APPENDIX D

COMMENTS ON THE DRAFT EA AND RESPONSES TO THE COMMENTS

COMMENT LETTER #1

DUNN EDWARDS PAINTS

THE PAINT THAT PROTECTS.®

October 23, 2003

VIA E-MAIL
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RE: DRAFT ENVIRONMENTAL ASSESSMENT FOR PROPOSED AMENDED RULE 1113 – ARCHITECTURAL COATINGS

Dear Mike:

1-1 Dunn-Edwards Corporation is an employee-owned business with roots going back to 1925. Since that time, Dunn-Edwards has grown from a small, local enterprise into a major regional manufacturer and distributor employing more than 1,300 people. Our facilities include three factories, four warehouses, and more than 70 store locations in California, Arizona, Nevada, New Mexico and Texas. Dunn-Edwards manufactures high-quality architectural coatings that are marketed primarily to professional painting contractors and institutional maintenance accounts, including schools, hospitals, commercial facilities, and public agencies. Our main office and factory complex, as well as many of our store locations, are within the jurisdiction of the South Coast Air Quality Management District ("SCAQMD"). Consequently, Dunn-Edwards has long been interested and involved in air quality regulatory matters affecting architectural coatings within the SCAQMD.

1-2 This letter responds to the SCAQMD Notice of Completion of a Draft Environmental Assessment ("DEA") for Proposed Amended Rule 1113: Architectural Coatings. In its "Description of Nature, Purpose, and Beneficiaries of Project," the Notice explains that the "proposed amendments to Rule 1113…would lower the VOC content limits for…clear wood finishes" [among other categories] and "phase-out the one-quart or less usage exemption for clear wood finishes…." It concludes that "[n]o environmental topic area was identified that could be significantly adversely affected by the proposed amended rule." The DEA does not, however, address the comments offered by Dunn-Edwards at the Public Workshop and CEQA Scoping Session held on Thursday, September 4, 2003, and later summarized in writing in the Dunn-Edwards letter of September 12 to SCAQMD. Those comments deal, in part, with the need to retain the Small Container Exemption as a mitigation measure to offset the potentially significant adverse environmental impacts of the proposed lower VOC content limit for Clear Wood Finishes. Those comments are again summarized and further expanded upon below.

SMALL CONTAINER EXEMPTION AS MITIGATION MEASURE

1-3 One proposed amendment would exclude Clear Wood Finishes from the Small Container Exemption after a lower VOC content limit becomes effective for Varnish and Sanding Sealers. This would materially impair the usefulness of the Small Container Exemption, since a significant portion of the products supplied under the exemption are stains, sanding sealers, and varnishes (primarily conventional solventborne varnishes), especially those formulated as fine furniture finishes. Technically, these coatings are not subject to regulation under Rule 1113 unless applied to appurtenances that are attached to an architectural structure (e.g., doors, kitchen cabinets, built-in bookcases, or handrails). Nevertheless, the Small Container Exemption has been an important part of architectural coatings regulation from the start, and is currently a feature of every architectural coatings rule in the country.

1-4 The Small Container Exemption serves a number of useful purposes within the context of architectural coatings rules, as has been discussed with the SCAQMD, ARB, and U.S. EPA at various times over the past 25 years. (Enclosed with our letter of September 12, 2003, were copies of correspondence with the SCAQMD, explaining the purposes of the exemption; those enclosures are hereby incorporated by reference.) Not the least of these purposes is that the Small Container Exemption actually makes the rules more effective in reducing VOC emissions, and the elimination or limitation of the Small Container Exemption would result in more emissions, not less. (See EL RAP letter dated July 26, 1996, among the enclosures referenced above.) One issue not previously addressed, but particularly relevant here, is the issue of relative reactivity of VOC solvents used in products that would be supplied under the Small Container Exemption, and in products meeting the proposed new VOC content limit for Varnish.

1-5 The term "reactivity" refers to the ability of a VOC to promote or inhibit ozone formation. (Potential contribution of VOCs to ozone formation is the reason why VOCs are regulated.) Atmospheric chemists have long known that different VOC species have different reactivities, and that relative reactivities may vary by an order of magnitude or more. Current VOC regulations (for the most part) seek only mass reductions of all VOC, without regard to relative reactivity (beyond exempting certain designated "negligably" reactive VOC). Where regulations result in solvent substitutions, however, relative reactivity becomes very important. Emitting smaller amounts of more reactive VOC, in place of larger amounts of less reactive VOC, may not have any beneficial effect on ozone formation, or may even cause more ozone to form, or to form more rapidly so that population-weighted ozone exposures increase.

1-6 The current limit of 350 g/L allows both conventional solventborne varnishes, and alternative waterborne clear wood finishes. According to the most recent ARB survey of architectural coatings distributed in California, waterborne varnishes have a sales-weighted average VOC content of 266 g/L, which is very close to the proposed limit of 275 g/L. In the "Preliminary Draft Staff Report for Proposed Amended Rule 1113," dated August 19, 2003, SCAQMD staff acknowledges that "[t]raditional varnishes…will not likely meet a proposed limit of 275 grams per liter…." The report also makes it clear that waterborne clear finishes are the most likely substitutes for traditional varnishes.

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A review of manufacturers' Material Safety Data Sheets and Product Information Sheets shows that the VOC solvents used in waterborne clear wood finishes typically consist of various glycol and glycol ether compounds. Below is a table (TABLE 1) showing the most common VOC solvents used in waterborne varnishes, along with their Maximum Incremental Reactivity ("MIR") values, as listed in the table incorporated in the ARB statewide regulation for aerosol coatings (one of the few reactivity-based regulations in operation today). The aerosol coatings
1-7 regulation and table of MIR values, along with related documents, can be viewed on the ARB website at the following location: http://www.arb.ca.gov/regact/conspro/aerocoat/aerocoat.htm

MIR values indicate the amount of ozone that will form, under certain conditions, as a result of the emission of a given amount of VOC (e.g., grams of ozone per gram of VOC emitted). The MIR values of the solvents listed range from 2.56 to 3.36, with an average MIR value of 2.91. This is significantly higher than the average reactivity of the mineral spirits solvents found in traditional solventborne varnishes.

Also given below is a table (TABLE 2) showing a variety of typical mineral spirits (petroleum distillates with average boiling point generally between 340 and 460 degrees Fahrenheit, with aromatics content less than eight percent by weight). These are the VOC solvents primarily used in conventional solventborne varnishes. ARB classifies aliphatic petroleum distillate hydrocarbon solvents into a number of "bins" according to general characteristics of these complex mixtures, and assigns an appropriate MIR value to each bin.

The MIR values of the mineral spirits listed range from 0.81 to 1.62, with an average MIR value of 1.15. Thus we find that, to the extent that lowering the VOC content limit for Varnish from 350 g/L to 275 g/L causes a shift from conventional solventborne varnishes to alternative waterborne clear wood finishes, a decrease of 21 percent in VOC content is accompanied by an increase of 153 percent in VOC reactivity. In terms of relative ozone formation impacts of VOC emitted, substituting waterborne clear finishes for conventional solventborne varnishes will almost double the amount of ozone formed, as calculated below:

$$\frac{275}{350} \times \frac{2.91}{1.15} = 1.99$$

Obviously, adopting a VOC content limit of 275 g/L for Varnish would be counterproductive to the air quality goal of ozone reduction. And excluding clear wood finishes from the Small Container Exemption would only compound the problem, by preventing the use of products that would have only half the ozone forming potential of the allowable complying products. Thus, the Small Container Exemption is necessary to mitigate the potentially significant adverse environmental impacts that would result from adopting the proposed lower limit for Varnish. Our previously stated recommendation is therefore to allow the Small Container Exemption to continue as currently given, without any exclusions or limitations on its operation.

TABLE 1

Solvents Used in Waterborne Clear Wood Finishes

Chemical Name	CAS Number	MIR Value
Ethylene Glycol	107-21-1	3.36
Ethylene Glycol Monobutyl Ether	111-76-2	2.90
Diethylene Glycol Monoethyl Ether	111-90-0	3.19
Diethylene Glycol Monomethyl Ether	111-77-3	2.90
Dipropylene Glycol Monomethyl Ether	34590-94-8	2.70
n-Methyl Pyrrolidone*	872-50-4	2.56
Propylene Glycol	57-55-6	2.75

* Prop. 65-listed chemical known to cause cancer.

TABLE 2

Mineral Spirits Used in Soventborne Varnishes

1-7 cont.

Description	Criteria	ARB Bin Number	MIR Value
Mineral Spirits, Type I, Class B	Alkanes (2 to <8% Aromatics)	14	1.21
Mineral Spirits, Type I, Class C	Alkanes (<2% Aromatics)	11	0.91
Mineral Spirits, Type II, Class B	(High Flash) Alkanes (2 to <8% Aromatics)	14	1.21
Mineral Spirits, Type II, Class C	(High Flash) Alkanes (<2% Aromatics)	11	0.91
Mineral Spirits, Type III, Class C	(Odorless) N- & Iso-Alkanes (≥90% and <2% Aromatics)	12	0.81
Mineral Spirits, Type IV, Class B	(Low Dry Point) Alkanes (2 to <8% Aromatics)	9	1.62
Mineral Spirits, Type IV, Class C	(Low Dry Point) Alkanes (<2% Aromatics)	6	1.41

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1-8

The discussion of reactivity in the DEA appears to be five to ten years out of date. Curiously, no mention is made of the significant progress in scientific research and regulatory policy over the past decade, including the June 2000 milestone ARB statewide regulation for aerosol coatings. As mentioned above, this regulation establishes reactivity-based standards derived from MIR values. In the ARB Initial Statement of Reasons for the amendments incorporating reactivity criteria (available at the ARB website given above), staff explains:

> "It has been known for several decades that individual VOCs vary in the amount of ozone potentially formed once emitted into the air. This concept is referred to as "reactivity." In the current Aerosol Coatings Regulation, total VOC content is limited on a percent-by-weight basis, without consideration of the differences in VOC reactivity. **However, the science of reactivity now allows us to more effectively control VOC emissions by targeting reductions from VOCs that have a higher potential to form ozone."** (Emphasis added.)

1-9

> "To use the concept of reactivity a method is needed to quantify the impact of each VOC on ozone formation. One tool that allows for ozone measurement is a reactivity scale. Many scales have been proposed to quantify the ozone formation potential of VOCs."

