by ordinary polishing) and cannot blister, crack or show film failures of any kind.

(4) Cabinet door edge 24 hour submersion in soapy water without delaminating, or swelling, and no film failure.

There are several compliant waterborne coatings that pass the KCMA tests. Manufacturers of these coating include SDA/Craft Technologies and Fuhr. SDA/Craft products are also used in field applications.

ARCHITECTURAL COATING EXISTING EMISSIONS INVENTORY

AIM coatings represent one of the largest non-mobile sources of VOC emissions under the district jurisdiction -- larger than petroleum refining. CARB has conducted architectural coating surveys every four or five years with previous surveys conducted in 1976, 1981, 1985, 1989, 1993, 1998 and 2003. The purpose of the surveys is to gather current information on the VOC content and sales volume of architectural coatings. CARB evaluated the data on architectural coatings sold in California collected with the latest survey conducted in 2000. It is titled 2001 Architectural Survey Draft Report (CARB Survey). The CARB Survey identified about 108 million gallons of architectural coatings sold in California in 2000, with 84 percent of that volume coming from waterborne products and 16 percent from solvent-borne products. Total California emissions from these coatings are approximately 43,300 tons of VOC per year or about 119 tons per day as an annualized daily average. Waterborne products contributed 44 percent of these emissions, while the solvent-borne products contributed 56 percent.

The emission inventory is calculated by multiplying the sales volume by the sales weighted average actual-VOC content. Staff adjusted the baseline inventory prepared by CARB for the SCAB to account for sales of: (a) coatings below the proposed VOC limit which were excluded from the inventory since these coatings are already compliant; (b) coatings above the current SCAQMD VOC limits assumed by CARB to be compliant and (c) small exempt containers. This establishes an adjusted emission inventory in order to calculate the emission reductions for the proposed amendments.

According to control measure CTS-07 in the 2003 AQMP, the VOC emissions in the district from the use of architectural coatings based on the 1997 Annual Average Inventory is estimated at 50.9 tons per day (tpd). Based on the Annual Average Inventory, the VOC emissions for 2006 and 2010 are projected as 32.7 tpd and 24 tpd, respectively, without additional controls on architectural coatings. The inventory decreases between years 2006 and 2010 because existing rule requirements have future compliance dates which will lower the VOC content limit of different coatings. Table 1-1 lists the current estimated usage and emission inventory for the coating categories subject to PAR 1113.

TABLE 1-1

VOC EMISSIONS INVENTORY FOR
AFFECTED COATING CATEGORIES in the SCAQMD

Categories	Estimated Usage* (gallons)	Emission Inventory* (tons/day)
Clear Wood Finishes (Varnishes)	196,247	0.63
Clear Wood Finishes (Sanding Sealers)	5,295	0.01

TABLE 1-1 (CONCLUDED)

VOC EMISSIONS INVENTORY FOR
AFFECTED COATING CATEGORIES in the SCAQMD

Categories	Estimated Usage* (gallons)	Emission Inventory* (tons/day)
Clear Wood Finishes (Quart Exemption Removal)	229,140	1.22
Roof Coatings	937,078	1.95
Stains	1,098,176	0.93
Waterproofing Sealers/ Waterproofing Sealers (Concrete and Masonry)	373,339	0.79
TOTAL	**2,839,275**	**5.53**

* adjusted from state of California reported sales based on population (SCAQMD = 45 percent of the state's total population)

DESCRIPTION OF AFFECTED ARCHITECTURAL COATING CATEGORIES

Installation of air pollution control equipment is not feasible for reducing AIM coatings emissions, thereby leaving coating reformulation as the only possible means to achieve the required reductions. The current proposal emphasizes reformulation of existing coatings, primarily by using currently available, technologically-innovative resins, as well as utilizing the growing list of solvents from the definition of Exempt Compounds. The following sections describe the existing and new coating categories, and their typical usage and application. In addition, the sections provide the compounds or resin systems used to reformulate and achieve a lower VOC content limit for each coating category.

Clear Wood Finishes (Varnishes and Sanding Sealers)

Clear wood finishes are clear and semi-transparent coatings, including lacquers and varnishes, applied to wood substrates to provide a transparent or translucent solid film. Varnishes are formulated with various resins to dry by chemical reaction on exposure to air. Sanding Sealers are clear wood coatings formulated for or applied to bare wood for sanding and to seal the wood for subsequent application of coatings. Either may be applied to various products consisting, but not limited to, cabinets, doors, molding, paneling, windows, decks, benches, siding and floors. There are three types of low-VOC clear wood finishes: waterborne, exempt solvent-borne, and high-solids. Several resin systems are available including acrylic, polyurethane, alkyd, and various copolymers or modifiers including but not limited to latex, polycarbonate, polyethylene, and urea. Many cure types are also available as one-component air-dried pre-catalyzed, and two-component post-catalyzed. Different cure types are necessary to assure proper durability for specific applications, whether they are for interior, exterior or for flooring use.

Appendix B lists numerous clear wood coatings that meet the proposed limit. The following is a brief discussion of specific compliant products listed in Appendix B, highlighting key characteristics and testing data.

BonaKemi USA manufactures and sells the BonaTech MEGA® Brand Floor Finish that has a VOC of 250 g/l. This product is specifically designed for use on heavy-traffic interior residential and commercial wood flooring. The resin system used in this single-component product is a polyurethane. Independent testing conducted by Colorado State University and the Taber Abraser testing indicate that the "MEGA® outperforms all other competitor's waterborne and oil-modified finishes."

Farwest Paint Manufacturing Co. manufactures and sells a Semi-Gloss Aquathane Waterborne Floor Finish comprised of a modified aliphatic urethane dispersion. The technical information indicates that the product is "primarily designed as a high abrasion resistant coating for hardwood floors; but is widely used for kitchen cabinets, coffee tables, fine wood furniture, table tops, clear wood trim varnish, etc." The solids content is greater than conventional nitrocellulose lacquers, making film build and aesthetics better than a conventional system. The VOC content is 186 g/l.

Fuhr International manufactures and sells the Multi-Purpose Ultra Clear Urethane, which is a waterbased self-sealing, self-cross linking, modified urethane finish. This product was originally designed for hardwood flooring, but has also been used on high end furniture, passage doors, millwork, windows and cabinetry for both interior and exterior uses. The VOC content is 160 g/l and the product can be used in the field or in the shop. Fuhr International also manufactures a Waterborne Acrylic Varnish, a waterbased, self-sealing, self-cross linking finish, and is recommended for use on furniture, molding, passage doors, millwork, and wine racks. The VOC content is 73 g/l, and the product meets the KCMA finish coat testing requirements for the kitchen cabinet industry.

ICI/Dulux manufactures and sells the WOODPRIDE™ Interior Waterborne Aquacrylic Gloss Varnish with a VOC content of 191 g/l, comprised of a hybrid acrylic/urethane technology. The technical information indicates that this product "provides durable, transparent protection for interior wood surfaces such as cabinets, doors, woodwork, paneling, furniture and floors." The product is also resistant to abrasion, chipping, marring, water, oil, alcohol and blushing.

Roof Coatings

Roof coatings are coatings formulated for application to exterior roofs and for the primary purpose of preventing penetration of the substrate by water, or reflecting heat and ultraviolet radiation. Roof coatings are generally applied as a system, that is, as primers, base coats and reflective topcoats. There are a variety of primers and coatings applied to bituminous, modified bituminous, roofing materials, as well as metal,

polyvinyl chloride (PVC) and various synthetic rubber membranes, which include, but are not limited to, ethylene-propylene terpolymer (EPDM), neoprene, chlorosulfonated polyethylene (CSPE, Hypalon), chlorinated polyethylene (CPE) and butadiene-acrylonitrile (nitrile rubber), polyisobutylene (PIB) and expanded polyurethane foam roofing. Other roof coatings can be applied to clay, concrete, wood shingles, and slate to extend their life. Primers are usually applied to smooth and granule surfaced asphalt, modified bitumen, metal, and can be applied to polymer roofing materials such as CSPE, CPE, PVC, and urethane foams, prior to a base coat or reflective topcoat. As the second part of the coating system, base coats have adhesive qualities, and asphalt, clay-stabilized emulsions comprise most base coats today. Lastly, reflective coatings are typically categorized as aluminum emulsion roof coatings and "white" reflective coatings. High VOC aluminum coatings still exist today, however, waterborne aluminum paste reflective coatings are in use as well and are fast replacing the high VOC variety. The acrylic and ceramic/acrylic blends provide the highest solar reflectance.

The following are representative samples of base coats and topcoats that meet a VOC limit of 50 grams of VOC per liter, less water and less exempt compounds. All data is reflective of information obtained from technical and material safety data sheets.

Geocel 9500MB – Elastomeric Coating is a product specifically for application to metal roofs and siding and is a blend of polymers and EPDM and forms a rubber membrane that is flexible, ultra violet (UV) light and mildew resistant, has 5 year durability limited warranty and may be brushed, rolled or spray applied. Application temperature is limited to 45 degrees Fahrenheit. The VOC content, less water is listed as 36 grams per liter.

United Coatings Roof Mate is an EPA Energy Star rated elastomeric 100% acrylic top coat for metal, built-up, modified bitumen, concrete, sprayed in place foam, Hypalon and EPDM, as well as composite shingle roofs. It forms a membrane that is highly reflective, flexible, breathable, chemical fallout and UV resistant. The product is available with 5, 10 and 15 year warranties and has a listed VOC content of 16 grams per liter, less water, and is sprayable.

Tropical Asphalt #360 Asphalt/Clay Emulsion Basecoat is a product designed as a basecoat for reflective topcoats and as a waterproofing coating. It is applications on built up roofing, metal, and masonry surfaces. A better bond occurs when roof surfaces are damp. Two coats are recommended with the use of a brush, roller or sprayer at application temperatures above 55 degrees Fahrenheit. Material should not be applied to PVC, or to dry and brittle roofing materials. The VOC content is listed as 30 grams per liter. Most base coats that meet the proposed VOC content of 50 grams per liter will be of this type.

Stains

Stains are semi-transparent (interior and exterior) or opaque (semi-solid) coatings which are generally used on wood. Semi-transparent stains are formulated to change the color but not conceal the grain pattern or texture. They are lower in solids (15-20 percent) and therefore form a barely visible coating film. These types of coatings are especially used extensively in cabins and homes with soft wood exterior siding, as well as deck coating. They protect the wood from UV exposure, moisture, and minimize tannin bleed through. Semi-transparent exterior stains do not need to be top coated with a clear finish. Opaque stains completely hide wood grain but not its texture and have high solids contents (25 to 40 percent). The category of stains will be further characterized between interior and exterior applications. Exterior stains at the proposed lower VOC content limit are currently available and are reformulated as acrylic, latex, modified acrylic and gilsonite resin systems.

Low-solids interior stains are stains labeled and formulated exclusively for use on interior surfaces that contain one pound or less of solids per gallon of material. For interior use, there are essentially two types of stains that exist. There are dye stains, which penetrate so deeply into the wood surface that to remove them requires extensive sanding, and normal penetrating stains which are less penetrating than dye stains. Both stains will change the color of a wood species and/or enhance the grain without forming a coating film. They require a sealing and a finish coating with a clear wood finish. Today's lower VOC technology has moved away from solvent-borne alkyd coating formulations to waterborne acrylic, acrylic latex and latex emulsions, gilsonite, and oil/alkyd/latex dispersions.

Appendix B lists numerous stains that meet the proposed limit. The following is a brief discussion of specific compliant products listed in Appendix B, highlighting key characteristics and testing data.

Sherwin Williams manufactures and sells the Exterior Solid Color Acrylic Latex Stain – A16 Series under their ProMar® product line that has a VOC content of 97 g/l. This is a 100 percent acrylic product recommended for use on vertical wood, rough sawn lumber, textured or abraded plywood, siding shakes, and siding shingles.

Smiland Paint Company, a local manufacturer, manufactures and sells the Exterior Acrylic Solid Color Rustic Stain for use on exterior wood, masonry, concrete, stucco, properly primed metal and previously painted surfaces. The technical data indicates that this product provides "excellent protection for rustic wood surfaces such as rough sawn lumber, vertical shakes and shingles, fences, and masonite or hardwood siding." The VOC for this stain is 97 g/l.

Dunn-Edwards Corporation, a local company, manufactures and sells the ACRI-FLAT® product, which is listed as an Exterior Wood Stain and Masonry Flat Paint (W 704). The technical information from the manufacturer indicates that "ACRI-FLAT is extremely

versatile and is ideally suited as a self-priming solid color stain for new or previously painted rough sawn wood." The VOC content of this product is 70 g/l.

Okon Co. manufactures and sells a product called DECK STAIN, which is a water-based water repellent and wood stain for horizontal wood applications. This product is designed for decks, milled, pressure-treated, and rough lumber. ASTM testing results show that this product performs equally or better than its higher-VOC counterparts. For example, this product passes the QUV 1,000 hour test for Ultraviolet light resistance, as well as ASTM D3359-90 for vapor transmission. The VOC content of this product is ~100 g/l.

Columbia Paint & Coatings manufactures and sells the Woodtech Solid Color Pre-Stain (09-870), a low VOC (62 g/l) interior and exterior bare wood substrates. The technical information from the manufacturer indicates "excellent color retention, good penetration, and recoat properties." The company representative indicated that this product forms a hard film that is abrasion resistant.

Epmar Corporation also manufacturers and sells a variety of low-VOC stains, including pigmented, clear, and semi-transparent. The Kemiko Transparent Stain is a single component product recommended for use on concrete, plaster, polymer cement, and wood. Applications include walkways, decks, hospitals, schools, shopping malls, restaurants, and theme parks. The VOC content is less than 30 g/l.

Fuhr International manufactures a Wiping Stain that has a VOC content of 15 g/l. This product is recommended for any wood surface and does not affect grain raising, and is available in an unlimited range of colors. The technical information from the manufacturer indicates good open time and workability for wiping applications. Fuhr International also manufactures a ZVOC® Exterior Waterbased Stain that provides "excellent substrate wetting and color control, overall durability, and chemical resistance, with minimal grain raising." This product has no VOCs

Waterproofing Sealers/ Concrete and Masonry Waterproofing Sealers

Waterproofing wood sealers are used to protect wood, and other porous surfaces to seal against moisture damage. On wood, the use of waterproofing sealers can prevent splitting, staining, and warping, as well as maintain the wood's true color and grain. These coatings rely on a variety of recently developed resin technologies, such as acrylic emulsion formulations and acetone-based formulations. There are three fundamental types of sealers: (1) penetrating sealers (low solids, approximately 5 to 15 percent solids by weight), (2) film forming (15 to 30 percent solids by weight), and (3) high build coatings ranging from 45 to 100 percent solids. Penetrating sealers do not form a visible continuous coating film and are usually formulated with silicone, silicates, or silane/siloxane waterborne micro emulsions. The silicone variety fills the pores of the

substrate, whereas the silane/siloxane variety are said to react with concrete to form both a chemical and mechanical bond. Low-VOC film forming waterproofing sealers are typically acrylic and modified acrylic (urethane and epoxy copolymers for example) emulsions that are applied in two or more coats. High build waterproofing sealers are available in two-component epoxy, and single-component moisture-cured polyurethane for below grade hydrostatic and hydraulic pressure resistance. Other materials that are high build in nature are elastomeric, which means they can form a rubberized membrane and are available in latex, acrylic, butyl rubber and asphaltic formulations.

Concrete and masonry waterproofing sealers provide the same water resistance as typical waterproofing sealers, but also protect the surface from inherent properties of concrete and masonry such as alkalinity and acidity reactions. In addition, they are formulated to resist ultraviolet (UV) light and to avoid staining.

Appendix B lists numerous waterproofing sealers and waterproofing concrete/masonry sealers. The following is a brief discussion of specific compliant products listed in Appendix B, highlighting key characteristics and testing data.

Davlin Coatings, Inc. manufactures and sells a waterproofing sealer (Acrylastic 490) that is marketed as a high-build, decorative, extremely flexible, high performance waterborne waterproof wall coating. It is recommended for use over cracked, uneven surfaces, especially where water penetration is a problem. The VOC content is 29 g/l, well below the proposed limit for waterproofing coatings. Testing, based on widely accepted ASTM methods, indicates excellent performance for tensile strength (ASTM D2370 – 2,400 l in./min), moisture vapor transmission (ASTM E96, Proc. B – 1.2 perms), peel adhesion, concrete (ASTM D413 – 48 psi), alkali resistance (Fed. Spec TT-C-555B, GSA ex. l – no effect), and resistance to wind-driven rain > 100 mph (Fed. Spec. TT-C-555B – no weight gain). These results are equal or superior in terms of overall performance when compared to higher-VOC counterparts. Overall life of the coating is estimated to be double the performance of competitors.

Everest Coatings manufactures and sells EVERCOAT 7000S, High Modulus Waterproof Coating, a single component product conceals irregularities, fills cracks, and provides excellent waterproofing on a variety of masonry substrates. This coating utilizes acrylic resin technology supplied by Rohm and Haas, and has a VOC of 69 g/l, with a percent solids vol. of 60 percent. This product exhibits excellent resistance to the elements and U.V. degradation, has alkali-resistant pigments, and is mildew resistant. The recommended uses include aged, new and previously painted above-grade masonry, concrete, concrete block, and stucco.

GE Sealants & Adhesives, manufactures and sells VP1550 CONCENTRATED WATER REPELLANT (VIP1550), which is a high performance, breathable, clear, water repellant sealer that penetrates deeply into concrete and masonry surfaces without altering the natural appearance of the substrate. This product contains silanes/siloxanes and is

recommended for use on concrete driveways, walkways, brick paver and patio deck steps, as well as vertical masonry surfaces including stone, tilt-up concrete, brick, clay tile, and block.. The VOC content is 0.5 g/l, and the product provides excellent water repellency to reduce cracking, spalling, freeze/thaw damage, chemical degradation, biological growth, efflorescence and dirt pickup.

L&M Construction Chemicals, Inc. manufactures Aquapel & Aquapel Plus, a micro-emulsion, silane/siloxane water repellant that bonds directly with the substrate, resulting in very good resistance to moisture and salt, and has a VOC of less than 50 g/l. This product is recommended for use on buildings, parking decks, monuments, garages, driveways, dams, piers or any other concrete surfaces. Technical data from the manufacturer indicates that reduced water adsorption by 85 percent and chloride intrusion by up to 90 percent. Both products exceed NCHRP 244, Series II requirements for salt and water penetration.

Rainguard International Products Company, a local manufacturer, manufactures and sells Blok-Lok®, a clear water repellant with a VOC content of 37 g/l that is comprised of polysilanes. This product is recommended for use on masonry block, concrete, stucco, cement plaster, and other composite construction materials. Testing based on ASTM procedures conducted by the manufacturer shows that the product has equal or superior performance to its higher VOC counterparts. For example, ASTM E-514-86, Wind Driven Rain tests indicate that the use of Blok-Lok® reduces leak by 98.7 percent, reduced chloride ion intrusion (NCHRP No. 244), and allows 100 percent water vapor transmission (ASTM D-1653).

