ATTACHMENT B

ANNUAL STATUS REPORT ON RULE 1113 – ARCHITECTURAL COATINGS

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

ANNUAL STATUS REPORT ON RULE 1113 – ARCHITECTURAL COATINGS

Dated: January 6, 2006

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Purpose of this Report

This report is the sixth annual progress report prepared in accordance with the 1999 Board-approved Work Plan for Implementation of Rule 1113 – Architectural Coatings. It reports on progress toward achieving compliant products with respect to the coating categories subject to the July 1, 2006 limits in the rule, including:

- Information on the ever increasing number of compliant and super-compliant products already available in the market;
- Summary of select articles on the latest resin and low-volatile organic compound (VOC) product technologies;
- Compliance status report relative to existing limits;
- Past and current laboratory and product development studies;
- Progress on the Reactivity and Availability assessment of solvents found in architectural coatings, and
- Recommendations based on the Technology Assessment Results.

As part of its technology assessment, the South Coast Air Quality Management District (AQMD) contracted with the University of Missouri – Rolla Coatings Institute (UMR) to conduct a laboratory study of architectural coatings in certain coating categories identified in the rule. This report incorporates the results of the testing and staff's conclusions and recommendations for public review.

Background

On August 13, 1999, the Board approved a workplan that required submittal of annual status reports summarizing issues and activities regarding the implementation of Rule 1113-Architectural Coatings. The first report, submitted on July 21, 2000 has been followed each year by new information on the implementation of future volatile organic compound (VOC) limits in the rule. In addition to rule requirements for technology assessments of specific coating categories, a Board approved resolution in December of 2002, ensured the continuance of annual reports with a focus on the progress towards achieving the 2006 VOC limits found in the rule. This is the sixth such report that staff will have presented to the Board. A draft of this report was presented to the Stationary Source Committee in June and was summarized as part of the committee's minutes presented at the July Governing Board meeting.

As mentioned in previous annual reports to the Board, the Technical Advisory Committee (TAC) is an important committee that staff relies upon for technical expertise and valuable feedback on all aspects of architectural coatings. The TAC was first formed in February 1998 to provide technical oversight of the Phase II Assessment Study and future technology assessments, including selection of coatings, relevant testing, and the report formats. The TAC also evaluates data to identify links between performance characteristics and the emission potential of architectural coatings, as well as helping

staff in designing a performance ranking system for future technology assessments. The current makeup of the TAC includes representatives of several large and small manufacturing companies, the CARB, the National Paint and Coatings Association, a consulting and engineering firm, a painting contractor and several members from academia.

AQMD staff continues to assess the significance of emissions contributing to ozone formation in the South Coast Air Basin (Basin) from volatile organic compounds (VOCs) attributable to architectural coatings and these coatings continue to be a critical component for attainment of Federal and State standards. The latest California Air Resources Board (CARB) architectural coating survey for year 2000 sales, show more than 50 tons per day of VOCs are attributed to the application of architectural coatings in the Basin based on demographics. After implementation of Rule 1113's lower VOC limits effective in 2001 and 2003, the 2003 Air Quality Management Plan (AQMP) estimates the remaining architectural coating VOC inventory at 38.36 tons per day in 2005.

Annual Progress Report

The intent of this annual report is to provide the latest information on the availability and performance of architectural coatings subject to current and future compliance limits. The results of surveys, web-based data searches, laboratory testing and evaluation of coatings, in-situ coating performance and available compliance options built into the rule are some of the topics covered in this report. The information contained in this report includes the following:

- Technical information from technical data sheets (TDS), Material Safety Data Sheets (MSDS), technical papers, and Original Equipment Manufacturer (OEM) brochures that demonstrate that VOC products meeting the future VOC limits are in use and available to all consumers.
- Product surveys, compliance inspections/audits and ongoing laboratory testing continue to show an increase in the use and application of compliant and super-compliant coatings meeting the 2006 and other future VOC limits in Rule 1113 for all categories.
- Recommendations on areas where performance is not yet confirmed.

Future Program Activities and Studies

AQMD staff is committed to continue researching all coating categories for additional products that show compliance with current and future rule limits. As the 2006 limits approach, more coatings are becoming available in all categories and the successful, voluntary use of available low-VOC technology is evidence that the coatings are performing at or above industry expectations. Discussions with the TAC continue and staff has asked them to provide a list of coatings that they would like included in potential future assessments.