> "Since 1989, [Dr. William P.L.] Carter and co-workers at the Statewide Air Pollution Research Center (SAPRC) (and now continuing at the College of Engineering Center for Environmental Research and Technology)…have been conducting the most extensive studies of incremental reactivities using smog chamber experiments and computer modeling. Carter defines incremental reactivity as the maximum amount of ozone formed by the addition of a test hydrocarbon to the base reactive organic gas mixture, divided by the infinitesimal amount of the test hydrocarbon added."

1-10

> "The MIR, maximum ozone incremental reactivity (MOIR), and equal benefits incremental reactivity (EBIR) are three incremental reactivity scales developed by Carter from box models of 39 U.S. urban areas (selection based on conditions described by the U.S. EPA). Incremental reactivity is expressed as the number of additional grams of ozone formed per gram of VOC compound added to the base organic mixture. **Incremental reactivity conveniently computes the ozone formation potential of a VOC…."** (Emphasis added.)

1-11

> "The MIR is the incremental reactivity computed for conditions in which the NOx concentration would maximize the base ROG reactivity. This scenario is typical in air parcels of low VOC-to-NOx ratios such as urban centers, or air parcels in which ozone is most sensitive to VOC changes. These are typical of urban centers in which there are high emissions of NOx and the chemistry is VOC-limited."

> "Studies have also addressed the appropriateness of using a simplified…box model to quantify the reactivities of VOCs. These studies involved comparing the MIR to other reactivity scales…. The results of these studies indicated that the box model-calculated

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1-11 cont.

MIR scale, using the SAPRC mechanism, is in agreement with other reactivity scales…. **Therefore, we conclude that the MIR scale provides a reliable description of hydrocarbon reactivities and, therefore, can be utilized for ozone control strategy decisions."** (Emphasis added.)

"For ozone control strategies, the reactivity scale selected should be designed for the best overall air quality benefit. At the request of ARB, Dr. Carter studied 18 different methods (including MIR, MOIR, and EBIR) of ranking the reacitivity of individual VOCs…. Dr. Carter concluded that if only one scale is to be used for regulatory purposes in California, the MIR scale is the most appropriate."

"The MIR scale appear to be most accurate for VOC-limited conditions, such as in the South Coast Air Basin, in which VOC controls would be most effective." (Emphasis added.)

"As further evidence of the MIR scale being appropriate for California, the VOC/NOx ratios used for deriving the scale are observed throughout the state of California, including such cities as San Diego, Los Angeles, Sacramento, and San Francisco."

1-12

As part of its efforts to validate the scientific basis for using reactivity criteria in ozone control policy, the ARB established in 1996 a Reactivity Scientific Advisory Committee, comprising six eminent experts in the field of atmospheric chemistry: Dr. John H. Seinfeld (California Institute of Technology); Dr. Roger Atkinson (University of California, Riverside); Dr. Jack Calvert (National Center for Atmospheric Research); Dr. Harvey Jeffries (University of North Carolina, Chapel Hill); Dr. Jana B. Milford (University of Colorado); and Dr. Armistead G. Russell (Georgia Institute of Technology). Biographies of the RSAC members are available at the ARB website using the following link: **http://www.arb.ca.gov/research/reactivity/rsac/bios.htm** The ARB Initial Statement of Reasons continues:

"To further validate the use of the MIR scale, at the suggestion of our Reactivity Scientific Advisory Committee (RSAC) and industry, ARB contracted with Dr. William Stockwell at the Desert Research Institute to conduct a review of the base mechanism (SAPRC99) from which the MIR scale is derived. The result of the review was encouraging. Stockwell concluded that Carter's mechanism represents "state of the science for air quality models." The RSAC concurred with Stockwell at its October 8, 1999, meeting and found that SAPRC99 represents the most thoroughly reviewed and best documented chemical mechanism available."

"Although the MIR values are calculated using a "state-of-the-science" chemical mechanism, the reactivity estimates of some ROC classes are still uncertain."

"These uncertainties do not need to preclude regulatory development…." (Emphasis added.)

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"The potential of using reactivity as a ROC control approach has also been evaluated…and we believe the scientific foundation needed for using reactivity is well-established and readily available." (Emphasis added.)

In the ARB "Final Statement of Reasons for Rulemaking, Including Summary of Comments and Agency Response," staff confirms that "the ARB is convinced that the science of reactivity is ready for use in regulatory programs." Moreover, "[w]hile ARB staff agrees that the science of reactivity will continue to evolve and improve, the science is sufficiently robust to expand its use in control strategies to control ozone in California. Furthermore, ARB staff worked extensively with the RSAC, comprised of leaders in the field of atmospheric chemistry, to ensure the fundamental science behind staff's work was sound. We also note that members of the RSAC have conducted several studies on the ability of MIRs to predict ozone formation in both urban and regional domains. The results of these studies indicate that the MIR scale can be used to describe VOC reactivity in "real world" situations."

1-12 cont. In its Resolution 00-22 (June 22, 2000) adopting the proposed amended aerosol coatings regulation, the Air Resources Board finds that:

"VOCs have differing abilities to induce formation of ozone in the air once emitted;

"By understanding the difference in the reactivities of different VOCs, an efficient control strategy can be developed that…limits the ozone formed from…VOC emissions;

"The MIR scale is an appropriate index for quantifying ozone formation of VOCs in California and can be used as the basis for ozone control strategies…." (Emphasis added.)

1-13 To ensure that the regulation would be responsive to the progress of scientific research, the Air Resources Board resolved to direct "the Executive Officer to review the Tables of Maximum Incremental Reactivity (MIR) Values 18 months after the effective date of the amendments, and every 18 months thereafter, to determine if modifications to the MIR values are warranted." ARB staff contracted with Dr. Carter to re-calculate and update the MIR values periodically, most recently in February 2003. Adoption of proposed revised MIR values is scheduled for a public hearing on December 3, 2003, in Sacramento. Of the approximately 670 VOCs or VOC categories listed, for which Dr. Carter re-calculated MIR values, only 26 were adjusted by more than five percent. More than half required no significant adjustment, including the VOC species given in TABLE 1 and TABLE 2 of this letter.

1-14 In summary, to the extent that Proposed Amended Rule 1113 will promote the substitution of waterborne Clear Wood Finishes at 275 g/L for traditional solventborne Varnish and Sanding Sealers at 350 g/L, the best available scientific evidence indicates that ozone formation impacts would almost double. Therefore, continuation of the existing Small Container Exemption, without the limitation proposed, is a necessary and appropriate mitigation measure.

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If you have any questions regarding this letter, or need any further information, please feel free to call me at (323) 826-2663.

Very truly yours,

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**COMMENT LETTER #1 FROM
DUNN-EDWARDS PAINTS**

(OCTOBER 23, 2003)

Response to Comment 1-1

The SCAQMD staff appreciates the interest and involvement by Dunn-Edwards in the architectural coating rule making process.

Response to Comment 1-2

The SCAQMD disagrees with the commentator's opinion that the Draft EA did not address previously submitted comments. The analysis in the Draft EA directly responds to previously submitted comments by analyzing the environmental effects of PAR 1113 identified by the commentator. Lowering the volatile organic compound (VOC) content limit for clear wood finishes would not result in a significant adverse air quality impact necessitating a mitigation measure but rather would result in an air quality benefit. According to CEQA Guidelines §15126.4(a)(3), "Mitigation measures are not required for effects which are not found to be significant." On the contrary, retaining the exemption of the quart-size containers of clear wood finishes from the rule's VOC limit would result in a reduction in the benefit to air quality that will occur under the project. Responses to the September 12, 2003 letter to SCAQMD staff can be found in the Staff Report for PAR 1113 which is located in the Final Board Package for PAR 1113.

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Response to Comment 1-3

The small container exemption has been subject to annual reporting in order for the Executive Officer to monitor its use to ensure that this exemption was not overly used. It was never intended as a means of reducing emissions. SCAQMD staff's research shows that, unlike other coating categories, there has been a significantly high sales volume in small containers for clear wood finishes. Because low VOC products are available, staff no longer believes the small container is needed for clear wood finishes.

For example, the products listed in Appendix B of the Environmental Assessment are all adequate replacements for their higher-VOC counterparts currently sold in small containers. Furthermore, the AVES Study clearly illustrates the ability of the low VOC varnishes, sanding sealers, and lacquers to successfully replace existing high VOC products for initial coating, as well as touch-up and repair. Lastly, the Rule 1136 – Wood Coatings Technology Assessment completed in August 2003 demonstrates the successful transition to waterborne coating systems, including the use of waterborne stains, sanding sealers, and topcoats (varnishes and lacquers), by wood coating facilities. Staff has also collected information that shows that the same products used in the shop are also used in the field. As a result, the lower VOC coatings can be used for the purposes that the higher VOC coatings, currently sold in small containers, are currently being used for. Therefore, there is no need for the products sold in small containers to have a higher VOC limit than the products sold in gallon containers. Based on this information and the fact that air quality in the district is so poor, the assertion that other architectural coatings rules elsewhere in the country have the quart exemption is irrelevant.

Response to Comment 1-4

The SCAQMD disagrees with the commentator's opinion that limiting the small container exemption would increase VOC emissions. Responses to the September 12, 2003 letter to SCAQMD staff can be found in the Staff Report for PAR 1113 which is located in the Final Board Package for PAR 1113. In addition, the EA discusses the issues raised in previous correspondence regarding potential environmental impacts of reducing VOC limits. Please refer to Response to Comment 1-3 for a discussion on small container exemption.

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Response to Comment 1-5

The commentator is incorrect in his assertion that the issue of reactivity has not been previously addressed. This issue was comprehensively addressed in Chapter 2 of the Draft EA. Further, reactivity of VOC solvents has been addressed in the CEQA documents for previous amendments to Rule 1113.

SCAQMD staff disagrees that implementing a lower VOC limit for stains, varnishes, and sanding sealers would be counterproductive to the air quality goal of ozone reduction. Lowering the overall volume of VOC solvents from solvent-based formulations by converting to waterborne formulations will continue to lower VOC emissions, thereby reducing ozone formation in the region. Staff disagrees with the notion that elimination of the small container exemption and the use of waterborne formulations in lieu of solvent-borne formulations will result in the use of solvents with higher reactivity and thus negate any environmental benefits. To begin with, it would be inappropriate to simply take arithmetical averages of the MIR values of some of the solvents found in the solvent-borne formulations and compare them to the MIR values of the waterborne formulations. According to Dr. Carter, "averaging the MIRs of the compounds found in finishes is not the appropriate approach; you need to do weighed averages based on the amounts of compounds actually in the finishes" (e-mail from Dr. Carter to N. Berry, SCAQMD, October, 2003). An additional analysis comparing the typical solvents found in solvent-borne clear wood coatings indicates the presence of solvent species other than glycols. These include toluene, xylene, and ethyl benzene, which all have significantly higher MIR values based on currently-available data. The inclusion of additional VOC species typically found in solvent-borne coatings clearly shows an overall higher average MIR value then with the glycols listed and included in waterborne formulations. Finally, the percent of solvent content found in solvent-borne formulations is much greater than the quantity of solvents found in waterborne coatings, which would make the weighted MIR in solvent-borne coatings greater than the already higher average MIR. One should also note that it is not a forgone conclusion that elimination of the small container exemption will necessitate the switch to waterborne chemistries. Manufacturers will have the option to use VOC exempt solvents and thus retain the basic resin chemistry used in solvent-borne formulations.