Sherwin Williams manufactures ConFlex XL, a textured high-build acrylic elastomeric coating recommended for concrete tilt-up, precast, poured-in-place concrete, CMU, and stucco. The technical information indicates "excellent flexibility, durability, and weather resistance". This pigmented waterproofing sealer has a VOC of 94 g/l. Testing done for or by Sherwin Williams, using ASTM methods, indicate elongation of 300 percent based on ASTM-D412. This coating also passes low temperature flexibility and freeze-thaw resistance tests, based on ASTM D522 and ASTM D2243, respectively.

Smiland Paint Company, under their Morwear Label, manufactures and sells a Clean Elastomeric Waterproofing Sealer (2571-70) recommended for application new or old, above grade, dense or porous concrete, stucco, and masonry surfaces. The VOC is reported to be 30 g/l, and the technical material from the manufacturer indicates that this product is suitable for damp or dry surfaces, is breathable and permeable to water vapor, and can be applied over substrates previously treated with silanes, siloxanes, urethanes, and acrylic paints. The technical data also indicates that this waterproofing sealer has "excellent elongation (440 percent), excellent tensile strength (400 psi), excellent exterior durability, and excellent water resistance." These conclusions were based on results from ASTM testing done for the above performance characteristics. Smiland Paint Company also makes and sells an interior/exterior heavy duty waterproofing (2555-70), which is an

emulsion of polysiloxane resins, exhibiting a durable and invisible shield against water penetration. This product is recommended for use on "interior or exterior above-grade concrete, masonry, cement blocks, brick, stucco, stones, porous tile, exposed aggregate concrete, sandstone, and slate." The VOC content of this product is 2 g/l.

Sierra Corporation/TK Products manufactures and sells a WB Silane Concentrate Concrete Sealer (TK-1311) that has a VOC of 59 g/l. This product is a micro emulsion based on silane and oligomeric alkoxysilanes mixed with water, and testing conducted by Wacker Silicones Corporation using the NCHRP 244 test procedures, indicates that chloride and moisture intrusion is reduced by more than 80 percent.

PROJECT DESCRIPTION

The current proposed amendments would implement, in part, the 2003 AQMP control measure CTS-07 – Further Reductions from Architectural Coatings and Cleanup Solvents. This control measure was also part of the 1999 Amendment to the 1997 Ozone SIP Revision for South Coast Air Basin, which is also consistent with the settlement agreement for the 1997 litigation between the SCAQMD and the NRDC, CCA and CBE. The proposed amendments to Rule 1113 include the following components, listed in the order they appear in the rule:

(a) Purpose and Applicability

No changes are proposed to this subdivision.

(b) Definitions of Terms

- Add new definition of "Aluminum Roof Coatings" [paragraph (b)(2)]
- Add new definition for "Interior Stains" [paragraph (b)(26)].
- Remove restriction of Industrial Maintenance Coatings for residential use or for use in areas of industrial, commercial or institutional facilities not exposed to extreme environmental conditions [paragraph (b)(25)] from "Definitions" and move to a more appropriate area of the rule, "Requirements." [paragraph (c)(2)].
- The definition of "Metallic Pigmented Coatings" excludes roof coatings [paragraph (b)(34)].

(c) Requirements

- Reduce the VOC content limit for clear wood finishes (varnishes) to 275 grams per liter of coating (less water and less exempt compounds) by July 1, 2006 [paragraph (c)(2)].
- Reduce the VOC content limit for clear wood finishes (sanding sealers) to 275 grams per liter of coating (less water and less exempt compounds) by July 1, 2006 [paragraph (c)(2)].
- Reduce the VOC content limit for roof coatings to 50 grams per liter of coating (less water and less exempt compounds) by January 1, 2005 [paragraph (c)(2)].
- Reduce the VOC content limit for aluminum roof coatings to 100 grams per liter of coating (less water and less exempt compounds by January 1, 2005 [paragraph (c)(2)]
- Reduce the VOC content limit for stains to 100 grams per liter of coating (less water and less exempt compounds) by July 1, 2006 [paragraph (c)(2)].
- The new coating category, interior stains, will maintain the current VOC content limit for stains at 250 grams per liter of coating (less water and less exempt compounds) [paragraph (c)(2)].
- Reduce the VOC content limit for waterproofing sealers to 100 grams per liter of coating (less water and less exempt compounds) by July 1, 2006 [paragraph (c)(2)].
- Reduce the VOC content limit for waterproofing concrete and masonry sealers to 100 grams per liter of coating (less water and less exempt compounds) by July 1, 2006 [paragraph (c)(2)].
- Three specific conditions added when the lower limit of a primer-sealer-undercoater, flat coating or non-flat coating does not apply [paragraph (c)(3)(B)].
- Expand the list of coating categories eligible under the Averaging Compliance Option [paragraph (c)(6)].
- Clarify that manufacturers who elect to comply with the Averaging Compliance Option to use only the sell through provision for each coating included in the program [paragraph (c)(6)(B)].

(d) Administrative Requirements

- Remove obsolete compliance effective dates [paragraph (d)(4)].

(e) Test Methods

No changes are proposed to this subdivision.

(f) Technology Assessment

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- Add varnishes to the list of coatings to be evaluated in a Technology Assessment by July 1, 2005.

(g) Exemptions

- Consolidate the list of coating categories, along with applicable conditions, currently required to be included in the annual report to the SCAQMD's Executive Officer reporting the number of gallons sold [paragraphs (d)(8)(A)-(E), paragraphs (g)(2), (g)(5), (g)(6) and (g)(9)].

- Move requirement that manufacturers of recycled coatings submit a letter to the SCAQMD's Executive Officer certifying their status as a Recycled Paint Manufacturer from "Exemptions" section of the rule to "Administrative Requirements" section of the rule [(paragraph (d)(10), paragraph (g)(5)].

- Move requirement for coating manufacturers selling containers having capacities of one quart or less to submit an annual report monitoring the use of the small container exemption [paragraph (g)(1)(A)] to "Administrative Requirements" section [paragraph (d)(8)(B)].

- Provide option to SCAQMD Governing Board to remove the exemption from the rule if using one quart or less of clear wood finishes, including varnishes, sanding sealers, lacquers and pigmented lacquers, after July 1, 2008 if from July 1, 2006 to June 30, 2008 clear wood varnishes and sanding sealers have a VOC content no greater than 450 grams per liter, and lacquers including pigmented lacquers have a VOC content no greater than 550 gram per liter [paragraph (g)(1)(A)(i) and (ii)]. Or

- Remove the exemption from the rule if using one quart or less of clear wood finishes, including varnishes, sanding sealers, lacquers and pigmented lacquers, after July 1, 2006 [paragraph (g)(1)(A)]

- Lower the VOC content limit for coatings containing acetone which is allowed to add up to ten percent by volume of VOC to avoid blushing of the finish [paragraph (g)(2)(B)].

- Roof coatings with a VOC content of 100 grams per liter or less that are certified under the USEPA Energy Star Program are not subject to the requirements of paragraph (c) from January 1, 2004 through December 31, 2006 [paragraph (g)(6)].

For a complete description of PAR 1113, the reader is referred to Appendix A of this Final EA.

ESTIMATED EMISSIONS REDUCTIONS

Implementation of PAR 1113 is currently estimated to result in approximately 3.73 tons per day of VOC emission reductions or approximately a 17 percent emission reduction of the 2010 baseline emission levels for this source category (24 tons per day), based on Annual Average Inventory in the 2003 AQMP (SCAQMD, August 2003) for this emission source category. The emission reductions from PAR 1113 are approximately 48 percent of the total emission reductions required by control measure CTS-07, as well as required by the settlement agreement. Table 1-2 summarizes the current proposed changes in VOC limits and the associated projected emission reductions.

TABLE 1-2

PAR 1113 Proposed Emission Limits and Projected Emission Reductions for Affected Coating Categories

Coating Category	Current Limit (g/l)[1]	Proposed Limit and Compliance Dates		Emission Reductions (tons/day)
		g/l[1]	Date	
Clear Wood Finishes (Varnishes)	350	275	7/1/06	0.22
Clear Wood Finishes (Sanding Sealers)	350	275	7/1/06	0.003
Clear Wood Finishes (Quart Exemption Removal)	---	275	7/1/06	0.83
Roof Coatings	250	50	1/1/05	1.59
Aluminum Roof Coatings	500	100	1/1/05	
Energy Star Roof Coatings	100	50	1/1/07	
Stains	250	100	7/1/07	0.56

TABLE 1-2 (CONCLUDED)

PAR 1113 Proposed Emission Limits and Projected Emission Reductions for Affected Coating Categories

Coating Category	**Current Limit (g/l)** [1]	**Proposed Limit and Compliance Dates**		**Emission Reductions (tons/day)**
Waterproofing Sealers	250	100	7/1/06	0.52
Waterproofing Sealers (Concrete and Masonry)	400	100	7/1/06	
TOTAL Emissions Reductions (tons per day)				**3.73**

[1] Grams of VOC per liter of coating, less water and less exempt compounds.
[2] Limits are in grams of VOC per liter of material.

CHAPTER 2

ENVIRONMENTAL CHECKLIST

Introduction

General Information

Environmental Factors Potentially Affected

Determination

Environmental Checklist and Discussion

INTRODUCTION

The environmental checklist provides a standard evaluation tool to identify a project's adverse environmental impacts. This checklist identifies and evaluates potential adverse environmental impacts that may be created by the PAR 1113 – Architectural Coatings.

GENERAL INFORMATION

Project Title:	Proposed Amended Rule 1113 – Architectural Coatings
Lead Agency Name:	South Coast Air Quality Management District
Lead Agency Address:	21865 Copley Drive Diamond Bar, CA 91765
CEQA Contact Person:	Michael A. Krause (909) 396-2706
Rule Contact Person:	Dan Russell (909) 396-2333
Project Sponsor's Name:	South Coast Air Quality Management District
Project Sponsor's Address:	21865 Copley Drive Diamond Bar, CA 91765
General Plan Designation:	Not applicable
Zoning:	Not applicable
Description of Project:	PAR 1113 would lower VOC content limit for the following coating categories: clear wood finishes, sanding sealers, waterproofing sealers, waterproofing concrete/masonry sealers, stains and roof coatings. The proposed amendments also phase-out the one-quart or less usage exemption for clear wood finishes and expand the scope of the Averaging Compliance Option to include the categories that are proposed for a change of VOC limits.
Surrounding Land Uses and Setting:	Not applicable
Other Public Agencies Whose Approval is Required:	Not applicable

ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED

The following environmental impact areas have been assessed to determine their potential to be affected by the proposed project. None of the environmental topics are expected to be adversely affected by the proposed project. An explanation relative to the determination of impacts can be found following the checklist for each area.

☐	Aesthetics	☐	Geology and Soils	☐	Population/ Housing
☐	Agricultural Resources	☐	Hazards and Hazardous Materials	☐	Public Services
☐	Air Quality	☐	Hydrology and Water Resources	☐	Recreation
☐	Biological Resources	☐	Land Use and Planning	☐	Solid/Hazardous Waste
☐	Cultural Resources	☐	Mineral Resources	☐	Transportation/Circulation
☐	Energy	☐	Noise	☐	Mandatory Findings

DETERMINATION

On the basis of this initial evaluation:

☑ I find the proposed project, in accordance with those findings made pursuant to CEQA Guideline §15252, COULD NOT have a significant effect on the environment, and that an ENVIRONMENTAL ASSESSMENT with no significant impacts will be prepared.

☐ I find that although the proposed project could have a significant effect on the environment, there will NOT be significant effects in this case because revisions in the project have been made by or agreed to by the project proponent. An ENVIRONMENTAL ASSESSMENT with no significant impacts will be prepared.

☐ I find that the proposed project MAY have a significant effect(s) on the environment, and an ENVIRONMENTAL ASSESSMENT will be prepared.

☐ I find that the proposed project MAY have a "potentially significant impact" on the environment, but at least one effect 1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENTAL ASSESSMENT is required, but it must analyze only the effects that remain to be addressed.

☐ I find that although the proposed project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier ENVIRONMENTAL ASSESSMENT pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier ENVIRONMENTAL ASSESSMENT, including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required.

Date September 25, 2003 **Signature:** Steve Smith

Steve Smith, Ph.D.
Program Supervisor
Planning, Rule Development & Area Sources

ENVIRONMENTAL CHECKLIST AND DISCUSSION

		Potentially Significant Impact	Less Than Significant Impact	No Impact
I.	**AESTHETICS.** Would the project:			
a)	Have a substantial adverse effect on a scenic vista?	☐	☐	☑
b)	Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	☐	☐	☑
c)	Substantially degrade the existing visual character or quality of the site and its surroundings?	☐	☐	☑
d)	Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	☐	☐	☑

I. a): The proposed amendments do not require any changes in the physical environment that would obstruct any scenic vistas or views of interest to the public. In addition, no major changes to existing architectural operations or stockpiling of additional materials or products outside of existing facilities are expected. The reason for this determination is that any physical changes would occur at existing industrial or commercial sites. Therefore, no significant impacts adversely affecting existing visual resources such as scenic views or vistas, etc. are anticipated to occur.

I. b), c): No new construction of buildings or other structures will result from the lowering of the VOC content in coatings so scenic resources will not be obstructed and the existing visual character of any site in the vicinity of affected operations will not be degraded. The purpose of AIM coatings is to improve the visual character and protect the surface of the product upon which the coating is applied. Defects in the appearance of the low-VOC coating after application, which could be argued as less aesthetically pleasing, is not anticipated because the rule contains a compliance schedule sufficient for coating formulators to produce acceptable quality low-VOC products that exhibit the desired performance characteristics. In addition, compliant low-VOC coatings are currently available, being sold, used and proven to be just as durable as coatings formulated with conventional solvents.

I. d): There are no components in PAR 1113 that would alter existing work practice, or require working at construction activities at night, and therefore, PAR 1113 is not expected to create a

new source of substantial light or glare that would adversely affect day or nighttime views in an area.

Based on the above considerations, significant adverse impacts to aesthetics are not expected from PAR 1113. Since there are no significant adverse impacts, no mitigation measures are required.

		Potentially Significant Impact	Less Than Significant Impact	No Impact
II.	**AGRICULTURE RESOURCES.** Would the project:			
a)	Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	☐	☐	☑
b)	Conflict with existing zoning for agricultural use, or a Williamson Act contract?	☐	☐	☑
c)	Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use?	☐	☐	☑

II. a) - c): As previously discussed, no major construction is associated with the lowering of the VOC content of affected coating categories. Further, the coating activities would occur at existing industrial or commercial areas. Therefore, the proposed project would not result in any construction of new buildings or other structures that would convert farmland to non-agricultural use or conflict with zoning for agricultural use or a Williamson Act contract. Since the proposed project would not substantially change the equipment or process in which the coatings are applied, there are no provisions in the proposed amended rule that would affect land use plans, policies, or regulations. Land use and other planning considerations are determined by local governments and no land use or planning requirements will be altered by the proposed project.

Based on the above considerations, significant adverse impacts to agriculture resources are not expected from PAR 1113. Since there are no significant adverse impacts, no mitigation measures are required.

	Potentially Significant Impact	Less Than Significant Impact	No Impact
III. AIR QUALITY. Would the project:			
a) Conflict with or obstruct implementation of the applicable air quality plan?	☐	☐	☑
b) Violate any air quality standard or contribute to an existing or projected air quality violation?	☐	☐	☑
c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions that exceed quantitative thresholds for ozone precursors)?	☐	☐	☑
d) Expose sensitive receptors to substantial pollutant concentrations?	☐	☑	☐
e) Create objectionable odors affecting a substantial number of people?	☐	☐	☑
f) Diminish an existing air quality rule or future compliance requirement resulting in a significant increase in air pollutant(s)?	☐	☐	☑

III. a): PAR 1113 would not conflict with or obstruct, air quality plan implementation but rather implement, in part, control measure CTS-07 from the 2003 AQMP, which was developed for the primary purpose of controlling emissions to attain and maintain all federal and state ambient air quality standards for the district. The 2003 AQMP concluded that major reductions in emissions of VOC and NOx are necessary to attain the air quality standards for ozone and PM10. VOC emissions cause the formation of ozone and PM10 (particulate matter less than 10 microns in size), two pollutants that exceed the state and national ambient air quality standards. VOCs react photochemically with oxides of nitrogen (NOx) to form ozone. Ozone is a strong oxidizer that irritates the human respiratory system and damages plant life and property. VOCs also react in the atmosphere to form PM10, a pollutant that adversely affects human health and limits visibility. Because these small particulates penetrate into the deepest regions of the lung, they affect pulmonary function and have even been linked to increased deaths. The VOC emissions from this industry will be reduced 3.73 tons per day as a result of implementing the proposed project thus providing a direct air quality benefit. This VOC emission reduction will assist the SCAQMD's progress in attaining and maintaining the ambient air quality standards for ozone.

III. b): For a discussion of this item, refer to the following analysis.

Air Quality Significance Criteria

To determine whether or not air quality impacts from adopting and implementing the proposed amendments are significant, impacts will be evaluated and compared to the following criteria. If impacts exceed any of the following criteria, they will be considered significant. All feasible mitigation measures will be identified and implemented to reduce significant impacts to the maximum extent feasible. The project will be considered to have significant adverse air quality impacts if any one of the thresholds in Table 2-1 are equaled or exceeded.

TABLE 2-1

Air Quality Significance Thresholds

Mass Daily Regional Thresholds		
Pollutant	**Construction**	**Operation**
NO_x	100 lbs/day	55 lbs/day
VOC	75 lbs/day	55 lbs/day
PM_{10}	150 lbs/day	150 lbs/day
SOx	150 lbs/day	150 lbs/day
CO	550 lbs/day	550 lbs/day
Lead	3 lbs/day	3 lbs/day
TAC, AHM, and Odor Thresholds		
Toxic Air Contaminants (TACs) Accidental Release of Acutely Hazardous Materials (AHMs)	MICR $\geq$ 10 in 1 million HI $\geq$ 1.0 (project increment) HI $\geq$ 3.0 (facility-wide) CAA §112(r) threshold quantities	
Odor	Project creates an odor nuisance pursuant to SCAQMD Rule 402	
NO_2 1-hour average annual average	 500 ug/m^3 (= 25 pphm) 100 ug/m^3 (= 5.3 pphm)	
PM_{10} 24-hour	 2.5 ug/m^3	
Sulfate 24-hour average	 25 ug/m^3	
CO 1-hour average 8-hour average	 1.1 mg/m^3 (= 1.0 ppm) 0.50 mg/m^3 (= 0.45 ppm)	

KEY: MICR = maximum individual cancer risk; HI = Hazard Index; ug/m^3 = microgram per cubic meter; pphm = parts per hundred million; mg/m^3 = milligram per cubic meter; ppm = parts per million; AHM = acutely hazardous material; TAC = toxic air contaminant

Construction Air Quality Impacts

The proposed project would only affect the future formulation of architectural coatings which is not expected to require physical changes or modifications involving construction activities. Thus, no construction air quality impacts will result from the proposed project.