In addition to the TAC, in early 2005, at the request of Governing Board Chairman William Burke, an ad hoc committee was formed for the purpose of providing an open forum to discuss key regulatory issues relative to the coatings industry . This committee is made up of AQMD Board Members Michael Antonovich and Jan Perry, AQMD Management representatives Dr. Barry Wallerstein and Dr. Laki Tisopulos, and industry representatives Christine Stanley of Ameron and Ron Widner of Benjamin Moore. Steve Sanchez of U.S. Can Company is an industry alternate. This ad hoc committee has had several meetings to date, and the AQMD is dedicated to continuing the open dialogue with the other members. Periodic updates will be given to the Board's Stationary Source Committee.

As technology improves and VOCs in all categories get closer to zero, staff will continue to research the feasibility of further reductions in the VOC content of all architectural coating categories as currently listed in the Table of Standards for Rule 1113.

Availability and Performance of Compliant Coatings

CARB Survey

Rule 1113 requires AQMD technology assessments to consider any applicable CARB surveys on architectural coatings. Approximately every four or five years since 1976, CARB has conducted architectural coating surveys. The survey methodology serves as a tool to obtain information such as VOC content and sales volume of coatings from manufacturers that offer products for sale in California. Data obtained for 2000 represents the latest information available that gives a comprehensive evaluation of sales data and coating chemistries supplied from manufacturers. Although, in 2005, CARB conducted its most recent survey to compile information based on 2004 sales information provided by manufacturers, the preliminary results of the survey will not be available until spring of 2006.

The sales data obtained for 2000 separates architectural coatings statewide into 51 categories, identifying more than 98 million gallons of architectural coatings sold in California in 2000, with 83 percent of that volume coming from waterborne products and the remainder from solvent-based coatings. However, waterborne products contributed to only 41 percent of the total emissions, while the solvent-based products contributed to 59 percent of the total emissions. The sales of architectural coatings in the AQMD are based on an estimated population representing 45 percent of all coatings sold statewide. Table 1 below summarizes the use and contribution of waterborne and solvent-based coatings from the most recent CARB survey.

Table 1
CARB Survey - California

	Waterborne	Solvent-Based
Total Volume (%)	83	17
Total Emissions (%)	41	59
Annual Volume (Gal/Yr)	81,548,961	16,906,211

Table 2 below summarizes information extrapolated from the 2000 sales data for the CARB 2001 Architectural Coatings Survey, listing the total number of products, sales volume, as well as number and percent of products, and percent volume of sales that currently meet the future Rule 1113 VOC limits for categories with future limits (excludes quart containers or smaller).

Table 2
CARB 2001 Survey Results - California

Coating Category	Total Products Listed	Total 2000 Sales Volume (gallons)	# of Products Meeting Future VOC Limits	Sales Volume meeting Future VOC Limits	% of Products Meeting Future VOC Limits	% of Sales Meeting Future VOC Limits
Flats	3,514	34,405,612	367	2,839,654	10%	8%
Floor	715	1,403,122	111	688,922	16%	49%
Industrial Maintenance	3,751	4,527,107	312	517,868	8%	11%
Non-flats						
High-gloss	842	1,781,198	1	944	0%	0%
Med-Gloss	2569	17,468,318	75	102,741	3%	1%
Low-gloss	1375	6,449,909	77	218,113	6%	3%
Primers, Sealers, & Undercoaters (PSU)	905	7,941,252	283	2,626,489	31%	33%
Quick-Dry PSU*	121	1,611,339	3	39,442	2%	2%
Rust Preventative**	81	180,522	3	1,047	4%	1%
Exterior Stains	1,315	2,741,425	126	313,266	10%	11%
Varnishes	427	664,414	87	236,557	20%	36%
Water Proofing Sealers	234	1,006,632	76	256,122	32%	25%
Water Proofing Concrete/Masonry Sealers	127	700,028	61	285,206	48%	41%

*- Subsumed into the PSU Category
**- New category in 2000; previously reported as non-flat, QDE, and light industrial coatings

When comparing the data from previous CARB surveys, this most recent sales information provided by coating manufacturers indicates an increase in the overall sales volume of lower VOC products in many categories that meet the AQMDs proposed future limits. CARB is currently compiling 2004 sales data for the CARB 2005 Architectural Coatings Survey that should be available sometime in 2006. Based on trends from previous surveys, staff anticipates an increase in waterborne sales for 2004 sales data.