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In response to the commentator's and others' recommendation to retain the small container exemption, staff is proposing an alternate amendment that phases out the exemption and in the interim establishes maximum VOC limits for clear wood finishes in those small containers.

Specifically, the small container exemption would be deleted effective July 1, 2008 and in the interim, the maximum VOC limit for varnishes and sanding sealers sold in small containers will be 450 g/l, and 550 g/l for lacquers.

Response to Comment 1-6

Traditional solvent-borne varnish formulations are likely unable to meet the proposed VOC content limit of 275 grams per liter, however, clear wood finishes using waterborne formulations that comply with the proposed future compliance limit are widely available and in use, and are considered to be likely substitute products with good performance characteristics. Appendix B of the Environmental Assessment lists currently available clear wood finishes that comply with the proposed future limit of 275 grams per liter.

Response to Comment 1-7

The commentator takes the position that adopting a VOC limit for clear wood finishes at 275 grams per liter is counterproductive, because, as the commentator claims, the average MIR value of compounds found in waterborne clear wood finishes is significantly higher than the average MIR value for compounds in solvent-borne clear wood finishes. However, as noted by the commentator in Comment 1-5, ozone formation potential is a direct result of reactivity times the quantity of VOC emitted. Whether the limit is counterproductive depends on the quantities of VOCs reduced and substituted, and their reactivities. As will be discussed later, there is considerable uncertainty as to the specific VOC species in both solvent-borne formulations and to a lower extent in waterborne coatings. Given such significant uncertainties, it is speculative to conclude that the low VOC limit for clear wood finishes would result in an air quality detriment. Indeed, the commentator's own numbers show otherwise. Even assuming the commentator's assertion that the average reactivity of waterborne finishes is approximately 2.5 times the average reactivity of solvent-borne finishes (2.91/1.15), there will be a net ozone reduction resulting from lowering the VOC limit because of the substantially lesser mass of VOCs being emitted from the waterborne finishes.

Thus, the proposed regulatory limit of 275 grams per liter for clear wood finishes translates into an actual VOC content of 110 grams per liter for waterborne coatings. As the commentator is aware, a regulatory VOC content is determined by excluding water, which results in a higher number than the actual mass VOC content of the waterborne coatings. However, solvent-borne coatings do not have water, so their regulatory VOC content of 350 grams per liter is the same as their actual VOC content.

Assuming a liter of each type of coating is used, 110 grams of VOC will be emitted from the waterborne finish while 350 grams of VOC will be emitted from the solvent-borne formulation. Again, assuming the commentator's asserted average reactivity values, the ozone formation potential of waterborne finishes is 110 x 2.91 = 320.1 which is still less than solvent-borne finishes at 350 x 1.15 = 402.5. Therefore, the decrease in actual VOC content is not 21 percent (275/350) as the commentator claims but rather 69 percent (110/350). Therefore, using the MIR values provided by the commentator, the waterborne clear wood finishes would reduce amount of ozone by 21 percent, as calculated below:

$$\frac{110}{350} \times \frac{2.91}{1.15} = 0.79$$

Moreover, the commentator improperly ignores other key VOC species in solvent-borne clear wood finishes with much higher reactivity values. For example, the commentator only lists mineral spirits as the solvent used in traditional coatings, which skews the data to reflect a low reactivity value. While mineral spirits can be found in traditional solvent-borne varnishes, they are not always the only component of clear wood coating formulations. As noted in Response to Comment 1-5, toluene and xylene have a prominent presence in the solvent-borne formulations, but were not included in the commentator's comparison analysis. According to CARB's "Improvement of Speciation Profiles for Architectural and Industrial Maintenance Coating Operations" (CARB, June 1996), solvent-borne formulations include a wide variety and mixture of alkenes, alkanes and aromatic petroleum distillates that have varying MIR values. Typical clear wood finishes, including sanding sealers, lacquers and varnishes, consist of up to 27 percent toluene and xylene in the solvent-borne formulation based on speciation profiles of lacquers, varnishes and sanding sealers and can consist up to over 100 different VOC species for one coating.

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Furthermore, the commentator's blanket assertion that waterborne finishes are much more reactive than solvent-borne finishes is incorrect. Table 1-1 lists the average reactivity, represented as a MIR value, of the solvents found in traditional clear wood finish formulations. The average reactivity of 3.44 for the solvent-borne formulation is higher than the average reactivity of 2.91 for waterborne finishes as provided by the commentator. The MIR values were taken from CARB's aerosol coating regulation accessed from its website at the following internet address: http://www.arb.ca.gov/regact/conspro/aerocoat/aerocoat.htm.

Table 1-1

Comparison of Reactivity of Solvents Used in Solvent-borne Clear Wood Finish Formulations

Solvents Used In Traditional Clear Wood Finishes	
CHEMICAL NAME	**MIR VALUE**
Toluene	3.97
Xylene	7.45*
Methyl Ethyl Ketone (MEK)	1.49
Ethylene Glycol Ethyl Ether (EGEE)	3.78
Ethylene Glycol Methyl Ether (EGME)	2.98
Mineral Spirits (average MIR value)	1.15**
Naphtha (petroleum distillates)	3.26
AVERAGE MIR VALUE	**3.44**

* - Because commercial xylene is a mixture of three isomers (meta-, ortho- and para-), the MIR value listed is an average of three isomers' MIRs.

**- Average depends on the overall composition of mineral spirits, including the level of straight-chain and branched-chain alkanes and aromatic content, and was included as a value in the commentator's letter.

As noted above, while various types of mineral spirits are used in traditional formulations of clear wood finishes, they are not the only compounds used. Toluene and xylene are also used, along with MEK, EGEE, EGME, etc. It is not an accurate depiction of the conventional solvent-borne coating formulation if the commentator analyzed mineral spirits as the only solvent used. Consequently, the SCAQMD staff disagrees that by substituting waterborne clear finishes for conventional solvent-borne varnishes will double the amount of ozone formed. Using the updated MIR value from Table 1-1 above, reformulating traditional clear wood finishes (at 350 grams per liter actual VOC) to waterborne clear wood finishes (at 110 grams per liter actual VOC) would result in a reduction in the ozone forming potential of the reformulated coating by approximately 73 percent, as indicated by the following equation:

$$\frac{110}{350} \times \frac{2.91}{3.44} = 0.27$$

Further, the commentator's claim that the use of the quart container exemption is to mitigate the adverse ozone impact of the allegedly more reactive waterborne finishes is incorrect. The estimated overall ozone reductions are even greater if one considers the fact that the weighted average actual VOC of the solvent-borne formulations for clear wood finishes is significantly higher than 350 grams per liter since these products are sold in quart or smaller containers which have VOC content at the 450-550 grams per liter range and are exempt from the VOC limit requirements of the rule. Reformulating the higher VOC clear wood finishes into compliant waterborne formulations would result in a reduction in the ozone forming potential by approximately 79 percent, as indicated by the following equation:

$$\frac{110}{450} \times \frac{2.91}{3.44} = 0.21$$

To treat waterborne and solvent-borne solvents equally would be an unfair and overly simplistic assessment or comparison. The analysis should include a weighted-reactivity approach for **all** the solvent species in the formulation. However, in order to calculate a weighted average for all solvent-borne and waterborne clear wood finishes, one would have to collect the speciation data, which varies for each coating formulated and is typically considered proprietary information. The following is a summary of comments and analysis conducted by CARB to demonstrate a more feasible approach of calculating overall ozone formation from two coatings, one waterborne and one solvent-borne:

The commentator states that relative ozone impacts can be determined by comparing two single ingredients from a waterborne and a solvent-borne coating. To provide a complete comparison of the ozone formation potential for two coatings, it is necessary to consider all of the ingredients in the coating and the relative contribution of each ingredient in the coating. Comparing the relative reactivity of two single coating ingredients can identify which ingredient is more reactive on its own, but it doesn't reflect the overall reactivity of a coating because it does not account for the relative mass contributions and it doesn't acknowledge the presence of water and solids. Focusing only on VOCs can make a coating seem highly reactive, even when it contains a relatively small quantity of VOCs.

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Consider the following example for two coatings, one solvent-borne and one waterborne, that both have a VOC Regulatory value of 280 g/l, whereas the actual VOC of the waterborne formulation is significantly lower. These coatings are based on actual products that were reported in CARB's 2001 Architectural Coating Survey, with the data slightly altered to protect manufacturer confidentiality.

Solvent-borne Coating (280 g/l): Reactivity of All Ingredients

n	**Ingredient**	**MIR Value** ($g\ O_3/g$ TOG)	$[Wt\%]_i$
1	Hydrocarbon Solvent (Bin 14)	1.21	19.3
2	Aromatic 100	7.51	1.3
3	Hydrocarbon Solvent (Bin unknown)	1.86	9.2
4	Solids	0	70.2
			Total Wt% = 100%

Waterborne Coating (Regulatory VOC = 280 g/l): Reactivity of All Ingredients

n	**Ingredient**	**MIR Value** ($g\ O_3/g$ TOG)	$[Wt\%]_i$
1	2-Propoxyethanol	3.50	5.7
2	2-Butoxyethanol	2.88	4.4
3	Toluene	3.97	1.0
4	Water	0	37.3
5	Solids	0	51.6
			Total Wt% = 100%

A comparison can be made between the two primary VOCs in each coating: Hydrocarbon Solvent (Bin 14) and 2-Propoxyethanol. If the comparison only includes the MIR values, as demonstrated by the commentator, it appears that the waterborne product is more reactive.

$$\frac{[WB]}{[SB]} = \frac{[\text{2-Propoxyethanol MIR Value}]}{[\text{HC Solvent (Bin 14) MIR Value}]} = \frac{[3.50\ g\ O_3/g\ TOG]}{[1.21\ g\ O_3/g\ TOG]} = \mathbf{2.9}$$

However, the appropriate method of comparison, as recommended by Dr. Carter, is to compare the weight fractions of the two predominant ingredients. If this is done, the waterborne product is less reactive.

$$\frac{[WB]}{[SB]} = \frac{[\text{2-Propoxyethanol MIR Value}]*[Wt\%]}{[\text{HC Solvent (Bin 14) MIR Value}]*[Wt\%]} = \frac{[3.50\ g\ O_3/g\ TOG]*[5.7\%]}{[1.21\ g\ O_3/g\ TOG]*[19.3\%]} = \mathbf{0.9}$$

Lastly, if the weight fractions and the relative MIR values were analyzed for all the listed solvents, the ratio of the waterborne over the solvent borne would be even less, 0.73, which demonstrates the waterborne formulation will have a 27% higher overall reduction in ozone formation.