Operational Air Quality Impacts – Direct Effects

The overall objective of the proposed project is to reduce VOC emissions from architectural coatings by lowering the VOC content limit from affected coating categories. To determine the VOC emission reductions anticipated for the proposed amendments, it is necessary to derive the emission inventory for architectural coatings. The following sections describe the methodology used to derive the emission inventory for architectural coatings and the VOC emission reductions anticipated for PAR 1113.

VOC Emissions Inventory

As mentioned in Chapter 1, CARB evaluated the data on architectural coatings sold in California collected with the latest survey conducted in 2003 (CARB Survey). To track the emission contributions of architectural coatings, an inventory was created that is based on the surveys. Coating sales in the SCAQMD are estimated based on population and represent 45 percent of those sold statewide. It is assumed that the distribution of waterborne and solvent-borne coatings is consistent throughout the state. The emission inventory is calculated by multiplying the sales volume by the sales weighted average actual-VOC content. Staff adjusted the baseline inventory to account for sales of: (a) coatings below the proposed VOC limit which were excluded from the inventory since these coatings are already compliant; (b) coatings above the current SCAQMD VOC limits assumed to be compliant and (c) small exempt containers except for clear wood coatings that are being phased out. This establishes an adjusted emission inventory in order to calculate the emission reductions for the proposed amendments. Table 1-1 lists the VOC emissions inventory for the affected coating categories as well as the amount of coatings used in the SCAQMD. Approximately 3 million gallons of affected coatings emit six tons per day of VOC.

VOC Emission Reductions

Implementation of PAR 1113 is currently estimated to result in approximately 3.73 tons per day of VOC emission reductions or approximately a 17 percent emission reduction of the 2010 emission levels for this source category (24 tons per day), based on Annual Average Inventory in the 2003 AQMP (August 2003, SCAQMD) for this emission source category. Table 1-2 summarizes the current proposed changes in VOC limits and the associated projected emission reductions.

III. c): Cumulative air quality impacts from the proposed amendments, PAR 1171, previous amendments and all other AQMP control measures considered together are not expected to be

significant because implementation of all AQMP control measures is expected to result in net emission reductions and overall air quality improvement. This determination is consistent with the conclusion in the 2003 AQMP PEIR that cumulative air quality impacts from all AQMP control measures are not expected to be significant (SCAQMD, 2003). Indeed, air quality modeling performed for the 2003 AQMP indicated that the district would achieve all federal ambient air quality standards by the year 2010 (SCAQMD, 2003). Future VOC control measures will assist in achieving the goal of ozone attainment by 2010. Based on regional modeling analyses performed for the 2003 AQMP, implementing control measures contained in the 2003 AQMP, in addition to the air quality benefits of the existing rules, it is anticipated to bring the district into attainment with all national and most state ambient air quality standards by the year 2010. Therefore, there will be no cumulative adverse air quality impacts from implementing PAR 1113. There are no provisions of PAR 1113 that result in either project-specific or cumulative air quality impacts. Since the proposed project is not expected to create significant adverse project-specific air quality impacts, indeed it is expected to improve air quality, the proposed project's contribution to significant adverse cumulative impacts are less than cumulatively considerable (CEQA Guidelines §15130(a)(3)) and, therefore, are not significant.

III. d): PAR 1113 is not expected to create significant adverse human health impacts or expose sensitive receptors to substantial pollutant concentrations based on the following analysis of the compounds to be used in reformulating new compliant coatings compared to the solvents currently formulated in conventional coatings.

Coalescing solvents such as propylene glycol and ethylene glycol, may be used more widely in low-VOC water-borne formulations as alternatives to their more toxic counterparts such as toluene, xylene, ethylene glycol monoethyl ether (EGEE), and ethylene glycol monomethyl ether (EGME). Coalescing solvents act as plasticizers in certain coating formulations to allow the otherwise solid resin to flow together to form a film. Isocyanates may be used as condensation reaction agents in low-VOC two-component waterborne urethane systems for clear wood finishes. Monomer styrene may be used as a viscosity reducer in high-solid clear wood finishes, however, these are also currently being used in conventional coatings. Isopropyl alcohol and ethylene glycol monobutyl ether (EGBE) are also formulated in both conventional and reformulated compliant coatings.

Conventional Solvents

Toluene

Toluene is a colorless liquid whose largest use is in the production of benzene. Toluene is also used as an octane booster or enhancer in gasoline, as a raw material for toluene diisocyanate, as a solvent, and in solvent extraction processes. As a solvent, it may be used in aerosol spray paints, wall paints, lacquers, inks, adhesives, natural gums, and resins, as well as in a number of consumer products, such as spot removers, paint strippers, cosmetics, perfumes, and antifreezes.

Breathing large amounts of toluene for short periods of time adversely affects the human nervous system, the kidneys, liver, heart, eyes, respiratory and reproductive/developmental (hazard index targets). Effects range from unsteadiness and tingling in fingers and toes to unconsciousness and death. Direct, prolonged contact with toluene liquid or vapor irritates the skin, eyes and nose. Human health effects associated with breathing or otherwise consuming smaller amounts of toluene over long periods of time are not known. Repeatedly breathing large amounts of toluene, such as when "sniffing" glue or paint, can cause dizziness, headaches and permanent brain damage. As a result, humans can develop problems with speech, hearing, and vision. Humans can also experience loss of muscle control, loss of memory, and decreased mental ability. Exposure to toluene can also adversely affect the kidneys. Laboratory animal studies and, in some cases, human exposure studies show that repeat exposure to large amounts of toluene during pregnancy can adversely affect the developing fetus. Other studies show that repeat exposure to large amounts of toluene adversely affects the nervous system, the kidneys, and the liver of animals.

The Clean Air Act Amendments of 1990 list toluene as a hazardous air pollutant. Toluene is also listed in Table I of SCAQMD Rule 1401 – New Source Review of Toxic Air Contaminants.

Xylene

Xylene is a colorless liquid that occurs naturally in petroleum and coal tar and is formed during forest fires. Chemical industries produce xylene from petroleum. It is one of the top 30 chemicals produced in the United States in terms of volume. As nonexplosive aromative hydrocarbons, mixtures of the three (technical xylene) isomers are heavily used in the chemical industry and in the petroleum industry as a gasoline “antiknock” additive. Xylene is also used as a solvent and in the printing, rubber, and leather industries. Furthermore, it is used as a cleaning agent, paint thinner, and in paints and varnishes. It is found in small amounts in airplane fuel and gasoline.

Xylene adversely affects the brain. High levels of exposure for short periods (14 days or less) or long periods (more than one year) can cause headaches, lack of muscle coordination, dizziness, confusion, and changes in one's sense of balance. Exposure of persons to high levels of xylene for short periods can also cause irritation of the skin, eyes, nose, and throat; difficulty in breathing; problems with the lungs; delayed reaction time; memory difficulties; stomach discomfort; and possibly changes in the liver and kidneys. It can cause unconsciousness and even death at very high levels.

Studies of unborn animals indicate that high concentrations of xylene may cause increased numbers of deaths, and delayed growth and development. In many instances, these same concentrations also cause damage to the mothers. It is unknown if xylene harms the unborn child if the mother is exposed to low levels of xylene during pregnancy.

The International Agency for Research on Cancer (IARC) has determined that xylene is not classifiable as to its carcinogenicity in humans. Human and animal studies have not shown xylene to be carcinogenic, but these studies are not conclusive and do not provide enough information to conclude that xylene does not cause cancer.

The Clean Air Act Amendments of 1990 list xylene as a hazardous air pollutant. Because xylene can cause adverse health affects other than cancer, it is listed in Table I of Rule 1401.

Methyl Ethyl Ketone

The primary use of methyl ethyl ketone, accounting for approximately 63 percent of all use, is as a solvent in protective coatings. It is also used as a solvent in printing inks, paint removers, and other cleaning products; in the production of magnetic tapes; and in dewaxing lubricating oil. Methyl ethyl ketone is used as a chemical intermediate in several reactions, including condensation; halogenation; ammonolysis; and oxidation. Small amounts of methyl ethyl ketone are also used as a sterilizer for surgical instruments, hypodermic needles, syringes, and dental instruments; as an extraction solvent for hardwood pulping and vegetable oil; and as a solvent in pharmaceutical and cosmetic production.

Breathing MEK for short periods of time, such as when painting in a poorly vented area, can adversely affect the nervous system. Effects range from headaches, dizziness, nausea, and numbness in fingers and toes to unconsciousness. MEK vapor irritates the eyes, the nose, and the throat. Direct, prolonged contact with liquid methyl ethyl ketone irritates the skin and damages the eyes. Human health effects associated with breathing or otherwise consuming smaller amounts of methyl ethyl ketone over long periods of time are not known. Workers have developed dermatitis, upset stomachs, loss of appetite, headaches, dizziness, and weakness as a result of repeated exposure to MEK. Laboratory studies show that exposure to large amounts of MEK in air causes animals to give birth to smaller offspring. Studies also show that repeat exposure to large amounts of MEK in air causes adverse liver and kidney effects in animals. The 1990 Clean Air Act Amendments list methyl ethyl ketone as a hazardous air pollutant.

Ethylene Glycol Ethers (EGEE, EGME)

Ethylene glycol ethers are colorless transparent liquids. EGEE and EGME are ethylene glycol ethers with alkyl chains of one or two carbon atoms. EGEE is also known as cellusolve and is a widely used solvent for nitrocellulose, dyes, inks, resins, lacquers, paints, varnishes. It is also a component of many cleaning agents, epoxy coatings, paints, hydraulic fluid, and is an anit-icing fuel additive in aviation. EGME is used as a solvent for cellulose acetate and resins as well as a solvent in the semiconductor industry. It is also used in dyeing leather and in the manufacture of photographic film. EGME is used as an anti-freeze in jet fuels. Quick drying varnishes, enamels, nail polishes, and wood stains may also contain EGME. EGEE and EGME are federal hazardous air pollutants (HAPs) and were identified as toxic air contaminants (TACs) in California in April

1993 under AB 2728. Exposures to glycol ethers are not well characterized, but may occur near sources of industrial emissions.

There is evidence in both humans and animals that exposure to specific glycol ethers can result in developmental toxicity. Developmental toxicity is one of the endpoints of concern for impacts on infants and children. The developing fetus is susceptible to certain glycol ethers and appears to be susceptible at levels lower than those associated with maternity toxicity. The effects of EGEE and EGME are considered severe because they include teratogenicity, testicular toxicity, and fetotoxicity in rabbits.

The glycol ethers cause damage to the developing fetus at exposure levels below those that cause maternal toxicity. Toxicity to the bone marrow and thymus at higher doses in adult animals indicate the possibility of enhanced risk to developing hematopoietic and immune systems. In some key animal studies, exposure to EGEE induces malformations in offspring in the absence of significant maternal toxicity while EGME is fetotoxic and teratogenic at concentrations below that necessary to induce maternal toxicity. EGME may cause changes in brain chemistry when exposure occurs during development. The brains of 21-day-old offspring had neurochemical changes, especially in the brainstem and cerebrum. They showed no behavioral effects as indicated by neuromotor function, activity, and simple learning ability.

The acute REL for EGEE is based on specific skeletal defects, including delayed ossification of the cervical vertebrae, sternum, and extra ribs seen in the fetuses from pregnant rats exposed by inhalation six hours per day on days six to fifteen of gestation. The chronic REL for EGEE is based on testicular degeneration and decreased hemoglobin in rabbits. The acute REL for EGME is based on teratogenic effects in rabbits and the chronic REL for EGME is based on testicular toxicity (reproductive system) in rabbits.

The most sensitive toxic endpoints associated with EGEE, EGME are developmental toxicity and male reproductive toxicity. These glycol ethers appear to be more toxic to the developing human than to humans at later stages of life. However, based on current risk assessment methodology, the existing health criteria for glycol ethers should be adequately protective of children because they are based on developmental endpoints in animals.

Possible Solvent Replacements

Propylene Glycol Monomethyl Ether

Propylene glycol monomethyl ether (PGME) is a colorless liquid whch has critical liver effects in rats and the hazard index target is the alimentary system (liver). Propylene glycol is used as a solvent for cellulose, acrylics, dyes inks and stains. Thus, the primary use of PGME is in lacquers and paints. Toxicity of propylene glycol ether is lower than ethylene glycol ether, and thus, it can

be regarded as relatively innocuous or low toxic. It can be used as or for chemical intermediate, brake liquid, detergent, frost resistant solvent as well as solvent for high grade paint. Use of PGME is anticipated to increase due to its low systemic toxicity.

No reports or studies of human toxicity following chronic expsosure to PGME were located in the literature. Slight eye irritation was reported by two of six human volunteers exposed to 100 ppm PGME for 2 hours. These subjects were exposed for a total of three and a half hours during which no decrement in visual acuity, coordinatoion, neurological responses or reaction time measured.

As mentioned in the previous subsection, EGME, a structurally related compound to PGME, exerts considerable toxicity on the blood, thymus, testes, and developing fetus. The toxicity of EGME has been linked to its primary metabolite, methoxyacetic acid. Recent comparative toxicity and metabolism studies indicate that the relatively low systemic toxicity exerted by PGME is due to its different metabolites.

Ethylene Glycol

Ethylene glycols are clear, colorless, odorless liquids that are used as an antifreeze agent in cooling and heating systems; in hydraulic brake systems; as an ingredient in electrolytic condensers; as a solvent in the paints and plastic industries; and in inks for ball-point pens and printer's ink. It is used in the manufacture of some synthetic fibers and in synthetic waxes. In addition, ethylene glycols have been used in some skin lotions, flavoring essences, in asphalt emulsion plants, in wood stains and adhesives, in leather dyeing as well as a de-icing fluid for airport runways.

The chronic effect from ethylene glycol is respiratory irritation to human volunteers and the harzard index target is the respiratory system, kidney and teratogenicity. Ten motor servicing workers had significantly higher urinary levels of ethylene glycol and ammonia, and decreased urinary glycosaminoglycan levels. The ethylene glycol levels in the air were undetectable in the worker's breathing zones, therefore dermal absorption appeared to be the primary route of exposure.

In a study of 20 volunteer male prisoners in Alabama, 20 hours per day exposure to aerosolized ethylene glycol concentration varying up to a mean of 20 ppm for 30 days was without effect. Respiratory irritation was noted after 15 minutes at an exposure concentration of 75 ppm and became quickly intolerable at 123 ppm. No effects were observed in normal clinical chemistry, clinical serum enzyme levels for liver and kidney toxicity, hematotoxicity or psychologoical responses. The respiratory irritation at 75 ppm resolved soon after exposure with no long term effects noted after a six-week follow up period.

Isopropyl Alcohol

Isopropyl alchol (IPA) is a colorless liquid soluble in benzene, miscible with most organic solvents, and slightly soluble in water, alcohol and acetone. IPA has wide use in consumer products such as mild skin disinfectants and astringents, and is also used as a solvent for cellulose nitrate. Irritation of the mucous membranes of the upper respiratory tract may occur following inhalation of isopropyl alcohol. In one study, ten human subjects were exposed for two to five minutes to 400 or 800 ppm isopropyl alcohol. Exposure to 400 ppm isopropyl alcohol produced mild irritation of the eyes, nose, and throat. When exposed to 800 ppm the majority of the subjects declared the atmosphere unsuitable for a prolonged exposure. The subjects indicated, however, that prolonged exposure to 200 ppm would not be objectionable. Persons with eye, skin, respiratory or neurological conditions and diabetics may be more sensitive to the toxic effects of isopropyl alcohol. Individuals exposed to acetone, carbon tetrachloride, or n-hexane may be at increased risk for adverse effects when exposed simultaneously to isopropyl alcohol. No human reproductive studies are currently available and only a limited number of animal studies on the effects of isopropyl alcohol have been conducted.

Ethylene Glycol Monobutyl Ether (EGBE)

EGBE, otherwise known as butyl cellosolve, is a colorless liquid that is used as a coupling agent to stabilize immiscible ingredients in metal cleaners, textile lubricants, and cutting oils. It is also used as a solvent for nitrocellulose resins, spray lacquers, enamels, and varnish removers. EGBE is also found in hydraulic fluids. EGBE has acute effects of irritation and the respiratory system is the hazard index target.

Two adult male volunteers were exposed to 113 ppm of EGBE for four hours. Eye, nose and throat irritation, taste disturbances, and headache and nausea were reported. Symptoms observed included nasal and ocular irritation, disagreeable metallic taste, and a slight increase in nasal mucus discharge. Four additional volunteers were exposed either mouth-only or skin-only, by a mouthpiece or a respirator in a chamber, to 50 ppm EGBE for two hours. Capillary blood samples were taken at regular intervals to determine rate of uptake from dermal and inhalation exposure. The experiment concluded that dermal uptake of EGBE from air is approximately four times greater than respiratory uptake. Seven healthy male adults were exposed to 20 ppm of EGBE in a chamber experiment designed to assess pulmonary uptake and metabolism of EGBE. Butoxyacetic acid was the primary metabolite found in the urine. The authors report that 57 percent of the inhaled dose was absorbed in the respiratory tract. In addition, persons with preexisting neurologist, blood or kidney conditions might be more sensitive. No studies on the developmental and reproductive toxicity of EGBE in humans were located.

Toluene Diisocyanates (TDI)

Toluene diisocyanates (TDI) are a colorless to pale yellow liquid which have a chronic effect of decreased lung function in occupationally exposed workers and the hazard index target is the

respiratory system. TDI are miscible with ether, acetone, benzene, carbon tetrachloride, chlorobenzene, diglycol monomethyl ether, kerosene, olive oil, alcohol; soluble in ethyl acetate

Commercial toluene diisocyanate is comprised of approximately 80 percent 2,4-TDI and 20 percent 2,6-TDI. TDI is used in the manufacture of polyurethane foams, elastomers, and coatings. It is also used in the manufacture of floor and wood finishes, lacquers, foam plastics, polyurethane foam coated fabrics, and insulation materials. Emissions of TDI to the atmosphere can occur during production, handling, and processing of polyurethane foam and coatings. No relationship between TDI exposure and change in lung function was observed, although the prevalence of chronic bronchitis was significantly associated with exposure. The limitations of studies showing pulmonary effects of TDI exposure include use of area sampling vs. breathing-zone measurement of exposure, poor statement of criteria for evaluating hypersensitivity, and the presence of other compounds in the environment which may influence lung function. The major limitations of the study are the uncertainty in estimating exposure, the potential variability in exposure concentration, and the limited nature of the study that focused on lung effects.