Response to Comment 1-8

The reactivity discussion in the EA has a similar analysis as in the past because the conclusions have not changed with regard to reactivity. The discussion was updated to include the 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, etc. The updated reactivity section in the EA included a discussion of funding for additional studies and how the studies will be peer reviewed when complete before generating conclusions or creating new regulatory approaches. Additional information on reactivity is provided in the following paragraphs.

In 1995, the California Air Resources Board (CARB) began the process of investigating using photochemical reactivity as an ozone control approach for consumer products and aerosol coatings as a substitute for the mass-based VOC content limit regulation. It was concluded by CARB staff and industry representatives that it was acceptable to replace the VOC content limits with mandatory reactivity-based VOC limits to provide more regulatory flexibility while efficiently reducing the ozone formed from aerosol coatings. In 1996, the Reactivity Research Advisory Committee (RRAC) approved the use of the maximum incremental reactivity (MIR) scale for use in developing reactivity-based control strategies for aerosol coatings in California. According to the CARB, "the aerosol coating category was chosen for the first consumer product reactivity based regulation because it is a well-characterized, discrete category within the inventory. This will allow us (CARB) to carefully monitor the implementation of the regulation to ensure that this regulatory approach is effective." (CARB, "Final Statement of Reasons for Rulemaking," 2000) Established MIR values are described in a subsequent comment in the commentator's letter, which purports to compare the reactivity of solvents used in traditional solvent-borne varnishes versus waterborne products. Please refer to Response to Comment 1-7 for a discussion on the reactivity comparison.

In general, the commentator provides a simplistic comparison of overall ozone potential from solvent-based formulations compared to waterborne formulations. However, as indicated in the staff report and the existing rule language, the SCAQMD recognizes the potential of reactivity as an alternative ozone control strategy, and recognizes the limitations of currently available data on MIR values, mainly the uncertainty associated with the current data, as published in numerous reports by the experts in the field, in particular Dr. William Carter of CE-CERT. According to Dr. Carter, "there is a minimum of 30 percent uncertainty of even well-standing compounds, and the uncertainties of compounds that have not been studied is greater. The ongoing experiments with representative petroleum distillates should address uncertainties for most solvent-based coatings. For the compounds listed in (R. Wendoll's) Table 1, experiments have been carried out to test the mechanisms for Ethylene Glycol Monobutyl Ether, n-Methyl Pyrrolidone, and Propylene Glycol, but Ethylene Glycol, Diethylene Glycol Monoethyl Ether, Diethylene Glycol Monomethyl Ether, Dipropylene Glycol Monomethyl Either have not been studied, so their MIRs are more uncertain. The MIR uncertainties for these are at least 50 percent and perhaps greater." (e-mail from Dr. Carter to N. Berry, SCAQMD, October, 2003) Because of the uncertainties and lack of all the necessary data associated with the reactivity-based approach, CARB did not recognize this approach as a feasible alternative in the Suggested Control Measure for Architectural Coatings at this time (Final Program Environmental Impact Report, CARB, 2000).

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A state-of-the art reactivity chamber was constructed at the CE-CERT facility at University of California, Riverside. In recognition of the SCAQMD's on-going commitment to evaluating this concept, the SCAQMD has contracted with CE-CERT to further study the reactivity and availability of VOC species most commonly found in waterborne and solvent-based coatings. The scope of the project will focus on assessing the reactivity of VOC species most commonly found in solvent-based and waterborne architectural coatings, including studying ozone reactivities of low volatility solvents and re-evaluating uncertainties resulting from current data and modeling. The SCAQMD project will further explore the potential of the new environmental chamber to investigate availability of the low volatility solvents and coordinate the studies with other availability studies. CARB has a limited pilot program in its Aerosol Coatings rule that allows the use of a reactivity-based control approach. What made the use of the reactivity approach in regulating aerosol coatings feasible was primarily the limited number of solvents used in aerosol formulations. The same does not hold true for architectural coatings, however, which represent one of the largest most complex non-vehicular emission source category. Because there are more categories and formulations, as well as greater number of solvents used in architectural coatings, there needs to be a heightened concern regarding uncertainties with MIR values and, thus, more complexity and higher risks with formulating and regulating. To address these uncertainties, similar to the SCAQMD, CARB has also contracted with CE-CERT to conduct additional studies in an effort to reduce the uncertainty of MIR values. Both the SCAQMD and CARB contracts include additional analyses for some of the solvent species highlighted in the comment letter. Therefore, at this time it is not prudent to regulate VOC emissions based on the ozone-forming potential using currently available MIR data. It should be noted that MIR values have changed twice since their original adoption. As mentioned in Response to Comment 1-17, one revised MIR value was for a compound used in waterborne clear wood finishes. Had a reactivity-based rule been in effect at that time, it would have been amended to reflect the new MIR values, which would have required those coating manufacturers using that compound to reformulate in order to comply with the amended rule. Until adequate, peer-reviewed data are available on the MIR values of these solvent species, especially from the newly constructed chamber, the mass-based regulatory approach continues to be the only proven ozone control strategy.

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According to CARB's MIR values, individual VOCs vary in the amount of ozone formed once emitted into the air. In its "Final Statement of Reasons for Rulemaking" (CARB, June 2000), CARB states, "…the reactivity-based Aerosol Coating Regulation does represent a new way of controlling VOC emissions. As such, staff believes that a reactivity-based control strategy should be evaluated on a case-by-case basis and **not automatically applied to other product categories.** Staff does believe the science of reactivity is sufficiently well developed to seriously consider using reactivity in other regulatory programs **as appropriate and necessary**." (Emphasis added) Besides the aerosol regulation, no other regulatory program has adopted the reactivity-based approach. According to its "Staff Report for the Suggested Control Measure (SCM) for Architectural Coatings", CARB "…intends to investigate the feasibility of incorporating mandatory reactivity-based limits into the architectural coatings SCM. Further research into the reactivity of VOCs commonly used in architectural coatings may be warranted, both for VOCs that we currently do not have data for, as well as for VOCs for which we need improved data."(CARB, June 2000) However, CARB rejected the use of the reactivity-based approach as not a feasible alternative in its (SCM) for Architectural Coatings, adopted after the inclusion of the alternative reactivity-based approach on a limited scale in the Aerosol Coatings rule. According to the Program Environmental Impact Report prepared for the CARB's SCM for Architectural Coatings (SCH# 99062093, CARB, 2000), the following reasons for rejecting a reactivity approach to regulate architectural coatings were identified:

1. The required inventory of speciated VOC data for each product was not sufficiently provided in order to accurately assess the reactivity of products and therefore, can not establish limits.
2. Some VOCs which are used exclusively in architectural coatings do not have well-established reactivity values.
3. Some of the VOCs needing further characterization are not easily evaluated using present methodologies.
4. In an El Rap concept paper it is acknowledged that not all VOCs used in architectural coatings have been thoroughly studied to reliably assess their reactivity. CARB disagreed with El Rap's suggestion's to use a default value of "one" where the reactivity value is unknown because reactivities of VOCs can vary by more than an order of magnitude.

CARB has also contracted with CE-CERT to conduct additional reactivity studies to reduce the uncertainty of VOC species most commonly found in architectural coatings. While there is merit to this approach, there is no evidence that the goal of reducing ozone is being thwarted by regulating and reducing the VOC content limit of architectural coatings. By comparing typical compounds used in solvent-borne coatings, especially aromatic compounds, to compounds used in waterborne coatings, the overall reactivity is reduced which means the ozone formation will be reduced as well.

Finally, in Response to Comment 1-5, it is noted that the current MIR data have high levels of uncertainty and need to be studied further before consideration for significant policy development regarding controlling regional ozone concentrations. As also stated in Response to Comment 1-5, SCAQMD and CARB have contracted with CE-CERT to conduct additional studies on the MIRs for the most commonly used VOC species in architectural coatings. There are many policy implications involved with adopting the mandatory reactivity-based approach over the current VOC content limit approach, including the burden on the industry to potentially limit usage of specific compounds in order to comply. Similar to determining the VOC content for each coating, the conceptual reactivity-based approach will require the coating manufacturer to mix the compounds with various MIR values and formulate to a value less than the compliant limit. Current testing allows the regulator to test the end product to ensure compliance with the VOC content limit. The reactivity-based approach would require extraction and testing of each compound from the end product to ensure the type and amount of chemical are what contributed to the overall weighted MIR value of the coating. This process could lead to a much more complex regulation. It could also result in the loss of regulatory compliance options such as the averaging provision, restricting manufacturers' product formulation options and eliminating certain product forms. USEPA has already commented in CARB's "Final Statement of Reasons for Rulemaking" that there are enforceability issues that would prevent effective enforcement of the reactivity-based program (CARB, 2000). USEPA has also indicated that a reactivity-based program would require considerably more resources in terms of data collection, maintenance, and analytical measurements than mass-based VOC control programs. In addition, because of industry claims that speciated VOC data are confidential business information, public accountability may be reduced and there may be concerns related to Clean Air Act, section 114(c), requirements for USEPA to make emission data public ("Final Statement of Reasons for Rulemaking," CARB, June 2000). In the same document, CARB acknowledges that existing air quality models may not currently have sufficient resolution to account for complete VOC speciation and, thus, more sophisticated models need to be developed.

If the MIR values change, and they have changed twice since their original adoption in 2000 based on more recent analyses, the coating manufacturers may be required to reformulate their products more frequently in order to comply with a reactivity-based approach. Currently, a VOC content limit regulation allows flexibility to formulate without too much control of individual compounds used in the formulation. The primary limiting factor in the formulation of the coating is whether the compound has toxic properties. This toxicity restriction would apply to all coating formulations whether regulated for their VOC content or ozone reactivity.