Methylene Diphenyl Isocyanate (MDI)

Methylene diphenyl isocyanate (MDI) are light yellow and used for bonding rubber to nylon. MDI is also used in the manufacture of lacquer coatings and in the production of polyurethane resins and spandex fibers. It is often handled in a partially polymerized form, which has a much lower vapor pressure than the monomer. They are soluble in acetone, benzene, kerosene, and nitrobenzene (monomer). The chronic effect is hyperplasia of the olfactory epithelium in rats and the hazard index target is the respiratory system.

A five-year occupational study of 107 workers from a polyurethane plastic manufacturing plant examined pulmonary function, respiratory systems, and smoking habits. No significant changes in pulmonary function or respiratory systems were observed when controlled for smoking.

Styrene

Styrene is a flammable, volatile liquid with a penetrating odor. Low levels of styrene occur in some foods, probably as a result of microbial action, and small amounts are permitted for flavoring purposes. The major source of styrene is industrial synthesis. Styrene is used in the production of polystyrene plastics and resins from which are manufactured many industrial and consumer products (e.g., luggage, construction and packaging materials, tub/shower units and boats).

Human exposure to styrene occurs under occupational and environmental conditions. OSHA estimates about 90,000 workers are exposed to styrene. Environmental exposure occurs during the release of styrene during transportation, manufacture and storage activities, during human activities such as smoking cigarettes or breathing automobile exhaust, and during the use of consumer products. Exposure to styrene by inhalation is also possible during its evaporation from water. In California, no styrene was detected in surface water discharges in 1998 from facilities

that report under the Toxics Release Inventory program, although nationwide, surface water discharges of about 13,000 pounds of styrene were reported to the U.S. EPA.

Eye and throat irritation have also been observed among acutely exposed humans. Acute exposures of laboratory animals to styrene can cause irritation and central nervous system decrements. Exposure of mice to styrene by inhalation resulted in liver damage. Multiple administrations of styrene to mice resulted in suppressed antibody and enhanced hypersensitivity responses. Subchronic inhalation exposures of mice resulted in lesions in the lung olfactory epithelium, forestomach and adrenal gland. Mice exposed for two years by inhalation to styrene exhibited liver necrosis, respiratory tract lesions and reduced body weight gain. Rats subchronically exposed to styrene exhibited alterations in the astroglial filaments and lesions of the respiratory tract. Mice exposed for two years by inhalation to styrene developed bronchiolar-alveolar adenoma and carcinoma. In one strain of mice that received styrene by gavage for the first 16 weeks of life, there was an increased incidence of lung tumors, whereas in a different strain of mice that received styrene by gavage for 120 weeks from birth, no tumors were observed.

Operational Air Quality Impacts – Toxic Effects

To analyze in more detail the toxic effects associated with the use of compliant low-VOC coatings, the SCAQMD conducted a health risk assessment (HRA) for the compounds listed in Tables 2-2 to 2-5 consistent with the HRA procedures listed in the SCAQMD's Risk Assessment Procedures for Rules 1401 and 212 document. An HRA is used to estimate the likelihood of an individual contracting cancer or experience other adverse health effects as a result of exposure to toxic air contaminants (TACs). Risk assessment is a methodology for estimating the probability or likelihood of an adverse health effect occurrence.

Carcinogenic Effects

Risks from carcinogens are expressed as an added lifetime risk of contracting cancer as a result of a given exposure. For example, if the emissions from a facility are estimated to produce a risk of one in one million (1×10^{-6}) to the most exposed individual, this means that the individual's chance of contracting cancer has been increased by one chance in one million over and above his or her chance of contracting cancer from all other factors (for example, diet, smoking, heredity and other factors). This added risk to a maximally exposed individual is referred to as a "maximum individual cancer risk" or MICR. For CEQA purposes, the SCAQMD's significance threshold for carcinogenic impacts is a MICR greater than or equal to 10 in one million (10×10^{-6}).

Although Appendix B contains a variety of clear wood coatings, including numerous single-component formulations and two-component systems, discussions with coatings manufacturers and review of coating product sheets indicate that isocyanates may be used in some low- or zero-VOC, water-borne compliant two-component urethane coating systems for clear wood finishes. TDI is the only compound potentially used in the reformulated coatings that has a carcinogenic

unit risk factor according to the SCAQMD's Rule 1401. TDI is part of a group of compounds known as diisocyanates, which are low-molecular-weight aromatic and aliphatic compounds. Also included in this group, but not considered to be carcinogenic, are hexamethylene diisocyanates (HDI) and methylene bisphenyl diisocyanates (MDI). These water-borne compliant formulations are intended as direct replacements for their higher-VOC solvent-borne two component counterparts currently being applied.

To analyze the potential cancer risks associated with the use of compliant coatings containing TDI to downwind receptors and applicators of these coatings, the SCAQMD performed a HRA. Typical formulations when atomized using a spray gun emit approximately one percent (by weight) of the TDI in the two component system, although most low- to zero-VOC systems should not result in any volatilization of any VOC compounds, including TDI, due to the small volume. The results of the carcinogenic HRA for TDI are shown in Table 2-2. Table 2-2 shows the volume of TDI coatings in gallons per day that would result in a MICR of 10 in one million (10×10^{-6}) or greater for sensitive receptors at specified distances.

TABLE 2-2

TDI Coatings in Gallons Per Day That Would Exceed A MICR Of 10×10^{-6}

	Downwind Receptor Distances, (in meters)					
	25		**50**		**100**	
Compound	**Emissions** lbs/day	**Usage** gals/day	**Emissions** lbs/day	**Usage** gals/day	**Emissions** lbs/day	**Usage** gals/day
TDI	0.14	1.52	0.41	4.60	1.55	17.23

As shown in Table 2-2, less than two gallons per day of coatings containing TDI can be used before the significance threshold of a MICR $>10 \times 10^{-6}$ is exceeded at a downwind receptor distance of 25 meters. At more distant source receptor distances the amount of daily coatings that can be used before exceeding the SCAQMD's significance threshold increases.

Although the daily usage levels in Table 2-2 are low, the application of architectural coatings is not expected to be an on-going operation at a specific site. The coating application is taking place at various locations exposing different sensitive receptors for periods of time much shorter than the exposure time estimated in the formulation of the unit risk factor for a specific TAC. Therefore, significant adverse carcinogenic human health impacts are not expected for downwind residential or sensitive receptors because the HRA estimates the probability of a potential maximally exposed individual contracting cancer as a result of continuous exposure to toxic air contaminants over a period of 70 years for residential and 46 years for worker receptor locations. Furthermore, the application of these coating systems are typically used for maintenance (e.g., touch-up and repair) or repaint purposes, lasting only a couple days to weeks, and occurring on an intermittent basis (e.g., once every couple of years to every ten years, or more). Therefore, downwind residential or sensitive receptors will not be exposed on a long-term basis to TDI that

would result in significant adverse carcinogenic human health impacts. The coating categories affected by the current amendments do not include IM coatings.

Furthermore, it appears that TDI in compliant water-borne two component systems are being phased out and replaced with HDI and MDI. Since HDI and MDI are noncarcinogenic, the replacement of TDI with HDI and MDI would eliminate all carcinogenic risk associated with the use of these compliant coatings.

In the context of worker exposure (e.g., applicators of the coatings), significant adverse impacts are not expected. Safety measures to protect individuals against exposure to diisocyanates are described in the following paragraphs.

Worker Isolation – Areas where coatings with diisocyanates are applied should be restricted to essential workers. If feasible, these workers should avoid direct contact with diisocyanates by using automated equipment or area with plenty of ventilation.

Protective Clothing and Equipment – When there is potential for diisocyanate exposure, workers should be provided with and required to use appropriate personal protective clothing and equipment such as coveralls, footwear, chemical-resistant gloves and goggles, full faceshields, and suitable respiratory equipment.

Respiratory Protection – Only the most protective respirators should be used for situations involving exposures to diisocyanates because they have poor warning properties, are potent sensitizers, or may be carcinogenic. These respirators include:

Any respiratory protection program must, at a minimum, meet the requirements of the OSHA respiratory protection standard [29 CFR 1910.134]. Respirators must be certified by NIOSH and MSHA according to 30 CFR or by NIOSH (effective July 19, 1995) according to 42 CFR 84. A complete respiratory protection program should include: (1) regular training and medical evaluation of personnel, (2) fit testing, (3) periodic environmental monitoring, (4) periodic maintenance, inspection, and cleaning of equipment, (5) proper storage of equipment, and (6) written standard operating procedures governing the selection and use of respirators. The program should be evaluated regularly. The following publications contain additional information about selection, fit testing, use, storage, and cleaning of respiratory equipment: NIOSH Guide to Industrial Respiratory Protection [NIOSH 1987a] and NIOSH Respiratory Design Logic [NIOSH 1987b]. Examples of complying with these regulations include the following:

- Any self-contained breathing apparatus with a full facepiece operated in a pressure-demand or other positive-pressure mode, and

- Any supplied-air respirator with a full facepiece operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained breathing apparatus operated in a pressure-demand or other positive-pressure mode.

Worker and Employer Education – Worker education is vital to a good occupational safety and health program. OSHA requires that workers be informed about:

- Materials that may contain or be contaminated with diisocyanates;
- The nature of the potential hazard [29 CFR 1910.1200]. Employers must transmit this information through container labeling, MSDSs, and worker training;
- The serious health effects that may result from diisocyanate exposures; and
- Any materials that may contain or be contaminated with diisocyanates.

Additionally, workers should take the following steps to protect themselves from diisocyanate exposure:

- Be aware that the highest diisocyanate concentrations may occur inside containment structures.
- Wash hands and face before eating, drinking, or smoking outside the work area.
- Participate in medical monitoring and examination programs, air monitoring programs, or training programs, offered by your employer.

The above safety practices and application techniques are recommended by the National Association of Corrosion Engineers (NACE) and the Society for Protective Coatings during the application of architectural coatings including future compliant two-component low-VOC TDI coatings. Thus, applicators will not require additional training regarding the proper handling or application of compliant coatings containing diisocyanates. This will further reduce the applicator's exposure to diisocyanates.

Non-Cancer Health Effects

There are a range of potential adverse health effects associated with toxic substances currently formulated in AIM coatings as noted in Table 2-3. The actual effects of exposure to coatings, however, depend on such factors as the exposure duration, potency of the solvents of concern, exposure frequency, and other factors.

TABLE 2-3

Toxicity of Currently Available Coating Solvents

Traditional/Conventional Solvents				
Solvents	**TLV (ACGIH) [a] (ppm)**	**PEL (OSHA) [a] (ppm)**	**IDLH (NIOSH) (ppm)**	**Health Hazard**
Conventional Solvents				
Toluene	50	200	2,000	Moderate irritation - eye, nose, throat; narcosis: skin; suspect teratogen; mutagen, nervous system
Xylene	100	100	1,000	Mild irritation - eye, nose, throat; narcosis; skin
MEK	200	200	3,000	Mild irritation - eye, nose, throat; narcosis
Butyl Acetate	150	150	10,000	Moderate irritation - eye, nose, throat; narcosis
Isobutyl Alcohol	50	100	8,000	Mild irritation - eye, nose, throat; suspect carcinogen
Stoddard Solvent	100	500	5,000	Narcosis; mild irritant
Petroleum Distillates (Naptha)	100	500	10,000	Mild irritation; narcosis
EGME	5	25	Not Available	Cumulative CNS; skin; suspect reproductive effects; blood disorders
EGEE	5	200	Not Available	Cumulative blood damage; moderate irritation of eyes, throat, skin
Replacement Solvents				
Propylene Glycol	100	100	Unknown	Mild irritation – slight eye, anesthesia
Ethylene Glycol	Not Available	10	2,500	Mild irritation - respiratory, skin, kidney, reproductive
EGBE	20	50	700	Mild irritation - eye, nose, throat; anemia; skin
Isopropyl Alcohol	400	400	12,000	Mild irritation - eye, nose, throat; narcosis
TDI	0.005	0.02	10	Mild irritation - respiratory
MDI	0.005	0.02	40	Mild irritation - respiratory
Styrene	20	100	5,000	Mild irritation – eye, respiratory, neurotoxicity

[a] Source: American Conference of Government Industrial Hygienists, 2001

[b] Source: Occupational Safety and Health Administration

[c] IDLH = immediately dangerous to life and health

To evaluate noncancer health effects from a TAC, exposure levels are estimated (just as with carcinogens), so that they can be compared to a corresponding reference exposure level (REL). As for carcinogens, exposure is evaluated for the most exposed individual. Chronic exposures are evaluated using the same exposure assumptions described for carcinogens -- continuously for a 70-year residential lifetime or 8 to 9 hours per day and 50 weeks a year for a 46-year working (commercial or industrial) lifetime. For acute exposures, the maximum hourly airborne concentration of a TAC is estimated.

The health risk from exposure to a noncarcinogenic TAC is evaluated by comparing the estimated level of an sensitive receptor's exposure to the TAC to the TAC's REL. The ratio is expressed as a hazard index (HI), which is the ratio of the estimated exposure level to the REL:

$$\text{Hazard Index (HI)} = \frac{\text{Estimated Exposure Level}}{\text{Reference Exposure Level}}$$

A HI of one or less indicates that the estimated exposure level does not exceed the Reference Exposure Level, and that no adverse health effects are expected. For CEQA purposes, the SCAQMD's significance threshold for noncarcinogenic impacts is a hazard index greater than or equal to one.

The ratio of the estimated acute level of sensitive receptor's exposure to a TAC to the acute REL is called an acute HI. The ratio of the estimated chronic level of exposure to a TAC to its chronic REL is called a chronic hazard index.

Based on the foregoing HRA methodologies, the SCAQMD estimated the long-term chronic, and short-term acute risks associated with the use of compounds where toxicity data were available. Tables 2-2 through 2-3 highlight the results of this risk analysis. These tables present the amount of each compound that can be emitted and coating usage before the SCAQMD significance thresholds are exceeded. For a more detailed discussion of how the table values where derived and the unit risk factors, chronic RELs, and acute RELs used to conduct the HRAs, the reader is referred to Appendix C of this Final EA.

Chronic Exposure: Table 2-4 shows the number of gallons it would take on a daily basis to equal or exceed a chronic hazard index of 1.0. According to industry sources, no more than 25 to 30 gallons of AIM coatings can be applied per day. If a solvent listed in Table 2-4 can exceed the significance threshold with a usage of less than 25 gallons daily, then the chronic HI for that compound is potentially significant. Since no more than 25 to 30 gallons of any given coating can be applied in one day, then solvents which require more than 25 gallons to exceed the daily significance threshold are not likely to have a significantly adverse chronic impact. As shown in Table 2-4, two conventional solvents currently have potentially significant chronic health impact while one compound, TDI, has the potential to exceed the significance threshold for chronic impacts. As evaluated in the previous section, TDIs, are used as reaction agents in two-component urethane systems which are not conducive to architectural coating application because of the limited pot life and the complexity of the two-part system. Thus, the two-component urethanes for clear wood finish applications are not widely used and are not expected to be widely used to comply with the proposed amendments.

TABLE 2-4

Long-term Chronic Exposure Risk Assessment
(Gallons Per Day That Would Exceed A Chronic Hazard Index Of 1.0)

	Downwind Receptor Distances					
	25m		50m		100m	
Conventional Solvents	**Emissions** lbs/day	**Usage** gals/day	**Emissions** lbs/day	**Usage** gals/day	**Emissions** lbs/day	**Usage** gals/day
Toluene	45.09	50.10	136.71	151.90	511.68	568.54
Xylene	105.21	116.90	318.99	354.44	1193.93	1326.59
EGEE	10.52	11.69	31.90	35.44	119.39	132.66
EGME	9.02	10.02	27.34	30.38	102.34	113.71
Replacement Solvents						
Ethylene Glycol	60.12	111.33	182.28	337.56	682.24	1263.42
Propylene Glycol	1052.09	2337.99	3189.94	7088.75	11939.28	26531.73
Isopropyl Alcohol	1052.09	2922.48	3189.94	8860.94	11939.28	33164.67
TDI	0.01	0.12	0.03	0.35	0.12	1.33
Methylene Phenyl Diisocyanate (MDI)	0.11	1.17	0.32	3.54	1.19	13.27
Styrene	135.27	1502.99	410.13	4557.05	1535.05	17056.11

Like risks associated with carcinogens, risks associated with compounds that pose chronic hazard risk are based on long-term continuous exposure. AIM coatings are applied on an infrequent and intermittent basis. For first time painting or repainting situations, application of AIM coatings occurs over a relatively short period of time, over the course of hours up to several weeks depending on the specific nature of the job. For touch-up and maintenance applications, actual application of AIM coatings takes several hours up to several weeks to complete depending on the specific nature of the job and occurs periodically through-out the year or over the course of several years. Therefore, because of the intermittent and infrequent application of AIM coatings, long-term exposure of downwind residential or sensitive receptors to chronic health effects is not anticipated from the implementation of PAR 1113. There are reformulations using propylene glycol which demonstrates adverse chronic impacts but at lower levels than EGEE or EGME. It is anticipated these less toxic coalescing solvents will be used to formulate future compliant low-VOC coatings. To a certain extent, PAR 1113 may have the beneficial effect of encouraging or accelerating the trend of formulating AIM coatings with less toxic or nontoxic solvents.

Acute Exposure: Several of the solvents used in conventional coatings that were analyzed for chronic affects have also been analyzed for short-term acute worker health effects through short-term, high-level or "acute" exposure. Table 2-5 presents the results of the SCAQMD's acute HRA for the solvents used in conventional coatings.

As shown in Table 2-5, low usage conventional coatings formulated with EGEE, or EGME could trigger acute human health impacts. Since there are many different product manufacturers and

coating formulations, as well as many different coating applications, the specific chemical composition of reformulated coating products is not known. However, as noted in earlier in this chapter, there is currently a trend by resin manufacturers and coating formulators of replacing currently applied coatings containing EGEE, and EGME with less toxic coalescing solvents such as ethylene glycol, and propylene glycol. There are reformulations using EGBE which demonstrates adverse acute impacts but at lower levels than EGEE or EGME. It is anticipated these less toxic coalescing solvents will be used to formulate future compliant low-VOC coatings. To a certain extent, PAR 1113 may have the beneficial effect of encouraging or accelerating the trend of formulating AIM coatings with less toxic or nontoxic solvents. Therefore, the implementation of PAR 1113 may ultimately provide human health benefits.

TABLE 2-5

Short-term Acute Exposure Risk Assessment
(Gallons Per Day That Would Exceed An Acute Hazard Index Of 1.0)

	Downwind Receptor Distances					
	25m		**50m**		**100m**	
Conventional Solvents	**Emissions** lbs/hr	**Usage** gals/day	**Emissions** lbs/hr	**Usage** gals/day	**Emissions** lbs/hr	**Usage** gals/day
Toluene	18.50	20.56	36.98	41.09	99.06	110.07
Xylene	1.10	1.22	2.20	2.44	5.89	6.54
EGEE	0.19	0.21	0.37	0.41	0.99	1.10
EGME	0.05	0.05	0.09	0.10	0.25	0.28
Methyl Ethyl Ketone (MEK)	6.50	7.22	12.99	14.44	34.81	38.67
Replacement Solvents						
EGBE	7.00	15.56	13.99	31.09	37.48	83.30
Isopropyl Alcohol	1.60	4.44	3.20	8.88	8.57	23.80
Styrene	10.50	116.67	20.99	233.19	56.22	624.72

Chronic and acute exposure of coating applicators to compliant coatings containing replacement solvents, in particular the diisocyanate compounds, is not expected to produce significant risks since coating applicators will be following the coating manufacturers' and recommended safety practices and OSHA's required safety practices for handling materials containing both conventional and replacement solvents. The recommended safety practices for handling these materials are discussed in the "Carcinogenic Effects" section. Additionally, the safety practices and application techniques associated with higher-VOC solvent-borne coatings will be the same for the compliant water-borne coatings. Thus, applicators will not need additional training regarding the proper handling or application of compliant coatings containing TDI.

Significant adverse chronic human health impacts are not anticipated because some solvents used in conventional coatings have the potential to create chronic human health impacts (e.g., EGEE), may be replaced by compliant low-VOC coatings that do not create significant adverse human

health impacts. In addition, long-term exposures that could generate significant adverse chronic human health impacts, are not anticipated.

No significant acute human health exposures are anticipated from implementing PAR 1113 because for some coating applications, less toxic coalescing solvents will be used to formulate future compliant low-VOC coatings than is currently the case. Also, the development of spraying technology will further reduce diisocyanate emissions. Based on the brushing, rolling, or spraying of one- or two-component low-VOC systems containing diisocyanate compounds should not expose the public at large to significant adverse human health impacts. In the context of worker (e.g., applicator) exposure, the use of personal protective equipment should provide adequate protection to applicators during coating application.

III. e): Objectionable odors are not expected to change with the use of reformulated coatings because the operation and application of architectural coatings is not expected to change. In fact, the conditions will improve over time as facilities switch to low-VOC materials, such as water-based solvents. In addition, local governments typically have ordinances that are intended to protect the public from adverse odors. SCAQMD Rule 402 – Nuisance, also protects the public from adverse odor impacts.

III. f): The adoption and implementation of PAR 1113 is expected to produce substantial long-term VOC emission reductions by lowering the VOC content limit of coatings, improving air quality and not diminishing any existing air quality rule or future compliance requirement.

In the past Industry Working Group meetings industry representatives raised eight issues which they claim could potentially diminish the goals of the existing rule or potentially cause adverse impacts. The following subsections describe each of the eight issues. The first seven issues are all contentions that the new formulations, either solvent-based or waterborne, result in more coating use, or use of noncompliant coatings, and an overall increase in VOC emissions over a period of time. The eighth issue is the contention that low-VOC waterborne and solvent-borne coatings have a higher reactivity than high VOC coatings formulations and, therefore, contribute at a greater rate to ozone formation. They also contend that under low-NOx conditions, some solvents actually have a negative reactivity. As demonstrated in the following subsections, staff believes these issues do not result in significant adverse air quality impacts.

More Thickness

PROJECT SPECIFIC IMPACT: Industry representatives contend that reformulated compliant water- and solvent-borne coatings are very viscous (e.g., are formulated using a high-solids content) and, therefore, are difficult to handle during application, tending to produce a thick film when applied directly from the can. A thicker film indicates that a smaller surface area is covered with a given amount of material, thereby increasing VOC emissions per unit of area covered.

ANALYSIS: SCAQMD staff evaluated the product data sheets (see Appendix B for a compilation of information obtained from the coating product sheets) for conventional and low-

VOC coatings to compare solids content by volume, coverage area, drying time, etc. Staff has asserted in the past and continues to maintain that a coating with more solids will actually cover a greater surface area. This contention is generally supported for the PAR 1113 affected coating categories. On the average, low-VOC coatings with lower solids content have comparable or higher area of coverage than conventional coatings. Low-VOC coatings, on the average, with a higher solids content have a comparable to slightly less area of coverage than conventional coatings. Many of the coatings at 50, 100 or 275 grams per liter of VOC tend to have 20 to 30 percent solids, similar to products formulated at 50 to 100 grams per liter of VOC, with approximately the same viscosity as their higher VOC counterparts.

Illegal Thinning

PROJECT SPECIFIC IMPACT: The SCAQMD has extensively analyzed the alleged air quality impacts due to more thinning. In oral testimony received by the SCAQMD from a few industry representatives, it has been asserted that thinning occurs in the field in excess of what is allowed by the SCAQMD rule limits. It is asserted that, because reformulated compliant water- and solvent-borne coatings are more viscous (e.g., high-solids content), painters have to adjust the properties of the coatings to make them easier to handle and apply. In particular for solvent-borne coatings this adjustment consists of thinning the coating as supplied by the manufacturer by adding solvent to reduce its viscosity. The added solvent increases VOC emissions back to or sometimes above the level of older formulations.

ANALYSIS: It has been further asserted that manufacturers will formulate current noncompliant coatings by merely increasing the solids content, which would produce a thicker film. Industry claims that a thicker film means less coverage. Therefore, thinning will occur to get the same coverage area as current noncompliant coatings resulting in more VOC emissions per area covered. Based upon manufacturer's claims regarding coverage, low-VOC coatings have comparable coverage area compared to conventional coatings. As a result, the data indicate that it is not true that a painter will have to thin low-VOC solvent-borne coatings to obtain the same coverage.

Many of the reformulated compliant coatings are water-borne formulations or will utilize exempt solvents, thereby eliminating any concerns of thinning the coating as supplied and increasing the VOC content as applied beyond the compliance limit. Since exempted solvents are not considered a reactive VOC, thinning with them would, therefore, not increase VOC emissions. Water based coatings are thinned with water and would also not result in increased VOC emissions.

A number of additional studies have addressed the thinning issue. The results are detailed below:

- In mid-1991, CARB conducted a field study of thinning in regions of California that have established VOC limits for architectural coatings. A total of 85 sites where painting was in progress were investigated. A total of 121 coatings were in use at these sites, of which

52 were specialty coatings. The overall result of this study was that only six percent of the coatings were thinned in excess of the required VOC limit indicating a 94 percent compliance rate.

- The SCAQMD contracted with an environmental consulting firm, to study thinning practices in the district. In Phase I of the study, consumers who had just purchased paints were interviewed as they left one of a number of stores located in different areas of the district. Seventy solvent-borne paint users responded to the survey. One-third of consumers purchased solvent-borne coatings. Of those surveyed, three (four percent of all solvent-borne paint purchasers) indicated that they planned to thin their coatings before use. In Phase II of the study, the consultant contacted 36 paint contractors. The majority stated that they were using water-borne coatings. Four contractors using solvent-borne paints allowed the consultant to collect paint samples at their painting sites. None of the samples collected were thinned.

- During the 1996 rule amendments to Rule 1113, SCAQMD staff conducted over 60 unannounced site visits to industrial parks and new residential construction sites to survey contractors regarding their thinning practices, coating application techniques, and clean-up practices. Samples were also collected during these site visits for coatings as supplied and as applied, for laboratory analysis and subsequent study of thinning practices. The results of the study indicate that out of the 91 samples taken only nine were thinned with solvents. Out of the nine thinned samples, only two were thinned to the extent that the VOC content limit of the coating, as applied, would have exceeded the applicable rule limit. During pre-arranged visits, however, excessive thinning was observed at only one site at a 1:2 ratio. At this level, the coating was thinned to the point where, according to the professional contractor using it, it did not provide adequate hiding and he had to apply several coats. The practice of over-thinning is expected to inhibit hiding power, application properties, and drying time of a coating.

- In August 2003, the Southern California Alliance of Publicly-Owned Treatment Works (SCAP) published a study conducted by KTA-TATOR that evaluated 21 low-VOC industrial maintenance coating systems suitable for wastewater environments and conveyance facilities, as offered by major manufacturers, specialty manufacturers, as well as low-VOC specialty manufacturers. According to their 2003 Final Report, SCAP states that although the coating systems that complied with the final 100 g/l VOC limit performed as well as the systems with VOC levels of 340 g/l, almost all the coatings in the test program had "challenges" during application. One-third of the coatings required thinning with VOC-containing solvent. Directly due to thinning, two coatings were bumped to a higher VOC category and six coatings had an unknown final VOC content. Since these findings differ from past studies mentioned above, the AQMD is currently investigating what the final VOC content was after thinning and what the manufacturer's recommendations were for applying the coatings (HVLP or airless spray technology), as well as their recommendation for thinning.

Field investigations of actual painting sites in the district and other areas of California that have VOC limits for coatings indicate that thinning of specialty coatings exists but rarely beyond the actual compliance limits. Even in cases where thinning does occur, it is rarer still for paints to be thinned to levels that would exceed applicable VOC content limits. The conclusion is that widespread thinning does not occur often; when it does occur, it is unlikely to occur at a level that would lead to a substantial emissions increase when compared with emissions from higher VOC coatings. Professional contractors can receive Notices of Violation (NOVs) for the practice of over-thinning, as it is illegal under the current version of the rule to exceed the specified compliance limits. It is, therefore, not likely that the proposed rule amendments would increase this practice. During the numerous surprise site visits conducted by SCAQMD staff over many years, inspectors did not observe excess thinning to the degree cited by the industry representatives or to any significant degree. Even if the emission reduction benefits of the rule were reduced very slightly due to over-thinning, there would not be an adverse impact from the amendments.

CONCLUSION: Thinning is not expected to be a problem because a majority of the coatings that would comply with future limits will be waterborne formulations or utilize exempt solvents. Other compliant coatings available may be applied without thinning. Even if some thinning occurs, thinning would likely be done with water or exempt solvents. Finally, current practice indicates that coating applicators do not engage in widespread thinning, and even when thinning occurs, the coatings VOC content limits are not exceeded. As a result, claims of thinning resulting in significant adverse air quality impacts are unfounded.

More Priming

PROJECT SPECIFIC IMPACT: Conventional coatings are currently used as part of a coating system, consisting of one or more of the following components; primer, midcoat, and topcoat. Coating manufacturers and coating contractors have asserted that reformulated compliant low-VOC water- and solvent-borne topcoats do not adhere as well as higher-VOC solvent-based topcoats to unprimed substrates. Therefore, the substrates must be primed with typical solvent-based primers to enhance the adherence quality. Industry representatives have testified that the use of water-borne compliant topcoats, could require more priming to promote adhesion. Additionally, it has been asserted that water-borne sealers do not penetrate and seal porous substrates like wood, as well as traditional solvent-borne sealers. This allegedly results in three or four coats of the sealer per application compared to one coat for a solvent-based sealer would be necessary, resulting in an overall increase in VOC emissions for the coating system.

ANALYSIS: Information from the coating product data sheets indicated that low-VOC coatings do not require substantially different surface preparation than conventional coatings. According to the product data sheets and recommended guidelines from coating associations, conventional and low-VOC coatings require similar measures for preparation of the surface (i.e. apply to clean, dry surfaces), and application of the coatings (i.e. brush, roller or spray). Both low-VOC coatings and conventional coatings for architectural applications have demonstrated the ability to adhere to

a variety of surfaces (AVES study). As a part of the staff's technology assessment for Rule 1113, staff analyzed the product data sheets for a variety of low-VOC waterproofing sealers and waterproofing concrete/masonry sealers.

CONCLUSION: As a result, based on the coating manufacturer's coating product data sheets and recommended guidelines from coating associations, the material needed and time necessary to prepare a surface for coating is approximately equivalent for conventional and low-VOC coatings. More primers are not needed because low-VOC coatings possess comparable coverage to conventional coatings, similar adhesion qualities and consistent resistance to stains, chemicals and corrosion, when applied to a properly prepared substrate (refer to the AVES study and the summary of coating characteristics in Appendix B). Low-VOC coatings tend not to require any special surface preparation different from what is required before applying conventional coatings to a substrate. As part of good painting practices for any coating, water-borne or solvent-based, the surface typically needs to be clean and dry for effective adhesion. Consequently, claims of significant adverse air quality impacts resulting from more priming are unfounded.

More Topcoats

PROJECT-SPECIFIC IMPACTS: Coating manufacturers and coating contractors assert that reformulated compliant water- and low-VOC solvent-borne topcoats may not cover, build, or flow-and-level as well as the solvent-borne formulations. Therefore, more coats are necessary to achieve equivalent cover and coating build-up.

ANALYSIS: Technology breakthroughs with additives used in recent formulations of low-VOC coatings have minimized or completely eliminated flow and leveling problems. These flow and leveling agents mitigate flow problems on a variety of substrates, including plastic, glass, concrete and resinous wood. These additives even assist in overcoming flow and leveling problems when coating oily or contaminated substrates. According to the AVES study and the product data sheets for the sampled coatings, water-borne coatings have proven durability qualities. Comparable to conventional coatings, water-borne coatings for architectural applications are resistant to scrubbing, stains, blocking and UV exposure.

CONCLUSION: As demonstrated in both the AVES study and in the summary of coating characteristics in Appendix B, low-VOC when compared to conventional coatings have comparable coverage and, in some cases, superior performance. These low-VOC coatings possess scrub and stain resistant qualities, blocking and resistance to UV exposure for the exterior coatings. Both low-VOC and conventional coatings tend to have chemical and abrasion resistant qualities, gloss and color retention, and comparable adhesion qualities. With comparable coverage and equivalent durability qualities, additional topcoats for low-VOC coatings should not be required.

More Touch-Ups and Repair Work

PROJECT-SPECIFIC IMPACTS: Coating manufacturers and coating contractors assert that reformulated compliant water- and low-VOC solvent-borne formulations dry slowly, and are susceptible to damage such as sagging, wrinkling, alligatoring, or becoming scraped and scratched. They also claim that the high-solids solvent-borne alkyd enamels tend to yellow in dark areas, and that water-borne coatings tend to blister or peel, and also result in severe blocking problems. All of these problems they claim require additional coatings for repair and touch-up.

ANALYSIS: Extra touch-up and repair and more frequent coating applications are related to durability characteristics of coatings. For past rulemaking, staff met with numerous resin and coatings manufacturers to discuss this issue, and also reviewed coating product data sheets and studies conducted to obtain durability information for low-VOC coatings and conventional coatings. Based on information in the coating product data sheets, comparable to conventional coatings, water-borne coatings for architectural applications are resistant to scrubbing, staining, blocking and UV exposure (see Appendix B for coating characteristics). They were noted for excellent scrubability and resistant to mildew. The average drying time between coats for the low-VOC coatings was less than the average drying time for the conventional coatings. In the AVES study, new no-VOC wood coatings demonstrated equivalent dirt pick-up, mar resistance and adhesion, as well as better UV resistance than the commercial higher VOC coatings. On occasion, the average drying time for the lower-VOC coatings did increase more than the conventional coatings and mildew/fungus resistance as well as stain blocking properties were not as good as those of solvent-based coatings (see Appendix B). Even if more paint is occasionally needed for touch up and repair, the amount will not be enough to make a significant adverse impact because small amounts of coatings are used to touch up and repair problem areas.

Staff's technology assessment shows that water-borne coatings are resistant to chemicals, corrosion, chalk, impact and abrasion. Similar to their conventional counterparts, water-borne coatings also tend to retain gloss and color, as well as have good adhesion to a variety of substrates. Further, both low-VOC coatings and conventional coatings tend to be comparable with regards to passing abrasion and impact resistance tests, and are considered to have proven durability qualities.

CONCLUSION: Therefore, based on the durability characteristics information contained in the coating product data sheets, as well as the laboratory testing and field site visits, and demonstrated in the AVES study, low-VOC coatings and conventional coatings have comparable durability characteristics. As a result, it is not anticipated that more touch up and repair work will need to be conducted with usage of low-VOC coatings. Consequently, claims of adverse air quality impacts resulting from touch-up and repair for low-VOC coatings are not significant.

More Frequent Recoating

PROJECT-SPECIFIC IMPACT: Coating manufacturers and coating contractors assert that the durability of the reformulated compliant water- and low-VOC solvent-based coatings is inferior to the durability of the traditional solvent-borne coatings. Durability problems include cracking, peeling, excessive chalking, and color fading, which all typically result in more frequent recoating. As a result, they claim more frequent recoating would be necessary resulting in greater total emissions than would be the case for conventional coatings.

ANALYSIS: The long-term durability of a coating is dependent on many factors, including surface preparation, application technique, substrate coated, and exposure conditions. Again, as mentioned above, key durability characteristics, as discussed in the AVES study and the coating product data sheets (see Appendix B), include resistance to scrub or abrasion, corrosion-, chemicals-, impact-, stain-, and UV- resistance, are similar between conventional and low-VOC coatings. Both low- and high-VOC coatings pass abrasion and impact resistance tests, and have similar durability qualities. According to the coating product data sheets, low-VOC coatings would not need additional surface preparation than what needs to be done to prepare the surface for conventional coatings (see also "More Priming" discussion above). The technique to applying the coatings did not significantly differ either. It is expected that if applied using manufacturers' recommendations, compliant low-VOC coatings are as durable as conventional coatings and, therefore, no additional recoating is required from the usage of low-VOC coatings. Furthermore, overall durability is dependent on the resin technology used in the formulation as well as the quality of pigment, instead of just the amount of solvent present in the coating. This finding has been well corroborated by various laboratory and field testing conducted by the SCAQMD on a variety of coatings.

The durability of a coating is governed by the nature of the binder used in its formulation, which are also known as film formers or resins. Table 2-6 shows the two main resin types currently in use. Acrylic resins are generally associated with low VOC coatings and alkyd resins are typically associated with high VOC coatings. These coatings are exposed to a variety of influences of daily life, including mechanical stresses, chemicals and weathering, against which they serve to protect the substrate. The major impact on the coating film is oxidation by exposure to light, causing the film to first lose color and gloss, and gradually become brittle and incoherent. This is mainly caused by a process known as photochemical degradation. This is especially the case for coatings used for exterior painting.

The coatings industry has developed a variety of additives that act as ultraviolet light (UV) absorbers or free radical scavengers that ultimately slow down the photo-oxidative process, thereby increasing the coating life. Antioxidants and sterically hindered amines are two classes of free radical scavengers, also known as hindered amine light stabilizers (HALS). These can be used with solvent-free or waterborne coatings. Other additives that have a positive effect on durability of coatings include adhesion promoters, corrosion inhibitors, curing agents, reactive

diluents, optical brightners, and algicides/mildewcides.