SCAQMD staff believes that a reactivity-based approach can be a highly effective regulatory approach provided the necessary analytical, technical and implementation tools are developed. The development of these tools and the elimination of the various implementation and enforcement hurdles are extremely important for the ultimate success of this regulatory approach.

Response to Comment 1-9

CARB has adopted the MIR scale of Dr. William P.L. Carter (2000) as a means of quantifying ozone impacts in its regulations of emissions of VOCs from aerosol coatings. However, as the commentator noted, this is one tool that allows for ozone measurement. There are other methods to quantify the ozone formation potential of VOCs, which produce different results and, thus, generate more levels of uncertainty for the MIR values. In addition, there are other methods to regulate and reduce VOC emissions from various product sources. Dr. Carter continues to review the MIR values to minimize uncertainty. Both the SCAQMD and CARB have initiated research projects with Dr. Carter to better understand the reactivity of the various components used in solvent borne and waterborne formulations and minimize uncertainties in the MIR values.

Response to Comment 1-10

The SCAQMD is aware of reactivity research being performed by Dr. Carter and is following it closely. The SCAQMD has provided comprehensive reasons why a reactivity-based architectural coating rule is not prudent at this time. Please refer to Responses to Comments 1-7 and 1-12 for the specific reasons why a reactivity-based architectural coating rule is not considered to be feasible at this time. In his "Evaluation of Atmospheric Ozone Impacts of Coatings VOC Emissions" presentation (Carter, September 2003), Dr. Carter identified the reactivity research needs for VOCs for architectural coatings. He highlighted that reactivity data are already available for many types of VOCs used in coatings including:

- Data available for representative alkanes, aromatics, alcohols, glycols, esters and a few others, however, not all aspects of mechanisms are adequately evaluated.

He added that reactivity estimates are uncertain for some important types of coatings VOCs such as:

- No data for low volatility compounds such as Texanol®
- Petroleum distillates have large compositional uncertainty and components include unstudied VOCs
- Amines and alcohol amines have very large mechanism uncertainty

Dr. Carter stated that there is a need to develop lower cost reactivity screening and enforcement methods, and concluded that there is uncertainty on how much deposition on surfaces and how other non-atmospheric loss processes are affecting atmospheric availability.

Response to Comment 1-11

In general, the South Coast Air Basin as a whole is considered VOC limited with a relatively low VOC/NOx ratio level, however it varies in degree across the Basin. The box model is a good place for proving concepts such as the performance of a reactive chemical mechanism when subjected to basic changes in parameters. The use of the box is to assess different mechanisms for comparison purposes. The box doesn't typically incorporate any real-time physical characteristics (i.e. transport, dispersion, unique emissions combinations) because it is mostly used to develop a level of performance for a given or standard set of conditions. Reactivity is in effect a simplification of the complex processes that take place in the air. It assigns a single number for the reactivity of a species. This ignores the fact that the reaction rate is influenced by a number of factors. Given that it is a simplification, it would not be wrong to use a simplified model to calculate it. Please refer to Response to Comment 1-7 with regards to the concerns and issues with the SCAQMD adopting a reactivity-based approach to regulating VOC emissions and ozone. In addition, refer to Response to Comment 1-8 with regards to CARB's statement on adopting a reactivity-based control strategy on a case-by-case basis, and as appropriate and necessary. The 2003 AQMP continues the SCAQMD's support for studying reactivity as a basis for regulation, but also indicates that the SCAQMD must continue lowering both NOx and VOC emissions in the district to achieve the ozone standard.

Response to Comment 1-12

The SCAQMD is aware of the work of the RRAC, which was comprised of independent, respected scientists who made their recommendations to CARB on the science related to hydrocarbon reactivity, and that they agreed that the MIR scale, developed by Dr. Carter, "…represents the most thoroughly reviewed and best document chemical mechanism available."

Please refer to Response to Comments 1-5 and 1-7 with regards to the concerns and issues with the SCAQMD adopting a reactivity-based approach to regulating VOC emissions and ozone. In addition, refer to Response to Comment 1-8 with regards to CARB's and USEPA's opinion on adopting a reactivity-based control strategy on a case-by-case basis, and as appropriate and necessary. As indicated in earlier responses, the newly constructed environmental chamber at UC Riverside will allow CARB and SCAQMD to reassess the old MIR values generated from the old chamber. If reactivity-based approach was adopted to regulate architectural coatings prematurely, coating manufacturers would be required to reformulate their product(s) in order to comply with these uncertainties and changing MIR values. The frequency of reformulations would depend on whether the MIR value needs to be changed and how often the scientific studies reveal new information. MIR values have changed twice since the original adoption in June 2000. Elimination of these uncertainties is of paramount importance prior to implementation of reactivity-based regulatory approach. The development of a large scale reactivity-based regulatory approach for architectural coatings in order to ensure or successful implementation, provide the needed certainty for manufacturers and minimize the role of errors in measuring the environmental benefits.

Response to Comment 1-13

As noted in Response to Comment 1-16, coating manufacturers would be required to reformulate their product(s) in order to comply with ongoing changes to the MIR values. While the commentator highlights that 26 out of 670 VOCs required adjustment to the MIR value of more than five percent, changes to the MIR for one compound could be a dilemma for the coating manufacturer because a coating formulation depends on the importance of that compound to the formulation, i.e., the amount used and the availability of effective substitutes. One of the revisions to the original list of MIR values was with a compound, dipropylene glycol monomethyl ether, the commentator listed as a solvent used in waterborne clear wood finishes. If the reactivity-based approach had been adopted to regulate VOC emissions from architectural coatings, coating manufacturers formulating with dipropylene glycol monomethyl ether would need to reformulate to ensure compliance.

Response to Comment 1-14

Please refer to Response to Comment 1-8 with regard to why the SCAQMD does not agree with the opinion of the commentator that ozone formation would double under a VOC content limit regulation. In addition, please refer to Response to Comment 1-2 as to why maintaining the Small Container Exemption is not a mitigation measure.

COMMENT LETTER #2

THE NATIONAL PAINT AND COATINGS ASSOCIATION(NPCA)

October 24, 2003

Mr. Michael Krause
DEA -- AIM Coatings Rule
South Coast Air Quality Management District
21865 E. Copley Drive
Diamond Bar, California 91765

RE: DEA for Proposed Revisions to Rule 1113

Dear Mr. Krause:

2-1

The National Paint and Coatings Association (NPCA) is providing the following comments on the SCAQMD's Draft Environmental Assessment (DEA) relating to the proposed of revisions to Rule 1113 that were initially proposed in mid-August 2003.

The chief purpose of a Draft Environmental Assessment is to thoroughly review the environmental impacts, positive and negative, of a proposed regulation to determine whether the regulation results in net gains for the environment. For a variety of reasons set out below we do not believe that the proposed revisions have been adequately evaluated in terms of their costs and technological feasibility. Consequently the findings of the DEA are fatally flawed.

2-2

As noted, the proposed revisions were announced in mid-August and there really has not been sufficient time for industry to fully evaluate the basis for the proposed adoption. This rulemaking has been characterized by late or last minute exchange of information exercises which has made it impossible for industry representatives to adequately review the information provided. Even now as these comments are due, the most recent version of the proposed revisions is not generally available to the public on the SCAQMD web site. As a result, many will not make the deadline for commenting on the DEA. We believe that for this reason and others set out below the rulemaking should be extended.

2-3

The SCAQMD's DEA relies extensively upon the AVES study. Our members reviewed the written report and noted several deficiencies which fundamentally undermine the credibility of the study for purposes of justifying the revised. These are set out below under the various coatings categories at issue.

2-4

CLEAR WOOD COATING

Interior Clear Wood

Taber Abrasion Test is an inappropriate test for clear wood coatings for low VOC thermoplastic coatings because the material softens under the instrument

1

and does not powder. Hence the test gives a false impression of durability by the material retaining more weight.

Even for low VOC thermosetting clear coatings which do not have this problem, taber abrasion cannot be relied upon. It can only be a lab test that lets one know that a minimal test has been met that justifies further testing for performance. These additional necessary performance tests are various mar and scuff tests that subject the coating to contacts mimicking actual foot traffic. "Durability" as a practical matter for such coatings (i.e., when it is worn enough to merit resurfacing) is not dictated by the actual remaining film left over time but by its appearance. Hence, taber abrasion is not dispositive of this issue; film thickness can still be fairly high when the appearance due to traffic (mars and scuffs) would prompt replacement.

2-4 cont.

An important practical point ignored by the testing so far is that many of the performance characteristics of polymers used here can only be fully seen under actual scuff and mar tests (foot traffic). Some of the lab tests cited by the SCAQMD such as the pencil scratch for durability do not manifest these performance problems. Hence, manufacturers of low VOC clear floor coatings would not perform such lab tests except for a minimal vetting purpose They would require actual traffic tests before producing a product.

2-5

One of these absolutely required test not done by the SCAQMD is the coefficient of friction test which determines the probability of slips and falls on the coating. A coefficient below .5 in the lab test means the coating is too risky and would it be reformulated. Acceptable coefficient friction is a <u>sine qua non</u> performance characteristic of a clear floor coating. It is behind this fundamental basic safety feature of the coating that other performance characteristics are arrayed in descending order of importance.

2-6

Another major problem with relying only on lab tests is that one needs to coat a sufficiently large enough surface of floor before one can see whether there is uniformity in depth and gloss, sufficient open time to prevent lapping. Laboratory tests on small surfaces do not manifest such performance problems. Also panelization occurs in large floor applications but will not manifest itself in laboratory tests alone. (Panelization is when the coatings perform like a glue, and glue separate floor boards together, which then causes them to spilt when the undergo swelling and contraction due to temperature and humidity changes.)

Another deficiency in the study's failure to apply and test the floor coatings on large surfaces is seen in floor varnishes below 350 grams. Going to such high solids materials means there will be thicker applications which increases the dry time. In the case of water`bornes there will be more air trapping which will lead to foaming, the full extent of which cannot be fully understood unless there is an actual application to a large area.

2-6 cont. These resolution of these performance issues are crucial for a coating's acceptability and as we have said time and again, large field application tests are not luxuries but absolutely essential. It is extremely important to note that even if such problems only occur in 5% of the coatings sold, the financial losses for a company would be catastrophic.

2-7 These coatings do not lend themselves to solvents that are not regulated VOCs, such as polyfunctional aziridine (it is a sensitizer with a toxicity profile unsuitable for consumer) and isocyanates (sensitizer) and PCBTF (odor and open flame, like gas water heater, liberates hydrochloric and hydrofluoric acid) and acetone (flammability). The safety and odor issues will prevent their use by consumers and contactors.

2-8 It is unclear why AVES did not perform these tests or provide an explanation of why they did not. Industry peer review was not conducted for the testing program.

2-9 Further, the lumping together of spar varnishes, floor finishes, cabinet coatings varnished lacquers, sanding sealer and clear wood finishes into one category exacerbates this problem because the coatings at issue have greatly differing requirements and exposures for which the simple laboratory tests performed did not adequately test.

Exterior Clear Wood

2-10 Spar varnishes cannot be effectively made at 250 grams per liter. Acrylic or epoxy two components are not an effective low VOC technology. Clear epoxies because they do not weather well – they are subject to UV deterioration. Clear acrylics because the UV gets through and attacks the wood which then causes delaminating of the coating. These problems would manifest themselves in properly conducted exposure tests which were not performed.

STAINS

Interior Stains

2-11 There were no field application tests over large enough areas that would manifest problems with uniformity, appearance, lapping, grain differentiating, and dry times. These performance characteristics are crucial and were not tested for.

2-12 **Stains Exterior**

3

2-12 cont. The tests here should have included exterior exposure tests and also differentiated among substrates, with red wood cedar and treated pine decks, etc., requiring more scrutiny for performance when low VOC waterbornes are applied. Additionally previously weathered wood surfaces in general, the condition of most decks of any age, are more susceptible to water penetration, making the waterborne materials particularly ill-suited for them. No exposure tests were conducted for such previously weathered surfaces.

2-13 Also trafficked horizontal surfaces are more of an issue than vertical surfaces, and there was no differences in testing for these radically different exposures.

Waterproofing Sealers

Wood

2-14 The key performance characteristic is whether the material actually seals the wood and the only way to determine this is through actual exterior exposures. The beading of water in a laboratory test is not an adequate substitute. Also it tells one nothing about the effects of UV exposure on penetrating stains

Concrete Sealers

2-15 Tests required by the DOT were not run and these include the tests for how well the concrete stands up under water exposures and the chemicals that are found in highway environments that can attack the sealers, breaching them and allowing water to entire the concrete. The key here is protecting the concrete from water intrusion. For a clear sealer there must be sufficient UV protection so the coating does not break down. For pigmented coatings the coating must be sufficiently durable to prevent chipping, etc., of the coating. The ideal application is a pigmented coating over a penetrating sealer. None of these important coatings performance characteristics were examined. The acrylic sealers which were lab tested only may have met the lab tests but they would not meet the DOT exposure tests, and would fail in two years if put in such tests. In addition, no real world testing exposures were conducted. Not even laboratory exposures were conducted.

Sanding Sealers

2-16 The lab tests were marginal and apparently highly subjective with the zero VOC getting an "okay" on sandability and gumming.

ROOF COATINGS

2-17 The rule essentially bans effective metallics without providing any justification other than by fiat saying adequate substitute exist. In doing this the SCAQMD does not address the proven longevity of the coatings, their ability to be put

2-17 cont. down in terrible weather conditions, and their ability to go over less than perfectly prepared surfaces. A water borne equivalent at the low VOC limits proposed liter does not exist. The aluminum pigmented coatings at this VOC level will simply put down a thin layer of flakes that at most will bond with the underlying asphalt but not interconnect with each other because there is insufficient solvent to a permit a resin that would effect this. Also one cannot use PCBTF as exempt an solvent here because it does not bind with asphaltic material. Additionally water borne aluminum coatings have a limited shelf life because water eventually penetrates to aluminum flakes and causes hydrogen gas formation which will explode the can.

2-18 **Failure to Take Account of Industry Comments That Oppose the Limits:** Industry representatives have participated in a number of meetings with the SCAQMD staff and also have provided written comments. The record relied upon for the DEA, however, reflects that only those comments supporting the limits were given any heeding.

2-19 **Errors In Selection of Materials as Representative of Effective Coatings the Meet the Proposed Limits:** A glaring example of this is seen in one of the coatings cited by the SCAQMD as an effective low VOC concrete sealer coating, PROSOCO's Concrete Science ToughCoat PS.

The following information about this coating has been provided by Prosoco, and NPCA member company.

> "PROSOCO's Concrete Science ToughCoat PS is a polysilicate based concrete densifier designed for use in a very narrow application with a limited range of performance characteristics. The product works by binding with the concrete substrate and filling surface pore space. When applied properly, treated concrete will have additional resistance to some chemicals and limited water repellency. In typical applications, it is applied in excess and then buffed to achieve a glossy finish.
>
> ToughCoat PS is designed for use on interior, slick-troweled concrete, such as a warehouse floor. The product may cause significant appearance change on a broom finished or rough surface concrete. It is not designed for use on vertical concrete of any description, nor will it work on any other masonry substrate.
>
> As listed on the Product Data sheet, ToughCoatPS does impart some water repellency to a properly treated concrete. The published absorption rate reduction per ASTM C462 is 75% of control. This represents a marginal increase over the natural porosity and permeability of a dense concrete. As a matter of perspective, the minimum acceptable industry standard for water absorption rate reduction in a treated concrete is 80% of control. Architects typically

5

specify a reduction of 90% or higher which is typically achieved by a variety of penetrating resin technologies.

2-19 cont.

Again, this is a product designed for a very specific and limited application. It does one job well, but is by no means a performance coating. PROSOCO was surprised to find this product listed on Appendix A to SCAQMD's proposed Rule 1113 changes. It is apparently being used as an example of a product that meets or exceeds the targeted low VOC standard for the Waterproofing Concrete/Masonry Sealers category. While it is compliant, its performance characteristics render it unsuitable for the majority of horizontal and vertical concrete surfaces encountered in the built environment. It is inconceivable to PROSOCO that this one product and a handful of other penetrating and film forming products on the market could be used to justify regulation of all specialty products used on the one hundred or so identified common substrates and finishes."

(See Appendix below for additional comments made by PROSOCO.)

Other manufacturers have made similar comments about the coatings relied upon by SCAQMD to justify the proposed limits both in writing and in oral statements at the SCAQMD meetings.

2-20

Concluding Comment: We appreciate the opportunity to comment on the DEA and we ask that our comments be given serious consideration. The DEA's justification for requiring a VOC reduction of nearly 70% from the coatings at issue is insufficient, in major part because the underlying information and record it relies upon ignores or assumes away crucial information which demonstrates the serious performance issues with coatings at the proposed limits. Essential performance tests have not been performed and reliance is placed on a limited number of coatings in the market or under development as being suitable to meet the all of the performance and application requirements of the entire coatings categories. We believe that the rulemaking should be delayed in order to allow industry to more fully address these deficiencies in the record of a proposal that was first presented in mid-August.

Sincerely,

Jim Sell
Senior Counsel

6

Appendix

From: Dwayne Fuhlhage [mailto:dfuhlhage@prosoco.com]
Sent: Wednesday, October 08, 2003 2:09 PM
To: Bob Nelson
Cc: Jason Netherton; David Cummins; Fran Gale
Subject: PROSOCO Substrate List 10-2003.xls

Bob, we are working on putting some comments together for you. We'll do what we can in the time allotted.

I received the AVES report this morning and am going over it. Just how much of their future strategy are they hanging on this? I am up to 5-1 and have found very little reference to use on concrete and masonry substrates. The one test they mention in passing is for concrete and it does not state how the product has been applied. From our perspective, the following crucial information has been omitted in their testing:

For exterior concrete:

Concrete finish (smooth, brushed, exposed aggregate)
Application method and coverage rate
Was this on green concrete (<28 days old) or old concrete (pH stability makes a big difference on green concrete due to alkalinity; many water carried emulsions are unstable or will not react with alkaline concrete)
How is the UV stability over time (normally use weather chamber per ASTM-G154?
What is the slip resistance of the product on exterior, horizontal substrates per ASTM-C1028?
What are the chloride screening capabilities per:
NCHRP 244 Series IV
AASHTO T259/260
2-21 (refer to our Product Data for Saltguard WB on our website)

These are off the top of my head. Additional study by our technical people may turn up a few more issues.

From a more general perspective, it is hard to conceive how they can derive a 50 or 100 g/L standard for ALL masonry substrates based on the Waterproofing Sealer WPS-2. A film forming material is not appropriate in many cases. Very few film formers will work for road maintenance departments that have to deal with chloride issues from de-icers or proximity to the ocean. I don't see any real methodology for how they tested the product. Interior or exterior? Horizontal or vertical?

After all of our R&D on low VOC products, it is hard for us to believe that anyone has truly come up with zero VOC products as listed in the AVES report. I think it would be fair to see the same calculation sheets that industry has to turn in to CARB, especially since their limited testing leads them to regulating an entire industry.

One thing that strikes me about the proposed rule and the AVES report is that there is no recognition of just how many masonry substrates there are. Hence the attachment of the types of substrates our products are applied on. I also note that Appendix A has no listing of substrate limitations (interior/exterior, wet surfaces, UV stability, pH stability, chloride screening, type of masonry substrate) or final appearance. You don't put a film forming varnish on a sandstone. Some stain resistant concrete densifiers (like our Tough Coat PS in Appendix A) impart no water repellency and vice versa. None of the penetrants or standard varnishes do anything in the way of providing water repellency to concrete block, which is a current favored building material. For that you need a long molecule such as RTV which cannot be carried in water. Most of the penetrants that work on concrete are incompatible with natural stone with low silica content- that uses a different resin technology which currently is incompatible with water. Consolidation treatments for natural stone are an entirely different beast, but is still lumped in with their generic classification.

The list goes on and on.

2-21 cont.

We won't have it done for you this week, but we are intending to create a cross-reference spreadsheet that shows all of the various substrates and the coating technologies that are appropriate for each one. We'll include limitations for each technology. We'll need to work with you on what kind of formal comments will best help NPCA in future litigation.

One thing that might help you get a handle on the variety of substrates and technologies is by looking at the project reference database on our website. It includes the actual laboratory reports we have created when material comes through our lab for testing. It is broken down by substrate families and then specific substrates.

One last comment with regards to VOC calculation methods. The proposed rule lists USEPA Method 24 and SCAQMD's Method 304. We have run across CARB Method 310 in our Green Seal product development and are wondering if it would help us at all with product having a high water content. Would requesting that 310 be included as an alternate test method be good for industry? We are going to run the numbers with one of our 15% active penetrants to find out.

That is it for now. We'll pass on more as we come up with it.