TABLE 2-6

Performance Comparison of Acrylic (Low VOC)
and Alkyd (High VOC)Resin Systems

Acrylic Coatings	Alkyd Coatings
Low-VOC and solvent-free formulations available	Higher VOC formulations
Excellent exterior durability because of high degree of resistance to thermal, photooxidation, and hydrolysis – Pendant groups are ester bonds, but body is C-C bonds, which are much harder to break.	Limited exterior durability because prone to hydrolysis.
Very good color and gloss retention, and resistance to embrittlement	Embrittlement and discoloration issues with age
Require good surface preparation. Since the surface tension is high, the substrate surface needs to be cleaner before application	Minimal surface preparation requirements due to low surface tension. Relatively foolproof applications
Acrylic coatings are generally higher in cost	Lower costs
Polyurethane modified acrylics perform even better, especially in flexibility and in UV resistance.	Rapid drying, good adhesion, and mar resistance. Silicone modified alkyds have higher performance

As indicated earlier in this report, there are numerous types of binders used in the formulation of coatings. However for architectural uses, acrylics and alkyds are the two most commonly used. Utilizing the additives available for improving application and durability characteristics, waterborne acrylic systems have overcome their limitations, and generally outperform solvent-borne coatings, when properly formulated. This finding has been well corroborated by various laboratory and field testing conducted by the SCAQMD on a variety of coatings, including the NTS Phase II Assessment Study, as well as the AVES Study.

CONCLUSION: Coatings manufacturers' own data sheets, as well as the AVES study, indicate that the low-VOC coatings for architectural applications are durable and long lasting. Any durability problems experienced by the low-VOC coatings are not different than those seen with conventional coatings. Recent coating technology has improved the durability of new coatings. Because the durability qualities of the low-VOC coatings are comparable to the conventional coatings, more frequent recoatings would not be necessary.

Substitution

PROJECT-SPECIFIC IMPACT: Coating manufacturers and coatings contractors assert that since reformulated compliant water- and low-VOC solvent-borne coatings are inferior in durability and are more difficult to apply, consumers and contractors will substitute better performing high VOC coatings in other categories for use in categories with low compliance limits. An example of this substitution could be the use of a higher VOC product (e.g., clear

wood coatings) currently sold under the small container exemption, which has a higher VOC content limit requirement, in place of a lower-VOC clear wood coatings.

ANALYSIS: There are several reasons why widespread substitution will not occur as a result of the implementation of PAR 1113. First and foremost, based on staff research of resin manufacturers' and coating formulators' product data sheets as well as recent studies conducted, there are, generally, a substantial number of low-VOC coatings in a wide variety of coating categories that are currently available, that have performance characteristics comparable to conventional coatings (see the tables in Appendix B). Second, PAR 1113 seeks to phase-out the small container exemption for clear wood coatings to prevent this type of substitution. Lastly, SCAQMD enforcement records reveal that there is greater than 99 percent compliance rate with Rule 1113. Thus, it highly unlikely that coating applicators will violate PAR 1113 by substituting higher-VOC coatings for lower-VOC coatings.

CONCLUSION: As discussed above, the SCAQMD does not expect that low-VOC coatings used for specific coating applications will be substituted for by higher-VOC coatings used for other specific types of coating applications. Currently, there are a substantial number of low-VOC coatings in a wide variety of coating categories that have performance characteristics comparable to conventional coatings. Additionally, the PAR 1113 phases out the small container exemption for clear wood coatings to prevent this type of substitution. PAR 1113 also requires that when a coating can be used in more than one coating category the lower limit of the two categories is applicable. Lastly, SCAQMD enforcement records indicate that there is greater than 99 percent compliance rate with Rule 1113.

If in the rare event that substitution does occur, PAR 1113 would still achieve overall VOC emission reductions. Although substitution would only result in lesser emission reductions than expected, it would not increase emissions as compared to the existing setting. Consequently, PAR 1113 will not result in significant adverse air quality impacts from the substitution of low-VOC coatings with higher-VOC coatings.

More Reactivity

Different types of solvents have different degrees of "reactivity," which is the ability to accelerate the formation of ground-level ozone. Coating manufacturers and coating contractors assert that the reformulated compliant low-VOC water- and solvent-borne coatings contain solvents that are more reactive than the solvents used in conventional coating formulations. Furthermore, they assert that water-borne coatings perform best under warm, dry weather conditions, and are typically recommended for use between May and October. Since ozone formation is also dependent on the meteorological conditions, use of waterborne coatings during this period increases the formation of ozone.

ANALYSIS: The use of reactivity as a regulatory tool has been debated at the local, state, and national level for over 20 years. For example, CARB incorporated a reactivity-based control strategy into its California Clean Fuel/Low Emissions Vehicle regulations, where reactivity

adjustment factors are employed to place regulations of exhaust emissions from vehicles using alternative fuels on an equal ozone impact basis. CARB is evaluating a similar strategy for consumer products and industrial emissions, and contracted with Dr. William Carter, University of California at Riverside, Center for Environmental Research and Technology, College of Engineering, for a study to assess the reactivities of VOC species found in the consumer products emissions inventory. Dr. Carter, one of the principal researchers of reactivities of various VOC species, studied VOC species, more specifically glycol ethers, esters, isopropyl alcohol, methyl ethyl ketone (MEK), and an octanol, since these are typically found in either waterborne coatings, solvent-borne coatings, or both. These specific VOCs have been prioritized based on emissions inventory estimates, mechanistic uncertainties, and lack of information in the current reactivity data. He identified the state of science with respect to VOC reactivity and described areas where additional work is needed in order to reduce the uncertainty associated with different approaches to assessing reactivity.

The contention that more reactive solvents will be used in lieu of traditional less reactive solvents is somewhat misleading because the coating categories affected by these rule amendments currently contain reactive and highly toxic solvents such as toluene, xylene, MEK, etc. Furthermore, Harley, et al., (1992) noted, "The speciated organic gas emissions from use of solvent-borne architectural coatings are 24 percent more reactive than the official [VOC] inventory would suggest." This observation suggests that solvent-borne architectural coatings may actually be more reactive than low-VOC coatings especially water-based coatings. Therefore, there is a need for further study of the chemical composition of industrial surface coatings and the detailed composition of petroleum distillate solvents incorporated in surface coatings.

To date, Dr. Carter has compiled some information regarding the reactivity of VOCs and has established several different reactivity scales. However, he cautions the use of these scales due to the uncertainties involved; for example, "Deriving such numbers is not a straightforward matter and there are a number of uncertainties involved. One source of uncertainty in the reactivity scales comes from the fact that ozone impacts of VOCs depend on the environment where the VOC is emitted. A second source of uncertainty is variability in the chemical composition of the VOC source being considered. Complex mixtures such as "mineral spirits" may be more difficult to characterize and may vary from manufacturer to manufacturer though in principal the composition of a given lot can be determined and reasonably assumed to be constant regardless of how the product is used. A third source of uncertainty comes from the complexity and uncertainties in the atmospheric processes by which emitted VOCs react to form ozone.

According to Dr. Carter, reliable reactivity numbers do not currently exist from which accurate air quality policy can be derived based on reactivity and not total VOC emissions. Further, Dr. Carter, asserts that ketones are the most important class of consumer emissions for which there are no environmental chamber reactivity data suitable for evaluating reactivity predictions. He also finds no experimental reactivity data for glycols or alcohols suitable for mechanism evaluation.

Another factor to be considered in the reactivity based approach, and probably the most important, is an accurate speciation profile of water-borne and solvent-borne coatings. As a part of the 2000 CARB survey, the latest speciation profile being used to conduct on-going studies in reactivity.

In spite of the studies identified above, reactivity data for VOCs, especially those compounds used to formulate consumer and commercial products, are extremely limited. This is essentially the conclusion reached by EPA in a 1995 report to Congress which states, "better data, which can be obtained only at great expense, is needed if the EPA is to consider relative photochemical reactivity in any VOC control strategy."

The SCAQMD Board adopted a resolution in 1999 to conduct reactivity and availability assessments of solvents present in architectural coatings to assess the feasibility of a reactivity-based, alternative regulatory approach. In addition, there is a desire to understand the interaction between the architectural coatings emissions with other emission sources such as mobile sources in the formation of ozone. In April 2003, the SCAQMD approved a contract with CE-CERT to carry out an environmental chamber study to assess the ozone and PM formation potential of selected types of VOCs emitted from architectural coatings and selected mixtures represent current mobile source emissions. The project is to use this chamber to assess ozone impacts of selected architectural coatings VOCs. This proposed SCAQMD project will cover environmental chamber studies of additional types of VOCs present in water-based architectural coatings and also chamber studies of VOC surrogate mixtures representing current mobile-source-dominated emissions, and characterization of PM formation potentials of the VOCs studied.

Furthermore, the architectural coatings industry is funding additional studies to further understand the mechanistic and kinetic reactivities of different VOC species. The results of all the aforementioned research and studies will be invaluable in determining the extent to which a reactivity based approach can be relied on for regulating VOC emissions from the application of coatings and the use of solvents.

Until the results of this research and studies are completed and peer reviewed, the SCAQMD believes that it would not be prudent to implement a reactivity-based ozone reduction strategy based on incomplete science. This is consistent with USEPA's conclusion that regulation should be based on total mass VOC emissions and should not attempt to regulate based on reactivity. Therefore, the SCAQMD will continue to monitor, participate and administer studies related to enhanced reactivity data for VOC species, including directly participating in studies pertaining to reactivity of solvents in architectural coatings.

CONCLUSION: In the absence of actual reactivity numbers for the compounds contained in "traditional" solvent formulations and compliant, low-VOC coatings, emissions must be calculated in the standard manner of total VOC per unit of coating applied manner. Based upon the current state of knowledge regarding VOC reactivity, it is speculative to conclude that the proposed amendments will generate significant adverse air quality impacts due to increased reactivity.

On June 16, 1995, the USEPA determined that acetone, PCBTF, VMS as well as other solvents have low photochemical reactivity and should be exempted from consideration as a VOC. The SCAQMD subsequently amended Rule 102 on November 17, 1995, to add acetone and other solvents to the definition of Group I exempt compounds, which are non-VOC by definition.

Oxsol 100 (p-chlorobenzotriflouride, PCBTF), manufactured by Occidental Chemical Corporation, was also delisted as a VOC in 1995. This solvent can be used to extend or replace many organic solvents, including toluene, xylene, mineral spirits, acetone, methyl ethyl ketone, trichloroethylene, and perchloroethylene. Toxicity data of PCBTF was assessed by OEHHA and it was not considered to have a significant toxic risk. This product is less toxic than toluene and is not considered a Hazardous Air Pollutant or an Ozone-Depleting Substance. The USEPA is also in the process of delisting t-butyl acetate, which may also help coating formulators in utilizing exempt solvents in their formulations.

Synergistic Effects of the Eight Issues

Coatings manufacturers have also alleged that not only should each of the eight issues (e.g., more thickness, illegal thinning, more priming, more topcoats, more touch-up and repair, more frequent recoating, more substitution, and more reactivity) be analyzed separately but that the synergetic effect of all issues be analyzed. As discussed above, the SCAQMD staff's research and analysis of resin manufacturers' and coating formulators' product information sheets concludes that on each separate issue that the low-VOC compliant coatings have comparable performance as current coatings or industry's specific assertions are unfounded. Therefore, since individually each issue does not result in a significant adverse air quality impact, the synergistic effect of all eight issues will not result in significant adverse air quality impacts. Even if it is assumed that some of the alleged activities do occur, e.g., illegal thinning, substitution, etc., the net overall effect of the proposed amendments is expected to be a reduction in VOC emissions.

Low Vapor Pressure

While not argued as one of the alleged eight issues discussed previously, coatings manufacturers have asserted that coating solvents should not be regulated as a VOC at all. These solvents currently used in consumer products and architectural coatings are considered low volatility compounds, meaning that they have a vapor pressure of less than 0.1 millimeter of mercury (mm of Hg) at 20 degrees Celsius. While CARB has included a low vapor pressure (LVP) exemption in its Consumer Products regulation, its staff indicate that the LVP exemption was placed into the proposed rule for some additives found in consumer products, such as surfactants, paraffin, and other heavier compounds that do not readily evaporate into the atmosphere and are typically washed away into the sewer. Since the VOCs in paints do and are intended to evaporate into the atmosphere, CARB does not support the LVP exemption for architectural coatings and did not include the LVP exemption into its Aerosol Coatings rule. USEPA staff also does not support an LVP exemption for the architectural coatings rule and did not include such an exemption in the National Architectural Coatings Rule. Based upon its test methodology, USEPA concludes that VOCs from architectural coatings do evaporate into the air and therefore should not be exempted.

The SCAQMD concurs with USEPA and CARB decisions to not include a LVP exemption for architectural coatings. Nevertheless, the SCAQMD will continue to work with CARB staff in identifying issues, participating in future studies, and monitoring the result of any studies. Additionally, CE-CERT will coordinate with the Reactivity Research Working Group to study the availability of some solvent species commonly found in architectural coatings.

Based on the above consideration, significant adverse impacts to air quality are not expected from PAR 1113. Since there are no significant adverse impacts, no mitigation measures are required.

		Potentially Significant Impact	Less Than Significant Impact	No Impact
IV.	**BIOLOGICAL RESOURCES.** Would the project:			
a)	Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	☐	☐	☑
b)	Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	☐	☐	☑
c)	Have a substantial adverse effect on federally protected wetlands as defined by §404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☐	☐	☑
d)	Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	☐	☐	☑

e)	Conflicting with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	☐	☑
f)	Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☐	☐	☑

IV. a), b), d): Implementation of the proposed amendments will not cause impacts to sensitive habitats of plants or animals because all activities will typically occur at construction, industrial or commercial sites already in operation. The intent of the proposed amendments is to reduce VOC emissions from affected coating categories. Therefore, the proposed amendments to Rule 1113 will have no direct or indirect impacts that could adversely affect plant or animal species or the habitats on which they rely in the SCAQMD's jurisdiction. The net effect of implementing the proposed amended rule will be improved air quality resulting from reduced VOC emissions, which is expected to be beneficial for both plant and animal life. Modifications at existing affected coating manufacturers to switch to low-VOC coatings, such as water-based, would not require acquisition of additional land or further conversions of riparian habitats or sensitive natural communities where endangered or sensitive species may be found.

IV. c): Acquisition of protected wetlands is not expected to be necessary to switch to low-VOC coatings, such as water-based. Affected coating categories would continue to practice existing operating procedures so the proposed amended rule will not directly remove, fill or interrupt any hydrological system or have an adverse effect on federally protected wetlands. In addition, potential impacts to aquatic life from releases of excess paint and associated wastewater disposed of in sewer and storm drains is discussed in the "Water Quality Impacts" section. The analysis of water quality impacts to both groundwater and surface water concluded that PAR 1113 would not generate significant adverse water quality impacts

IV. e), f):There are no provisions in the proposed amended rule that would adversely affect land use plans, local policies or ordinances, or regulations. Land use and other planning considerations are determined by local governments and no land use or planning requirements will be altered by the proposed project. The proposed amended Rule 1113 would not affect in any way habitat conservation or natural community conservation plans, agricultural resources or operations, and would not create divisions in any existing communities.

Based on the above consideration, significant adverse impacts to biological resources are not expected from PAR 1113. Since there are no significant adverse impacts, no mitigation measures are required.

	Potentially Significant Impact	Less Than Significant Impact	No Impact
V. CULTURAL RESOURCES. Would the project:			
a) Cause a substantial adverse change in the significance of a historical resource as defined in §15064.5?	☐	☐	☑
b) Cause a substantial adverse change in the significance of an archaeological resource as defined in §15064.5?	☐	☐	☑
c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☐	☐	☑
d) Disturb any human remains, including those interred outside of formal cemeteries?	☐	☐	☑

V. a) - d): There are existing laws in place that are designed to protect and mitigate potential impacts to cultural resources. Reformulation of architectural coatings won't require major construction activities such as grading, trenching, etc. The application of architectural coatings typically occurs after construction where archaeological resources would have already been disturbed or assessed. The proposed revisions to Rule 1113 are, therefore, not anticipated to result in any activities or promote any programs that could have a significant adverse impact on cultural resources in the district. As a result, the proposed project has no potential to cause a substantial adverse change to a historical or archaeological resource, directly or indirectly destroy a unique paleontological resource or site or unique geologic feature, or disturb any human remains, including those interred outside a formal cemeteries.

Based on the above consideration, significant adverse impacts to cultural resources are not expected from PAR 1113. Since there are no significant adverse impacts, no mitigation measures are required.

		Potentially Significant Impact	Less Than Significant Impact	No Impact
VI.	**ENERGY.** Would the project:			
a)	Conflict with adopted energy conservation plans?	☐	☐	☑
b)	Result in the need for new or substantially altered power or natural gas utility systems?	☐	☐	☑
c)	Create any significant effects on local or regional energy supplies and on requirements for additional energy?	☐	☐	☑
d)	Create any significant effects on peak and base period demands for electricity and other forms of energy?	☐	☐	☑
e)	Comply with existing energy standards?	☐	☐	☑

VI. a), e): Lowering VOC content limits at affected facilities will not conflict with adopted energy conservation plans or cause affected facilities to be out of compliance with existing energy standards because affected equipment would basically continue current operations although using new formulations of affected coatings. Because add-on control equipment is not expected to be used to comply with the provisions of PAR 1113, no additional energy use is expected to be required. Additionally, PAR 1113 will not substantially increase the number of businesses or amount of equipment in the district and, therefore, would not be expected to interfere with existing energy standards or future energy conservation plans because these are typically targeted to residential consumers, etc.

VI. b), c), d): The architectural coating operations are not expected to change as a result of lowering the VOC content limit of affected coatings. Since there will be no additional demand for electricity, there will be no need for new or substantially altered power or natural gas utility systems as a result of the proposed project. The proposed project will have a non-significant effect on the electricity capacity or demand and, therefore, no significant impact on peak or base demands for electricity.

Based on the above consideration, significant adverse impacts to energy are not expected from PAR 1113. Since there are no significant adverse impacts, no mitigation measures are required.

		Potentially Significant Impact	Less Than Significant Impact	No Impact
VII.	**GEOLOGY AND SOILS.** Would the project:			
a)	Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:	☐	☐	☑
	• Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault?	☐	☐	☑
	• Strong seismic ground shaking?	☐	☐	☑
	• Seismic–related ground failure, including liquefaction?	☐	☐	☑
	• Landslides?	☐	☐	☑
b)	Result in substantial soil erosion or the loss of topsoil?	☐	☐	☑
c)	Be located on a geologic unit or soil that is unstable or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?	☐	☐	☑
d)	Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?	☐	☐	☑
e)	Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?	☐	☐	☑

VII. a): Architectural coatings are applied to buildings, stationary structures, roads, etc. The proposed amendments affect coating formulators and have no effects on geophysical formations in the district. The coating activity will not change from current practice so the proposed amendments to Rule 1113 will not expose people to potential substantial geological effects greater than what they are exposed to already. Lowering the VOC content limit of affected coating categories will not expose people or structures to risks of loss, injury, or death involving: rupture of an earthquake fault, seismic ground shaking, ground failure or landslides.