Dwayne

COMMENT LETTER #2 FROM
THE NATIONAL PAINT AND COATINGS ASSOCIATION (NPCA)

(OCTOBER 24, 2003)

Response to Comment 2-1

The SCAQMD disagrees with the commentator's opinion that the analysis in the Draft Environmental Assessment is "fatally flawed." The Environmental Assessment analyzes the adverse impacts As required by CEQA Guidelines 15070(a). According to the CEQA Guidelines §15021(b), "in deciding whether changes in a project are feasible, an agency may consider specific economic, environmental, legal, social and technological factors." However, CEQA Guidelines also states "Economic and social changes resulting from a project shall not be treated as significant effects on the environment" (CEQA Guidelines §15064(e)). Lowering the VOC content limits in coating formulations will not physically change the architectural coating procedure or structures being painted. Furthermore, the proposed amendments to Rule 1113 are considered to be technologically feasible because compliant coatings in the categories where the VOC content limit will be reduced, are currently available as indicated in Appendix B of the Environmental Assessment. Specific responses to the commentator's opinions on the quality of the environmental analysis are provided in the following responses to comments.

Response to Comment 2-2

The SCAQMD staff has provided adequate time and information for other public agencies and members of the public to review and comment on the Draft EA. Staff has kept industry involved in the rule development process, provided the scope of the proposal to industry, including amendments to specific coating categories, at earlier working group meetings held on March 20, 2003, May 6, 2003, and July 16, 2003, and to the public and other public agencies prior to August 2003. Staff also provided substantial time for industry to provide input at each step in the amendment process, including the requirements of the proposal prior to issuing the August 2003 version of the rule. SCAQMD staff disagrees with the commentator's rulemaking characterization of late and last minute exchange of information etc. Reasons for changes to the project description and the rule stem from resolving issues raised by the public and industry representatives. In the meantime, the SCAQMD has complied with the legal requirements and continues to work with interested parties in the rule development process. The 30-day review and comment time period is consistent with the CEQA Guidelines §15105(b), which states that the public review period for a CEQA document with no significant adverse environmental impacts "shall not be less than 20 days." Based on input from the public, however, the rulemaking period was extended by an additional 30 days period to provide more time to industry for an exchange of information. This extension was granted so that staff could obtain additional information from the commentator. However, staff has repeatedly requested studies from the commentator and its member companies that provide empirical data to validate comments provided by the industry. To date, the SCAQMD has not received any such information from the commentator.

Response to Comment 2-3

While the Draft EA references the AVES study as a study of side-by-side comparison testing of the coatings affected by the proposed amendments, it is not the only evidence to support the conclusions in the Draft EA nor meant to be all-inclusive, but rather a relative performance comparison of solvent-borne and waterborne coatings. Case studies by USEPA and Midwest Research Institute, as well as performance data and product data sheets from coating manufacturers compiled under Appendix B of the EA provide further evidence of the availability and use of these compliant coatings. Furthermore, Chapter II, Table 1 of the staff report summarizes market penetration data for sales of these products in the Year 2000 for each of the categories included in the current proposal. In the three years subsequent to the year 2000 data, staff anticipates that the market penetration data probably greater for each of the categories, based on the findings of the Annual Status Reports, as well as the presence of compliant products listed in Appendix B and not included in the CARB survey.

Response to Comment 2-4

The AVES Study was designed to assess the most common performance characteristics, based on the type of testing conducted and reported for the coating categories on their technical data sheets. While Taber Abrasion is commonly conducted by manufacturers of clear wood coatings used on floors, it is not the only test. A review of some of the performance information obtained from the coating manufacturer, Bona Kemi, clearly indicates the use of Taber Abrasion as a key test. Specifically, their technical data sheet indicates that "The Taber test, the most commonly accepted standard lab test for durability, evaluates the resistance of a material to abrasion. For hardwood floors, this equates to evaluating wear." Additionally, information provided by Bona-Kemi indicates that their clear waterborne wood floor coating with a VOC of 240 g/l, as tested by SGS U.S. Testing Co, indicated twice the durability than the nearest competitor, which included oil-modified finishes, as tested under the Taber Abraser Grit Feeder Test. Staff agrees that actual traffic tests should also be examined to assess actual performance characteristics of polymers. Staff did so by reviewing data collected by Bona-Kemi on testing that began in 1993 by the Wood Sciences Department at the Colorado State University. Test panels of hardwood flooring with wear-through lines were coated with finishes according to manufacturers' specifications and placed in busy university hallways. As a part of the study, all panels are rotated periodically to ensure even wear patterns. Year-around traffic from faculty and students with hiking boots, rollerblades, skateboards, bicycles and pets tracking in water, snow, salt and dirt, provides a true 'real-life' durability test. These test panels are rated in terms of wear-through, scuff, scratch, and chemical resistance, as well as overall visual appearance. These real-life tests have confirmed the laboratory testing using the Taber Abrasion testing, and have concluded that the waterborne formulation by Bona-Kemi are the most durable available, as compared to other solventborne and waterborne finishes. These products by Bona-Kemi have been used on numerous residential and commercial uses, including large areas. One such location is the Barneys of New York store in Beverly Hills where more than 5,000 square feet of maple wood coating was applied.

Response to Comment 2-5

Coefficient of friction test (which determines probability of slips and falls on coatings) was not specifically a part of the AVES Study, but is a performance characteristic evaluated by the SCAQMD staff. Bona-Kemi's Traffic™ product is classified by Underwriters Laboraties, Inc., as a slip resistant coating. There are already existing compliant coatings in each of the categories affected by the rule amendment. Thus, these formulations, which have already been tested, may be used safely.

Response to Comment 2-6

As indicated in Response to Comment 2-4, Bona-Kemi's products have been successfully applied over large areas without any panelization issues in residential and commercial environments. Staff also disagrees with the commentator's assertion that lower-VOC finishes have longer dry times. The AVES Study, as well as performance data from Bona-Kemi clearly indicates that the waterborne products actually dry and cure faster than their solvent-borne counterparts. In conclusion, there are products in the marketplace that do not have the specific issues cited by the commentator.

Response to Comment 2-7

Safety and odor issues prevent certain solvent usage for all coating formulations, not just architectural coatings. If there are toxic ramifications from any compounds, whether formulated in a waterborne coating or a solvent-borne coating, the manufacturer has to consider the ability to use a coating as well as the safety issues to the consumer and contractor. The Bona-Kemi products discussed in earlier comments, as well as other products listed in Appendix B, do not have the specific issues listed by the commentator, and are regularly used by the professional applicator and the consumer. Typically, solvent-borne products, especially clear wood finishes, have more toxic solvents (e.g., toluene, ethyl benzene, etc.) than solvents found in waterborne formulations, as shown in chapter 2 of the EA.

Response to Comment 2-8

As indicated earlier, the AVES Study was designed to assess the most common performance characteristics, based on the type of testing conducted and reported for the coating categories on their technical data sheets. Also as indicated earlier, staff did not rely solely on the results of the AVES Study, but also relied on data obtained from manufacturers and other sources. The AVES Study was performed by a third-party contractor with expertise in coating development and evaluation, selected as a result of a Request for Proposal. The expertise of the contractor did not require an additional peer review.

Response to Comment 2-9

Please refer to Response to Comments 2-4 through 2-8. While staff recognizes the numerous uses of clear wood coatings, Appendix B lists a variety of clear wood coatings that can be used for each of the listed uses. As indicated earlier, the AVES study evaluated typical coatings performance characteristics and should not be considered "all inclusive" since each manufactures different characteristics for the same coating type.

Response to Comment 2-10

The SCAQMD staff disagrees that exterior products using an acrylic or epoxy resin cannot have UV-resistance. In the AVES Study, there is a detailed assessment of the modified epoxy resin that shows the best UV resistance. Furthermore, Appendix B includes numerous products that can be used to replace the traditional spar varnishes, including urethane products by JFB Hart and Epmar. The SCAQMD has used these zero-VOC polyurethane coatings on exterior substrates for the past five years. These wood substrates have indicated excellent gloss retention and film appearance.

Response to Comment 2-11

Although the interior stains included in the AVES Study performed well in the laboratory environment, as well as the case study, the current proposal does not lower VOC limits for interior stains.

Response to Comment 2-12

The SCAQMD staff disagrees with the commentator's opinion expressed in this comment. The AVES Study did include a thorough assessment of exterior semi-transparent and opaque stains, concluding that the zero-VOC products performed better for UV resistance, as tested under ASTM G53-88 on both redwood and cedar. Nevertheless, the staff recognizes the industry desire to conduct additional real time exposure studies for exterior stains, and has therefore modified its initial proposal and proposed a 42 month implementation period to allow for the completion of the reformulation and exterior field testing. Furthermore, the semi-transparent urethane-based coatings available today are excellent substitutes for both horizontal and vertical surfaces and can be used as exterior semi-transparent stains and have been used on new and previously painted substrates, including wood decks. JFB Hart products have been used on an exterior wood deck in Chicago that was previously coated with a solvent based semi-transparent stain over two years ago without showing any wear.

Response to Comment 2-13

Please refer to Response to Comment 2-12. As indicated in earlier responses, the AVES study is not "all inclusive" and the SCAQMD has relied on assessment of commercially available products and their actual performance in the field. Appendix B and the staff report lists several exterior deck stains. Okon Company 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 constructed with 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 is approximately 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 stain for 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. Furthermore, detailed evaluations were conducted by Consumer Reports Magazine (June 2002 and August 2003), on clear, semi-transparent, toned, and opaque stains used on horizontal surfaces such as decks. The conclusion from the August 2003 article indicates that opaque stains, mainly due to the higher pigment content, last the longest, typically more than three years, whereas "a semi-transparent finish may need to be reapplied every two to three years. The conclusion also indicates that clear deck finishes don't last more than one year (for both high VOC finishes as well as low-VOC finishes)." Nonetheless, based on the comment, staff has revised the final compliance date for stains to July 1, 2007, thus, providing more time for additional development and testing. Additionally, this category is included in the future technology assessment, where specific characteristics could be assessed.

Response to Comment 2-14

The AVES Study analyzed the typical characteristics for waterproofing sealers for wood. Appendix B, as well as the staff report, lists numerous waterproofing sealers, indicating their performance characteristics well beyond beading of water. These products indicate good performance on water sealing. It should be noted that the largest manufacturer of waterproofing sealers for wood uses beading of water as a marketing tool.