VII. b): The proposed project will not require major construction activities (e.g., grading, trenching, refilling and repaving), so there is no potential impacts to existing geophysical conditions. No soil is expected to be disrupted because no new development will be required as a result of the proposed project. Therefore, no substantial soil erosion or loss of topsoil is expected from the lowering of the VOC content limit for affected coating categories.

VII. c), d): The proposed project does not involve construction of new structures and, therefore, will not involve locating any structures on soil that is unstable or expansive. However, as already noted, no soil disturbance is anticipated, therefore, no destabilization of unstable soils would be expected that could cause on- or off-site landslides, lateral spreading, subsidence, liquefaction or collapse.

VII. e): The proposed project does not involve the installation of septic tanks or alternative waste water disposal systems. Therefore, this type of soil impact will not occur.

Based on the above consideration, significant adverse impacts to geology and soils are not expected from PAR 1113. Since there are no significant adverse impacts, no mitigation measures are required.

		Potentially Significant Impact	**Less Than Significant Impact**	**No Impact**
VIII.	**HAZARDS AND HAZARDOUS MATERIALS.** Would the project:			
a)	Create a significant hazard to the public or the environment through the routine transport, use, and disposal of hazardous materials?	☐	☐	☑
b)	Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	☐	☐	☑
c)	Emit hazardous emissions, or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	☐	☐	☑
d)	Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code §65962.5 and, as a result,	☐	☐	☑

	would create a significant hazard to the public or the environment?			
e)	For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?	☐	☐	☑
f)	For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?	☐	☐	☑
g)	Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	☐	☑
h)	Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?	☐	☐	☑
i)	Significantly increased fire hazard in areas with flammable materials?	☐	☐	☑

VIII. a), b), c): Architectural coating operations are not expected to change from current practice and, thus, the amount of solvents used is not expected to change. In fact, in order to comply with the lower VOC content limits, affected coatings are expected to be formulated with less solvents and more water, which are typically less hazardous than currently used. As mentioned earlier and noted in Table 2-3, there are a range of potential adverse health effects associated with toxic substances currently formulated in AIM coatings. The actual effects of exposure to coatings, however, depend on such factors as the exposure duration, potency of the solvents of concern, exposure frequency, and other factors.

Hazard impact concerns are related to the risk of fire, explosions, or the release of hazardous substances in the event of an accident or upset conditions. It is expected that the lower VOC content limits required by PAR 1113 may be achieved, in part, through the use of replacement solvents and predominantly water-borne technologies. Overall, exempt solvents are considered to be viable alternatives to other, more toxic solvents currently found in various coatings.

Additionally, coalescing solvents such as propylene glycol, and ethylene glycol may be used more widely in low-VOC water-borne formulations as alternatives to more toxic coalescing solvents such as EGEE and EGME. Furthermore, diisocyanates (e.g., HDI, MDI, and TDI) may be used

more widely in low-VOC two component urethane systems as condensation reaction agents.

As noted in Table 2-7, the flammability classifications by the NFPA are the same for acetone, t-butyl acetate, toluene, xylene, MEK, isopropanol, butyl acetate, and isobutyl alcohol. Recognizing that as a "worst-case" acetone has the lowest flashpoint, it still has the highest Lower Explosive Limit, which means that acetone vapors will not cause an explosion unless the vapor concentration exceeds 26,000 ppm.

In contrast, toluene vapors can cause an explosion at 13,000 ppm, which poses a much greater risk of explosion. The concentration of xylene vapors that could cause an explosion is even lower at 10,000 ppm. Under operating guidelines of working with flammable coatings under well-ventilated areas, as prescribed by the fire department codes, it would be difficult to achieve concentrated streams of such vapors.

Furthermore, any increase in accidental releases of compliant acetone-based coatings would be expected to result in a concurrent reduction in the number of accidental releases of existing coating materials. As shown in Table 2-7 many of the solvents used in conventional solvents are as flammable as acetone, so there would be no net change or possibly a reduction in the hazard consequences from replacing some conventional solvents with acetone.

TABLE 2-7

Chemical Characteristics for Common Coating Solvents

Traditional/Conventional Solvents						
Chemical Compounds	**M.W.**	**Boiling Point** (^{o}F)	**Flashpoint**[a] (^{o}F)	**Vapor Pressure** (mmHg @ 68 ^{o}F)	**Lower Explosive Limit** (% by Vol.)	**Flammability Classification** (NFPA)*
Toluene	92	231	40	22	1.3	3
Xylene	106	292	90	7	1.1	3
MEK	72	175	21	70	2.0	3
Isopropanol	60	180	53	33	2.0	3
Butyl Acetate	116	260	72	10	1.7	3
Isobutyl Alcohol	74	226	82	9	1.2	3
Stoddard Solvent	144	302 - 324	140	2	0.8	2
Petroleum Distillates (Naptha)	100	314 - 387	105	40	1.0	4
EGBE	118	340	141	0.6	1.1	2
EGME	76	256	107	6	2.5	2
EGEE	90	275	120	4	1.8	2

TABLE 2-7 (CONCLUDED)

Chemical Characteristics for Common Coating Solvents

Replacement Solvents						
Chemical Compounds	**M.W.**	**Boiling Point** (^oF)	**Flashpoint**[a] (^oF)	**Vapor Pressure** (mmHg @ 68 ^oF)	**Lower Explosive Limit** (% by Vol.)	**Flammability Classification** (NFPA)*
Acetone	58	133	1.4	180	2.6	3
Di-Propylene Glycol	134	451	279	30	1	1
Propylene Glycol	76	370	210	0.1	2.6	1
Ethylene Glycol	227	388	232	0.06	3.2	1
texanol	216	471	248	0.1	0.62	1
Oxsol 100	181	282	109	5	0.90	1
t-Butyl Acetate	113	208	59		1.5	3
Hexamethylene Diisocyanate (HDI)	168	415	284	0.5	1	1
Methylene Bisphenyl Diisocyanate (MDI)	250	314	385	0.5	1	1
Toluene Diisocyanate (TDI)	174	200	270	0.04	1	1

*National Fire Protection Association

0 = minimal; 1 = slight; 2 = moderate; 3 = serious; 4 = severe

Although acetone is expected to be used to formulate some future compliant AIM coatings, current information from coating products indicate that the majority of the future compliant coatings are expected to be reformulated with water-borne technologies. Therefore, it is unlikely that PAR 1113 will substantially increase the future usage of acetone in the district.

With regard to other possible replacement solvents, based on discussion with resin manufacturers and coating formulators, the trend in coating technologies is to replace EGEE, EGME, etc., with less toxic/hazardous coalescing solvents such as ethylene glycol, and propylene glycol. Further, it appears from this information that the use of solvents, such as propylene glycol in water-borne coating formulations, is prevalent today and should continue into the future with the eventual replacement of more toxic and hazardous coalescing solvents such as EGEEs with less or nontoxic coalescing solvents. The latest CARB survey corroborates with these trends.

As noted previously, some future compliant two-component urethane coating systems may contain diisocyanate compounds. While the trend of using less hazardous compounds is not reflected by the use of diisocyanate compounds, there should be no significant increase in the hazard risks due to the potential for increased use of these compounds because there will be a small increase which is offset by the decrease in toxics previously used. Like texanol, oxsol 100, propylene glycol, and ethylene glycol, diisocyanates are significantly less flammable as compared to currently used highly flammable conventional solvents. Therefore, the potential increased use

of compliant coatings containing diisocyanates will be offset by the decrease use of more flammable solvents.

Potential hazard impacts resulting from adopting and implementing PAR 1113 are not expected to be significant for the following reasons. The increased usage of acetone as a result of implementing PAR 1113 will generally be balanced by reduced usage of other equally or more hazardous materials such as MEK, toluene, xylene, etc. Further, emergency contingency plans that are already in place are expected to minimize potential hazard impacts posed by any increased use of acetone in future compliant coatings. In addition, businesses are required to report increases in the storage of flammable and otherwise hazardous materials to local fire departments to ensure that adequate conditions are in place to protect against hazard impacts.

Interviews with four local fire departments during the 1996 amendments to Rule 1113 revealed that all four departments would be equally concerned with any coating or solvent, which has a flashpoint below 65 degrees Fahrenheit. Currently, several conventional coatings generally have flashpoints below 65 degrees Fahrenheit. Based on inquiries from the SCAQMD, Captain Michael R. Lee, of the Petroleum-Chemical Unit for the County of Los Angeles Fire Department, submitted a letter to the SCAQMD stating that the Uniform Fire Code (UFC) treats solvents such as acetone, butyl acetate, MEK, and xylene as Class I Flammable Liquids. Further, the UFC considers all of these solvents to present the same relative degree of fire hazard. The UFC also sets the same requirements for the storage, use and handling of all four solvents. Captain Lee goes on to state, "In my opinion, acetone presents the highest degree of fire hazard of the four solvents considered, but not significantly more hazardous than the others. All four should be used with extreme caution, with proper safeguards in place."

The County of Los Angeles, Fire Department, Fire Prevention Guide #9 regulates spray application of flammable or combustible liquids. The guide requires no open flame, spark-producing equipment or exposed surfaces exceeding the ignition temperature of the material being sprayed within the area. For open spraying, as would be the case for the field application of the acetone-based coatings, no spark-producing equipment or open flame shall be within 20 feet horizontally and 10 feet vertically of the spray area. Anyone not complying with the above guidelines would be in violation of current fire codes. The fire department limits residential storage of flammable liquids to five gallons and recommends storage in a cool place. If the flammable coating container will be exposed to direct sunlight or heat, storage in cool water is recommended. Finally all metal containers involving the transfer of five gallons or more should be grounded and bonded.

Another reason hazard impacts from implementing PAR 1113 are not expected to be significant is that it is anticipated that resin manufacturers and coating formulators will continue the trend of using less toxic or hazardous solvents such as texanol, oxsol 100, propylene glycol, ethylene glycol, etc., in their compliant water-borne coatings. As a result, it is expected that future compliant AIM coatings will contain less or non-hazardous materials compared to conventional coatings, a net benefit. While diisocyanates are more toxic, their flammability is significantly less than current solvents. Thus, overall hazard risks are not significantly increased as a result of

using compliant coatings containing diisocyanates.

No additional transport of the solvents is expected and, thus, no new hazards to the public will be created through transport, use or disposal of hazardous materials. Consequently, the proposed amendments to Rule 1113 will not create a significant new hazard to the public or create a reasonably foreseeable upset involving the release of hazardous materials. Similarly, emissions from affected facilities will not increase but will decrease.

VIII. d): Government code §65962.5 refers to hazardous waste handling practices at facilities subject to the Resources Conservation and Recovery Act (RCRA). Since the proposed project would lower the usage of hazardous materials, hazardous waste handling practices, if any, at regulated facilities would not be affected. However, it is expected that any facility using affected coatings that are on the §65962.5 list will continue to comply with any applicable requirements.

VIII. e), f): Even for facilities that may be located near airports or private airstrips, the proposed project will not create new safety hazards because any affected coating operations are not expected to change their current practices.

VIII. g): Reducing the VOC content of affected coatings is not expected to affect a user's ability to comply, and not interfere, with all adopted emergency response plans and emergency evacuation plan because existing coating activities are not expected to be alterd by the proposed project.

VIII. h), i): Affected coating categories are currently formulated with toxic substances listed in Table 2-3 and 2-7. Eventually, affected facilities are required to comply with lower VOC content limit requirements, which is likely to happen through reformulation of the solvent or conversion to alternative resin technologies. It is anticipated that the reformulation will entail the use of water-based components or low-VOC materials less hazardous or flammable than currently being used. The Uniform Fire Code and Uniform Building Code set standards intended to minimize risks from flammable or otherwise hazardous materials. Local jurisdictions are required to adopt the uniform codes or comparable regulations. Local fire agencies require permits for the use or storage of hazardous materials and permit modifications for proposed increases in their use. Permit conditions depend on the type and quantity of the hazardous materials at the facility. Permit conditions may include, but are not limited to, specifications for sprinkler systems, electrical systems, ventilation, and containment. The fire departments make annual business inspections to ensure compliance with permit conditions and other appropriate regulations. Consequently, local fire departments ensure that adequate permit conditions are in place to protect against potential risk of upset from the use of hazardous materials. However, any use of hazardous materials at affected facilities is not expected to change and may even decrease as a result of implementing the proposed project.

Based on the above consideration, significant adverse impacts to hazards and hazardous materials are not expected from PAR 1113. Since there are no significant adverse impacts, no mitigation measures are required.

		Potentially Significant Impact	Less Than Significant Impact	No Impact
IX.	**HYDROLOGY AND WATER QUALITY.** Would the project:			
a)	Violate any water quality standards or waste discharge requirements?	☐	☐	☑
b)	Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g. the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?	☐	☐	☑
c)	Substantially alter the existing drainage pattern of the site or area, including through alteration of the course of a stream or river, in a manner that would result in substantial erosion or siltation on- or off-site?	☐	☐	☑
d)	Substantially alter the existing drainage pattern of the site or area, including through alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner that would result in flooding on- or off-site?	☐	☐	☑
e)	Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?	☐	☐	☑
f)	Otherwise substantially degrade water quality?	☐	☐	☑
g)	Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?	☐	☐	☑

h)	Place within a 100-year flood hazard area structures which would impede or redirect flood flaws?	☐	☐	☑
i)	Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?	☐	☐	☑
j)	Inundation by seiche, tsunami, or mudflow?	☐	☐	☑
k)	Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?	☐	☐	☑
l)	Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☐	☑
m)	Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☐	☑
n)	Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?	☐	☐	☑
o)	Require in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	☐	☐	☑

IX. a), f): Lowering the VOC content limit of coatings at affected facilities will have no direct or indirect impact on hydrology and water quality because the reformulation of the coatings is not expected to change the current architectural coating operation practices or alter the coating formulations to be more detrimental to water quality. It is likely that resin manufacturers and coating formulators will replace conventional coating formulations, which may contain toluene, xylene, mineral spirits, acetone, methyl ethyl ketone (MEK), tricholorethylene, and percholoroethylene, with either exempt solvents (e.g., acetone, Oxsol 100, t-butyl acetate) or water-borne formulations. In addition to the above-mentioned solvents, coalescing solvents such as propylene glycol, and ethylene glycol may be used more widely in low-VOC water-borne formulations as alternatives to more toxic coalescing solvents such as EGEE and EGME.

Furthermore, increased usage of diisocyanates (e.g., HDI, MDI, and TDI) may occur in low-VOC two component, water-borne urethane systems as condensation reaction agents to replace their higher-VOC solvent-borne counterparts.

In the past the SCAQMD has received comments that with the increased use of water-borne technologies to meet the lower VOC content limits, there will be a greater trend of coating applicators to improperly dispose of the waste generated from these coatings into the ground, storm drains, or sewer systems. However, there are no data to support this contention. In any event, there are several reasons why there should be no significant increase over current practices for improper disposal due to greater use of water-borne coatings.

Results from a survey of contractors determined that a majority either dispose of the waste material properly as required by the coating manufacturer's MSDS or recycle the waste material regardless of type of coating. Based upon these results, there is no reason to expect that paint contractors will change their disposal practices, especially those that dispose of wastes properly, with the implementation of PAR 1113.

Impacts to water quality from reformulated coatings (i.e., water-based coatings) would be due to the increased use of water for clean-up and the potential resultant increased discharge into the sewer system. POTWs in the region are expected to be able to accommodate the potential increase in wastewater associated with reformulated coating. (The POTWs have an overall capacity of about 1,700 million gallons per day – see Table 2-8.) Further, state and federal regulations are expected to promote the development and use of coatings formulated with non-hazardous solvents. Based on discussions with resin manufacturers and coating formulators, the trend in coating technologies is to replace toxic/hazardous solvents (e.g., EGEEs) with less toxic/hazardous solvents (e.g., ethylene glycol, and propylene glycol). Therefore, wastewater which may be generated from reformulated coatings is expected to contain less hazardous materials than the wastewater generated for solvent-based coating operations, thereby reducing toxic influent to the POTWs. The amount of increased wastewater generated from coating operations would be well within the capacity of the regions POTWs. Consequently, wastewater impacts from coating reformulation are not considered significant.

It should be noted that the National Paints and Coatings Association's "Protocol for Management of Post Consumer Paint," and the SCAQMD's "Painter's Guide to Clean Air" provide the public and painting contractors with information as to the environmentally sound coating disposal practices. These public outreach programs are expected to reduce the amount of coating waste material entering the sewer systems, storm drainage systems, and being dumped on the ground. Therefore, further reducing any water quality impacts associated with the improper disposal of compliant coatings.

Future compliant AIM coatings are expected to be formulated primarily with water-borne technologies. As a result, more water will be used for clean-up and the resultant wastewater material could be disposed of into the public sewer system. It is anticipated that current coating equipment (i.e., spray guns, rollers, and brushes) clean-up practices of using water will continue

into the future. Table 2-8 illustrates the "worst-case" potential increase of waste material likely to be received by POTWs in the district as a result of implementing PAR 1113.

The EPA in its Report to Congress entitled "Study of Volatile Organic Compound Emissions from Consumer and Commercial Products" evaluated consumer products to determine which categories were likely to be disposed of to POTWs. The study found that the likelihood of paints, primers, and varnishes being disposed of to POTWs was low. Therefore, this category was not even evaluated for its VOC emission impacts on POTWs. This suggests that the presence of solvents from this category of consumer products in wastewater streams is very low compared to the total volume of solvents being disposed of from other consumer product categories.

In addition, as discussed earlier, water-borne coatings are increasingly becoming less toxic than current coatings. To that extent, it is likely that adverse impacts to water quality will actually decrease as compared to the existing situation. Table 2-8 shows the historical and projected POTW impact from reformulated coatings.

TABLE 2-8

Historical and Projected POTW Impact From Reformulated Coatings

Year	**POTW Average Daily Flow**[a] (mgd)	**POTW Capacity**[b] (mgd)	**Estimated Usage** (gallons/year)	**Coatings Disposal Daily Flow**[c] (mgd)	**Total Impacts** (% Increase)
2003	1394.00	1687.30	2,795,277	0.0076	0.00045
2006	1394.00	1687.30	3,073,448	0.0084	0.00049

[a] 2002 data of total average daily wastewater flows handled by all POTWs greater than 10 mgd in the district (2003 AQMP).

[b] Based on design daily flows by all POTWs greater than 10 mgd in the district (2003 AQMP).