Response to Comment 2-15

Although the AVES Study did not specifically analyze typical Department of Transportation (DOT) or National Cooperative Highway Research Program (NHCRP) tests, staff evaluated numerous products that comply with the proposed VOC content limits for this coating category and that meet the DOT requirements and the NHCRP requirements. These are discussed in detail in the staff report, as well as included in Appendix B. Therefore, there are available compliant products that meet the DOT requirements, such as L&M's Aquapel Plus waterproofing concrete/masonry sealer, Rainguard's Blok-Lok clear water repellant, and Poly-Carb Mark-163 Flexogrid (2-component).

Response to Comment 2-16

The AVES Study did show the sandability of the zero-VOC sanding sealer to be okay. However, the KCMA data and USEPA Case Studies Reports, as well as SCAQMD's Technology Assessment Report for Rule 1136 – Wood Coatings, all indicated the successful use of waterborne sanding sealers, with a VOC content of 250 g/l to 275 g/l. Therefore, the proposed limit is established at 275 g/l.

Response to Comment 2-17

Because of the chemical solvency of solvent-based coatings to dissolve dirt and other contamination, they are more "forgiving" in application than waterborne coatings. Staff recognized this problem by avoiding any VOC content reductions on bituminous roof primers. With the application of solvent-based primer to bituminous roofing materials, any surface can be prepared to accept basecoats and subsequent topcoats. Metallic roof coatings with VOC contents of 500 grams per liter are excessively high, particularly in light of the availability of waterborne aluminum roof coatings that can be formulated with VOC contents at or below 100 grams per liter. Upon further consideration to address concerns that aluminum coatings need more solvent, staff is recommending a separate category for aluminum roof coatings and setting a lower limit consistent with the lowest VOC containing waterborne aluminum roof coating emulsions, consistent with Title 24 for roof additions, alterations, and repairs (0.30 reflectivity) and opening the possibility of new aluminum roof coatings to achieve the high standards for new construction of the California energy code. A definition of aluminum roof coatings has been added as well, setting the elemental aluminum content to 0.7 pound of elemental aluminum per gallon of coating. The SCAQMD is aware that during storage waterborne aluminum coatings may be prone to chemical reactions that produce hydrogen and aluminum oxide stoichiometricly and the rate of reaction is accelerated by the addition of heat. Excessive pressure buildup and oxidation of the aluminum flake have been minimized through proprietary additives that slow this reaction. United Coatings, manufacturers of waterborne aluminum coatings, indicate that several drums of aluminum coating have been in storage for three years without excessive pressure buildup issues. If little hydrogen has been produced in three years with the chemical additive, it is necessarily true that little oxidation has also occurred. Most waterborne aluminum roof coatings are purchased in bulk and professionally applied within a short period of time, so that chemical reactions are not a concern. In the case of consumer use and storage of waterborne aluminum roof coatings, a pressure relief valve is installed on the containers sold to consumers, which ensures that pressure build-up will not occur. White reflective coatings are typically marketed to consumers. Lastly, Rule 1113 contains a specialty coating category called Bituminous Roof Primers that have a VOC limit of 350 g/l. At this time, staff is not proposing a lower limit for these bituminous roof primers

Response to Comment 2-18

The SCAQMD staff disagrees with the opinion of the commentator that the Draft EA reflected only the comments supporting the limits. As noted in Response to Comment 2-2, the SCAQMD provided substantial opportunities to provide comments through working group meeting, public consultation meetings, etc. The SCAQMD also extended the period for providing comments on the staff proposal by 30 days. Also as noted in Response to Comment 2-2, when asked to provide empirical data to support comments made by the regulated industry, such data or other information was not provided.

Response to Comment 2-19

Staff recognizes that there are a variety of waterproofing sealers and waterproofing concrete/masonry sealers, and that formulations cover specific different uses. Appendix A of the Staff Report and Appendix B of the EA list a large number of compliant products that represent a variety of uses, including concrete driveways, pool decks, vertical concrete block walls, concrete tilt up walls, and exposed aggregate. The list also includes products recommended for above-grade and below-grade, as well as interior and exterior uses. There are also several penetrating sealers that meet the DOT requirements, as tested under the NCHRP 244 tests (see Response to Comment 2-15). The AVES study includes a side-by-side comparison of acrylic, alkyd, and epoxy-based sealers that clearly shows the superior performance of the zero-VOC epoxy-based waterproofing concrete/masonry sealer compared to the alkyd- and acrylic-based sealers. Lastly, the availability and use of these products clearly demonstrate that these products perform well, especially since they are being used in the absence of any regulatory requirements with such low VOC limits.

Response to Comment 2-20

Comprehensive responses have been prepared for all comments received on the Draft EA. The commentator, however, should be aware that the role of the EA is to analyze potential adverse environmental impacts from the proposed project, which includes reducing the VOC content limits for specific coating categories. Data and other technical information that support staff's proposal to reduce the VOC content of selected coating categories can be found primarily in the Staff Report for the proposed project. Information on the availability of coatings that currently comply with the proposed VOC content limits can also be found in Appendix B of the EA. With regard to specific issues raised by the commentator, please refer to the responses to comments above.

Response to Comment 2-21

Staff recognizes that there are a variety of waterproofing sealers and waterproofing concrete/masonry sealers, and that formulations cover specific different uses. Appendix A of the Staff Report and Appendix B of the EA list a large number of compliant products that represent a variety of uses, including concrete driveways, pool decks, vertical concrete block walls, concrete tilt up walls, and exposed aggregate. The list also includes products recommended for above-grade and below-grade, as well as interior and exterior uses. There are several penetrating sealers that meet the DOT requirements, as tested under the NCHRP 244 tests. The AVES study includes a side-by-side comparison of acrylic, alkyd, and epoxy-based sealers that clearly shows the superior performance of the zero-VOC epoxy-based waterproofing concrete/masonry sealer compared to the alkyd- and acrylic-based sealers. The availability and use of these products clearly demonstrate that these products perform well, especially since they are being used in the absence of any regulatory requirements with such low VOC limits.

One example of a compliant waterproofing concrete/masonry sealer included in Appendix A of the Staff Report and Appendix B of the EA is Flexogrid™ (MARK-163), manufactured by POLY-CARB, is a zero-VOC urethane-epoxy copolymer recommended for use on bridge decks, parking decks, highway on and off-ramps, and weather-exposed concrete structures requiring waterproofing and skid-resistant qualities. It also has flexibility to accommodate minor movements of the substrate such as vibrations, thermal shock, freeze and thaw cycles, expansion or contraction due to weather. This is a film-forming coating that protects the concrete from water absorption and chloride ion permeation. This product is formulated to provide good abrasion resistance, tensile elongation, and skid number. Listed below are results from tests performed by independent laboratory:

Tensile Strength	ASTM D638-82	>2,500 psi
Tensile Elongation	ASTM D638-82	35±5
Shore D Hardness	ASTM D2240-75	65±5
Abrasion Resistance - Wear Index	ASTM C-501	75-85 mg
Water Absorption Max.	ASTM C-570	0.2%
Chloride Ion Permeability	AASHTO T277	200 coulombs avg.
Skid number	ASTM E 524	40-45 avg.

As of 1999, Flexogrid has been used by Department of Transportations in Ohio, N. Carolina, Alabama and Illinois State among others, in over 110 transportation projects in both the United States and Canada.

COMMENT LETTER #3

CURTIS COLEMAN, ESQUIRE

Comments of The Sherwin-Williams Company
on the
Draft Environmental Assessment for PAR 1113

The Sherwin-Williams Company has reviewed the DEA for PAR 1113 and believes that the discussion of the "more frequent recoating" issue is inadequate as it pertains to exterior stains. Sherwin-Williams has advised the SCAQMD staff on numerous occasions during the development of these rule amendments that a 100 gram per liter limit for semi-transparent exterior stains will not allow the production of semi-transparent stains suitable for use on horizontal surfaces subject to wear and abrasion, such as concrete driveways and patios, and wooden decks. Semi-transparent stains for these uses must be formulated with harder resins that can withstand the wear that vertical surfaces (e.g., siding) are not exposed to. These harder resins require more coalescing solvent than the softer resins. The additional coalescing solvents in an otherwise waterborne formulation require a regulatory VOC limit of 250 grams per
3-1 liter.

The product listings prepared by SCAQMD staff support this conclusion. Virtually all of the stains recommended for horizontal surfaces such as decks have VOC contents over 200 grams per liter. In our experience, semi-transparent stains with VOC content at or less than 100 grams per liter lack the durability for use on horizontal surfaces, or require a topcoat to provide that durability. If a semi-transparent stain lacking durability is used, additional VOCs will be generated by the need for more frequent recoating, thus negating the anticipated benefits of the rule. Likewise, if an additional topcoat is required to provide the durable finish, more VOCs will be emitted than would be the case if a durable stain were used in the first instance.

Sherwin-Williams was not the only manufacturer to
3-2 raise this issue during the rule development process, thus we were surprised to see that no discussion of this issue was incorporated into the DEA.

Curtis L. Coleman
Law Offices of Curtis L. Coleman
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Los Angeles, CA 90045

COMMENT LETTER #3 FROM
CURTIS COLEMAN, ESQUIRE

(OCTOBER 24, 2003)

Response to Comment 3-1

Appendix A and the Staff Report and Appendix B of the EA list several compliant exterior deck stains. Okon Company 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 constructed with 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 and is considered to be as durable as some of the higher VOC exterior stains. VOC is approximately 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. Furthermore, detailed evaluations were conducted by Consumer Reports Magazine (June 2002 and August 2003) on clear, semi-transparent, toned, and opaque stains are used on horizontal surfaces such as decks. The conclusion from the August 2003 article indicates that opaque stains, mainly due to the higher pigment content, last the longest, typically more than three years, whereas "a semi-transparent finish may need to be reapplied every two to three years. The conclusion also indicates that clear deck finishes don't last more than one year. However, these conclusions were true for higher VOC stains as well as low VOC stains. Nonetheless, based on the comment, staff has revised the final compliance date for stains to July 1, 2007, thus, providing more time for additional development and testing. Additionally, this category is included in the future technology assessment, where specific characteristics could be assessed.

Response to Comment 3-2

SCAQMD staff believes there were durable compliant exterior stains available at the time of the release of the Draft EA, thus a general durability discussion was included in the Draft EA. Rule 1113 requires a technology assessment to re-assess the performance characteristics, including durability. Stains are included in this assessment and if there are performance concerns with currently available compliant exterior stains for horizontal surfaces and there are limited possibilities of the development of a durable compliant exterior stain in the future, SCAQMD staff will consider a modification to the rule amendment to address this issue.