[c] Assumes that one gallon of water will be used to clean-up equipment for every gallon of coating applied. The figures for Coatings Disposal Flow are based on the annual emissions inventory of the affected coating categories (2003) and their projected future sales until compliance in 2006; originally expressed in mgy, they are converted to mgd by dividing by 365.

mgd = millions of gallons per day

The potential increase is considered to be well within the existing and projected capacity of POTWs in the district. Hence, wastewater impacts associated with the disposal of water-borne clean-up waste material generated from PAR 1113 affected coating categories are not considered significant. With the increasing trend toward less toxic water-borne, it is likely that there will be less adverse impacts to water quality. Therefore, PAR 1113 will not adversely affect water resources, water quality standards, groundwater supplies, water quality degradation, existing water supplies or wastewater treatment facilities.

IX. b), n): Historically, potential water demand to reformulate conventional coatings into waterbased coatings and to clean up waterbased coatings has not resulted in a significant adverse impact on water demand or deplete groundwater supplies. As shown in Table 2-9, water demand impacts associated with the manufacture and clean-up of water-borne formulations (included as a

"worst-case"), currently and in the future, are anticipated to create a negligible incremental water demand impact and do not exceed the SCAQMD's significant threshold of 5,000,000 gallons per day.

While it is not possible to predict water shortages in the future, existing entitlements and resources in the district provide sufficient water supplies that currently exceed demand. Further, according to the Metropolitan Water District (MWD), the largest supplier of water to California, "For its part, Metropolitan expects to be able to meet 100 percent of its member agencies' water needs for the next ten years, even during times of critical drought. Metropolitan and its member agencies have identified and are implementing programs and projects to assure continued reliable water supplies for at least the next 20 years."[1] MWD is expected to continue providing a reliable water supply through developing a portfolio of diversified water sources that includes: cooperative conservation; water recycling; and groundwater storage, recovery, and replenishment programs. Other additional water supplies will be supplied in the future as a result of water transfer from other water agencies, desalination projects and state and federal water initiatives, such as CALFED and California's Colorado River Water Use Plan.

TABLE 2-9

Historical and Projected Water Demand for Reformulated Coatings

Year	Projected Population[a] (millions of people)	Projected Water Demand[b] (bgy)	Projected Coating Sales[c] (mgy)	Projected Mfgr Demand[d] (mgy)	Projected Cleanup Demand[e] (mgy)	PAR 1113 Total Demand[f] (mgy)	Total Impacts[g] (% Increase)
2003	16.46	1,635.55	2.79	2.79	2.79	5.58	0.0003
2006	17.04	1,414.84	3.07	3.07	3.07	6.14	0.0004

[a] Population projections obtained from SCAG's 1998 RTP.

[b] Water demand and supply projections obtained from Hydrology Existing Setting in 2003 AQMP. AF (acre- feet) equals approximately 326,000 gallons

[c] SCAQMD Staff Report for PAR 1113.

[d] Assumes that one gallon of water will be used to manufacture one gallon of coating applied. Also assumes as a "worst-case" scenario, that all affected coatings used in the SCAQMD's jurisdiction were manufactured here.

[e] Assumes that one gallon of water will be used to clean-up equipment for every gallon of coating applied. Also assumes as a "worst-case" scenario, that full conversion of affected coating categories to water-borne formulations occurs in 2006.

[f] Total amount of manufacturer and clean-up water demand.

[g] The percentage increase in water demand as a result of the incremental increase due to water clean-up of water-borne coating material.

Acronyms: bgy = billion gallons per year; mgy = millions of gallons per year

As shown in Table 2-9, it is within the capacity of the local water suppliers to supply the small incremental increase in water demand associated with the implementation of PAR 1113. Sufficient water supplies are available to serve the project from existing entitlements and no are

[1] From Metropolitan Water District, Annual Progress Report to the California's State Legislature, February 2002.

new or expanded entitlements are needed to implement the proposed project. Therefore, no significant water demand impacts are expected as the result of implementing PAR 1113.

IX. g), h): Since PAR 1113 does not require construction of new structures, it will not result in placing housing in a 100-year flood hazard areas. Architectural coating contractors are not expected to change their existing current practices so any flood hazards would be part of the existing setting.

IX. c), d), e): The proposed project would not change current architectural coating application or practices. Consequently, no major construction activities will be necessary to comply with PAR 1113, so the proposed project will not alter any existing drainage patterns, increase the rate or amount of surface runoff water that would exceed the capacity of existing or planned stormwater drainage systems.

IX. l), m), o): Because no significant increase of water or waste results from the coating activity, the proposed project would not generate additional volumes of wastewater that could exceed the capacity of existing stormwater drainage systems or require the construction of new wastewater or stormwater drainage facilities.

IX. k): Since the proposed project will not change architectural coating operations, no changes to existing wastewater treatment permits would be necessary so they would still be expected to comply with existing wastewater treatment requirements of the applicable Regional Water Quality Control Board.

IX. i), j): Since PAR 1113 does not require construction of new facilities, it will not alter existing flood risks or risks from seiches, tsunami's or mudflow conditions.

Based on the above considerations, significant adverse impacts to hydrology and water quality are not expected from PAR 1113. Since there are no significant adverse impacts, no mitigation measures are required.

		Potentially Significant Impact	**Less Than Significant Impact**	**No Impact**
X.	**LAND USE AND PLANNING.** Would the project:			
a)	Physically divide an established community?	☐	☐	☑
b)	Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program	☐	☐	☑

	or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?		
c)	Conflict with any applicable habitat conservation or natural community conservation plan?	☐	☐	☑

X. a.): Lowering the VOC content limit of certain coatings at affected facilities will not create divisions in any existing communities because there is no anticipated change to current architectural coating practices. Further, the proposed project does not require construction of any features, such as freeways, that would physically divide an established community.

X. b), c): Architectural coating operations would still be expected to comply, and not interfere, with any applicable land use plans, zoning ordinances, habitat conservation or natural community conservation plans. There are no provisions of the proposed project that would directly affect these plans, policies, or regulations. Land use and other planning considerations are determined by local governments and no present or planned land uses in the region or planning requirements will be altered by the proposed project. No new development or alterations to existing land use designations will occur as a result of the implementation of the proposed amendments. It is not anticipated that existing land uses located in the district would require additional land to continue current operations or require rezoning as a result of implementing PAR 1113. Therefore, no significant adverse impacts affecting existing or future land uses are expected.

Based on the above consideration, significant adverse impacts to land use and planning are not expected from PAR 1113. Since there are no significant adverse impacts, no mitigation measures are required.

		Potentially Significant Impact	**Less Than Significant Impact**	**No Impact**
XI.	**MINERAL RESOURCES.** Would the project:			
a)	Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	☐	☐	☑
b)	Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?	☐	☐	☑

XI. a), b): There are no provisions of the proposed amended rule that would directly result in the loss of availability of a known mineral resource, such as aggregate, coal, shale, etc. of value to the region and the residents of the state, or of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan. The proposed project would lower the VOC content of certain coatings which needs no mineral resource to reformulate.

Based on the above consideration, significant adverse impacts to mineral resources are not expected from PAR 1113. Since there are no significant adverse impacts, no mitigation measures are required.

		Potentially Significant Impact	Less Than Significant Impact	No Impact
XII.	**NOISE.** Would the project result in:			
a)	Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☐	☐	☑
b)	Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?	☐	☐	☑
c)	A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	☐	☑
d)	A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	☐	☑
e)	For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☑
f)	For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☑

XII. a), b), c), d): Excessive generation of noise, excessive groundborne vibration, or substantial increase in ambient noise levels is generally not associated with architectural coating operations. The proposed project is not expected to increase noise levels relative to existing noise levels that are currently generated from the application and use of architectural coatings. Since architectural coating operations are not noise intensive, it is expected that painting contractors would comply with existing relevant local community noise standards and ordinances. In addition to noise generated by coating contractors operations, noise sources from adjacent sources may include nearby freeways, truck traffic to adjacent businesses, and operational noise from adjacent businesses. In general, the primary noise source at existing facilities that use architectural coatings is generated by vehicular traffic, such as trucks transporting raw materials to the facility, trucks hauling wastes away from the facility, trucks to recycle waste or other materials, and miscellaneous noise such as spray equipment (i.e. compressors, spray nozzles) and heavy equipment use (forklifts, trucks, etc.). Noise is generated during operating hours, which generally range from 6 a.m. to 5 p.m. Monday through Friday. PAR 1113 is not expected to alter noise from existing noise generating sources. It is likely that contractor or affected facilities using architectural coatings are operating in compliance with any local noise regulations that may exist in their respective communities. Additionally, the implementation of PAR 1113 is not expected to result in significant noise impacts in residential areas because changing the VOC content will not affect noise levels from coating applications. As with industrial or commercial areas, it is assumed that these areas are subject to local community noise standards. Contractors or do-it-yourselfers applying compliant PAR 1113 coatings in residential areas are expected to comply with local community noise standards. Thus, the lowering of the VOC content limit requirement of affected coating categories would have no additional noise impacts.

XII. e), f): Lowering the VOC content of coatings affected by PAR 1113 is not expected to alter in any way coating operations. As a result, noise levels will either not change as a result of the proposed project and, therefore, will not have an adverse noise impact even if a facility is located near an airport or private airstrip.

Based on the above considerations, significant adverse impacts to noise are not expected from PAR 1113. Since there are no significant adverse impacts, no mitigation measures are required.

	Potentially Significant Impact	**Less Than Significant Impact**	**No Impact**
XIII. POPULATION AND HOUSING. Would the project:			
a) Induce substantial growth in an area either directly (for example, by proposing new homes	☐	☐	☑

	and businesses) or indirectly (e.g. through extension of roads or other infrastructure)?			
b)	Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?	☐	☐	☑
c)	Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?	☐	☐	☑

XIII. a), b), c): Human population in the SCAQMD's jurisdiction is anticipated to grow regardless of implementing the proposed project. The proposed amendments will primarily affect the formulation of architectural coatings and are not anticipated to generate any significant effects, either direct or indirect on the district's population as no additional workers are anticipated to be required to comply with the proposed amendments. Further, PAR 1113 is not expected to cause a relocation of population within the district. As a result, housing in the district is expected to be unaffected by the proposed amendments. The population will not grow directly as a result of the proposed amended rule and the coating activity will not indirectly induce growth in the area of the coating facilities. The construction of single- or multiple-family housing units would not be required as a result of implementing the proposed project. Therefore, existing housing or populations in the district are not anticipated to be displaced necessitating the construction of replacement housing elsewhere.

Based on the above considerations, significant adverse impacts to population and housing are not expected from PAR 1113. Since there are no significant adverse impacts, no mitigation measures are required.

	Potentially Significant Impact	**Less Than Significant Impact**	**No Impact**
XIV. PUBLIC SERVICES. Would the proposal result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered government facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the following public services:			

a) Fire protection?	☐	☐	☑
b) Police protection?	☐	☐	☑
c) Schools?	☐	☐	☑
d) Parks?	☐	☐	☑
e) Other public facilities?	☐	☐	☑

XIV. a), b): The proposed amendments will not substantially increase the amount of businesses or equipment in the district. Reformulation of coatings is not expected to require new or additional fire fighting resources or police protection. In fact, PAR 1113 may actually result in fewer impacts to public service agencies because compliant coatings are expected to be formulated with less hazardous materials compared to current coatings. Any increase in accidental releases of compliant coating materials would be expected to result in a concurrent reduction in the number of accidental releases of existing coating materials. As a result, the net number of accidental releases would be expected to remain constant, allowing for population growth in the district. Additionally, future compliant coating materials are not expected to cause significant adverse human health impacts, so accidental release scenarios would be expected to pose a lower risk to the public and responding fire and police departments. Furthermore, if manufactures continue to use solvents such as texanol, propylene glycol, ethylene glycol, etc., in their compliant water-borne coatings, fire departments would not be expected to experience adverse impacts because in general these solvents are less flammable solvents and, therefore, create fewer emergency incidents. Demands on public service systems are not expected to increase and impacts to these systems are, therefore, not considered to be significant because any potential increase in the use of flammable substances, such as acetone, are expected to be minor and, as a result, are not expected to be adversely affect performance objectives, service ratios, response times, etc.

XIV. c), d): Because coating operations are not expected to change, contractor operations or affected facilities are not expected to require new employees. As noted in item "XIII. Population and Housing," the proposed project will not increase population growth in the district. Consequently, no new impacts to schools, parks or other recreational facilities are foreseen as a result of implementing the proposed amendments to Rule 1113.

XIV. e): The proposal would not result in the need for new or physically altered government facilities in order to maintain acceptable service ratios, response times or other performance objectives.

Based on the above considerations, significant adverse impacts to public services are not expected from PAR 1113. Since there are no significant adverse impacts, no mitigation measures are required.

		Potentially Significant Impact	Less Than Significant Impact	No Impact
XV.	**RECREATION.**			
a)	Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated.?	☐	☐	☑
b)	Does the project include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment?	☐	☐	☑

XV. a), b): The proposed amendments will not generate additional demand for, or otherwise affect land used for recreational purposes. The proposed amendments are not expected to have adverse affects on land uses in general. As discussed under "Land Use and Planning" above, there are no provisions in the proposed project that would affect land use plans, policies or ordinances, or regulations. Land use and other planning considerations are determined by local governments; no land use or planning requirements will be altered by the proposal. As already noted in item "XIII, Population and Housing", the proposed project is not expected to increase population growth in the district because no additional employees would be required to apply lower VOC coatings so no additional demand for parks is anticipated. Further, the proposed amendments would not increase the use of existing neighborhood and regional parks or other recreational facilities or include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment.

Based on the above considerations, significant adverse impacts to recreation are not expected from PAR 1113. Since there are no significant adverse impacts, no mitigation measures are required.

	Potentially Significant Impact	Less Than Significant Impact	No Impact
XVI. SOLID/HAZARDOUS WASTE. Would the project:			
a) Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?	☐	☐	☑
b) Comply with federal, state, and local statutes and regulations related to solid and hazardous waste?	☐	☐	☑

XVI. a), b): Coating operations are not expected to change as a result of the proposed amendments. Similarly, the volume of coatings and coating wastes is not expected to increase as a result of implementing PAR 1113. Therefore, no new solid or hazardous waste will be generated as a result of lowering the VOC content limit of certain coatings in Rule 1113. Affected facilities would continue to complying with federal, state, and local statutes and regulations related to solid and hazardous waste handling and disposal. Therefore, potential solid waste impacts are considered not significant.

Based on the above consideration, significant adverse impacts to solid/hazardous waste are not expected from PAR 1113. Since there are no significant adverse impacts, no mitigation measures are required.

	Potentially Significant Impact	Less Than Significant Impact	No Impact
XVII. TRANSPORTATION/CIRCULATION Would the project:			
a) Cause an increase in traffic which is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in either the number of vehicle trips, the volume to capacity ratio on roads, or congestion at intersections)?	☐	☐	☑
b) Exceed, either individually or cumulatively, a	☐	☐	☑

	level of service standard established by the county congestion management agency for designated roads or highways?			
c)	Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?	☐	☐	☑
d)	Substantially increase hazards due to a design feature (e.g. sharp curves or dangerous intersections) or incompatible uses (e.g. farm equipment)?	☐	☐	☑
e)	Result in inadequate emergency access?	☐	☐	☑
f)	Result in inadequate parking capacity?	☐	☐	☑
g)	Conflict with adopted policies, plans, or programs supporting alternative transportation (e.g. bus turnouts, bicycle racks)?	☐	☐	☑

XVII. a), b), f): PAR 1113 is not expected to alter affected coating operations so no additional transportation/circulation impacts are expected to occur directly or indirectly as a result of lowering the VOC content limit of certain coatings in Rule 1113. As noted in item XIII, Population and Housing, no new employees are expected to be needed at affected facilities and therefore no new worker trips that could increase traffic or affect in any way the level of service designation for any roadways will result from the proposed amendments. Similarly, additional parking would not be required from implementing PAR 1113. Because affected coating operations are not expected to change, no new or additional raw materials will be needed and, therefore, no transport trips that could affect the level of service for roadways will be generated from the continued operation of the coating activity.

XVII. c): Air traffic patterns are not expected to be directly or indirectly affected by the proposed amended rule because the coating activity will not require any air transportation of any materials. Since PAR 1113 willnot require transport of materials by air, no increase in any safety risks are expected.

XVII. d), e): The proposed amendments to Rule 1113 does not have direct or indirect impact on specific construction design because the proposed project does not require or induce the construction of roadway design features. PAR 1113 simply lowers the VOC content limit of certain coatings, so it is expected that the architectural coating operation would not change.

XVII. g): Affected facilities would still be expected to comply with, and not interfere with adopted policies, plans, or programs supporting alternative transportation. The lowering of the VOC

content limit of certain coatings in Rule 1113 will not hinder compliance with any applicable alternative transportation plans or policies.

Based on the above considerations, significant adverse impacts to transportation/circulation are not expected from PAR 1113. Since there are no significant adverse impacts, no mitigation measures are required.

		Potentially Significant Impact	Less Than Significant Impact	No Impact
XVIII.	**MANDATORY FINDINGS OF SIGNIFICANCE.**			
a)	Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	☐	☐	☑
b)	Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)	☐	☐	☑
c)	Does the project have environmental effects that will cause substantial adverse effects on human beings, either directly or indirectly?	☐	☐	☑

XVIII. a): As discussed in items I through XVII above, the proposed amended rule has no potential to cause significant adverse environmental effects because it would a result in lowering the VOC content limit of certain coatings in Rule 1113. Therefore, the proposed project is not expected to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife

species, cause a fish or wildlife population to drop below self sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal. Similarly, PAR 1113 would not eliminate important examples of the major periods of California history or prehistory or otherwise degrade cultural resources.

XVIII.b) Based on the foregoing analyses, since PAR 1113 will not result in project-specific significant environmental impacts and indeed will reduce emissions, PAR 1113 is not expected to cause cumulative impacts in conjunction with other projects that may occur concurrently with or subsequent to the proposed project. Cumulative air quality impacts from the proposed amendments, PAR 1171, previous amendments and all other AQMP control measures considered together are not expected to be significant because implementation of all AQMP control measures is expected to result in net emission reductions and overall air quality improvement. As described in Chapter 1, there is little overlap between the proposed amendments for Rules 1171 and 1113. Where effects do overlap, the effects are typically beneficial. Furthermore, PAR 1113 impacts will not be "cumulatively considerable" because the incremental impacts are not considerable when viewed in connection with the effects of past, current, or probable future projects.

XVIII.c) Based on the foregoing analyses, PAR 1113 is not expected to cause significant adverse effects on human beings, either directly, or indirectly.

APPENDIX A

PROPOSED AMENDED RULE 1113

– ARCHITECTURAL COATINGS

In order to save space and avoid repetition, please refer to the latest versions of the proposed amended Rule 1113 located elsewhere in the rule package. The "Version C" of the proposed amended rule was circulated with the Draft EA that was released on September 25, 2003 for a 30-day public review and comment period ending October 24, 2003.

Original hard copies of the Draft EA, which include the "Version C" of the proposed amended rule, can be obtained through the SCAQMD Public Information Center at the Diamond Bar headquarters or by calling (909) 396-2039.