Using the data from the surveys every four years, CARB has calculated the associated emissions. Table 3 contains summary data from these surveys. Please note that the surveys have varied in content and format. Therefore, it is not always possible to make a direct comparison between results from different survey years.

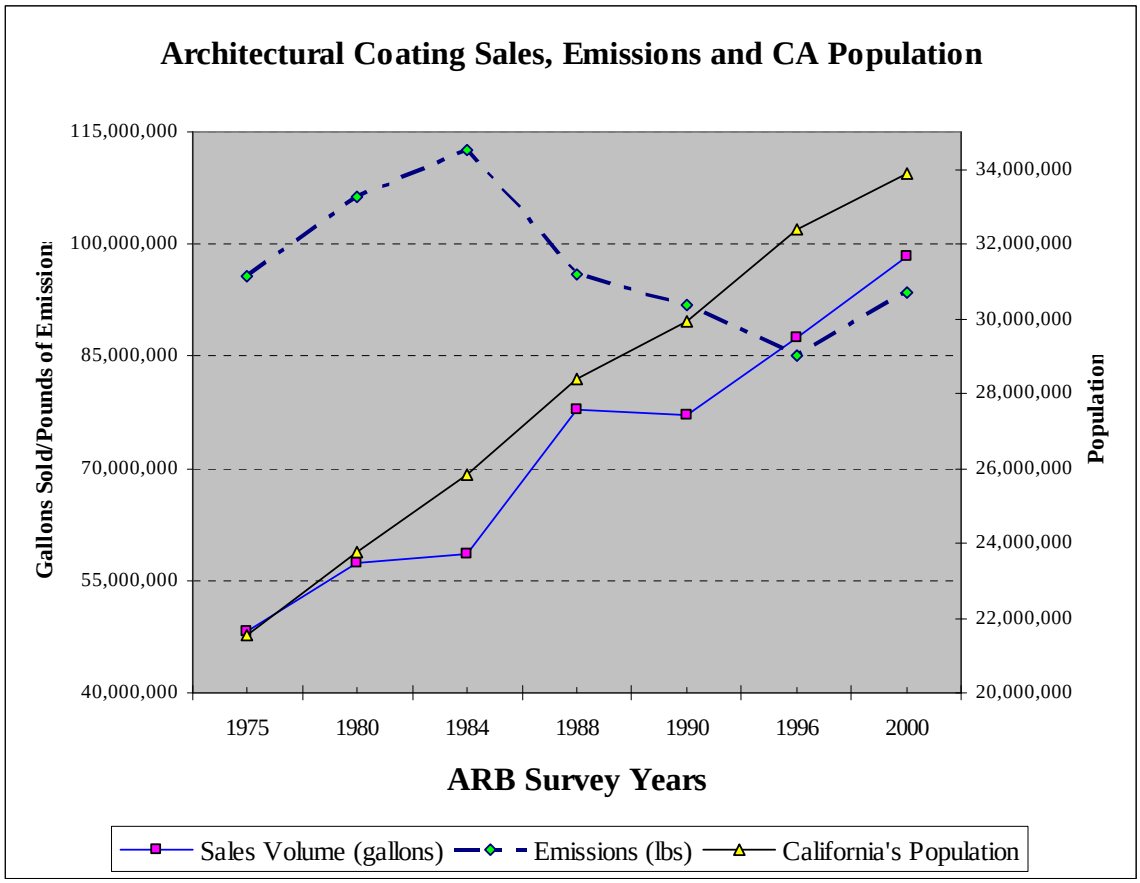
Table 3
CARB Architectural Coatings Volume and Emissions Trends

Survey Year	Sales Volume (gallons)	Emissions (lbs)	California's Population	Pounds of VOC Emissions per capita	# of Surveys Mailed Out	# of Companies Reporting Sales
1975	48,206,000	95,776,000	21,538,000	4.4	N/A	N/A
1980	57,247,000	106,211,000	23,782,000	4.5	N/A	N/A
1984	58,481,000	112,532,000	25,816,000	4.4	~400	143
1988	77,876,000	96,056,000	28,393,000	3.4	N/A	130
1990	77,056,000	91,842,000	29,944,000	3.1	N/A	174
1996	87,496,000	85,142,000	32,383,000	2.6	>700	152
2000	98,455,172	93,629,000	33,871,648	2.8	700	183

Emissions include emissions from thinning and cleanup solvents; also reflects economic recession trends.
N/A = Not Available

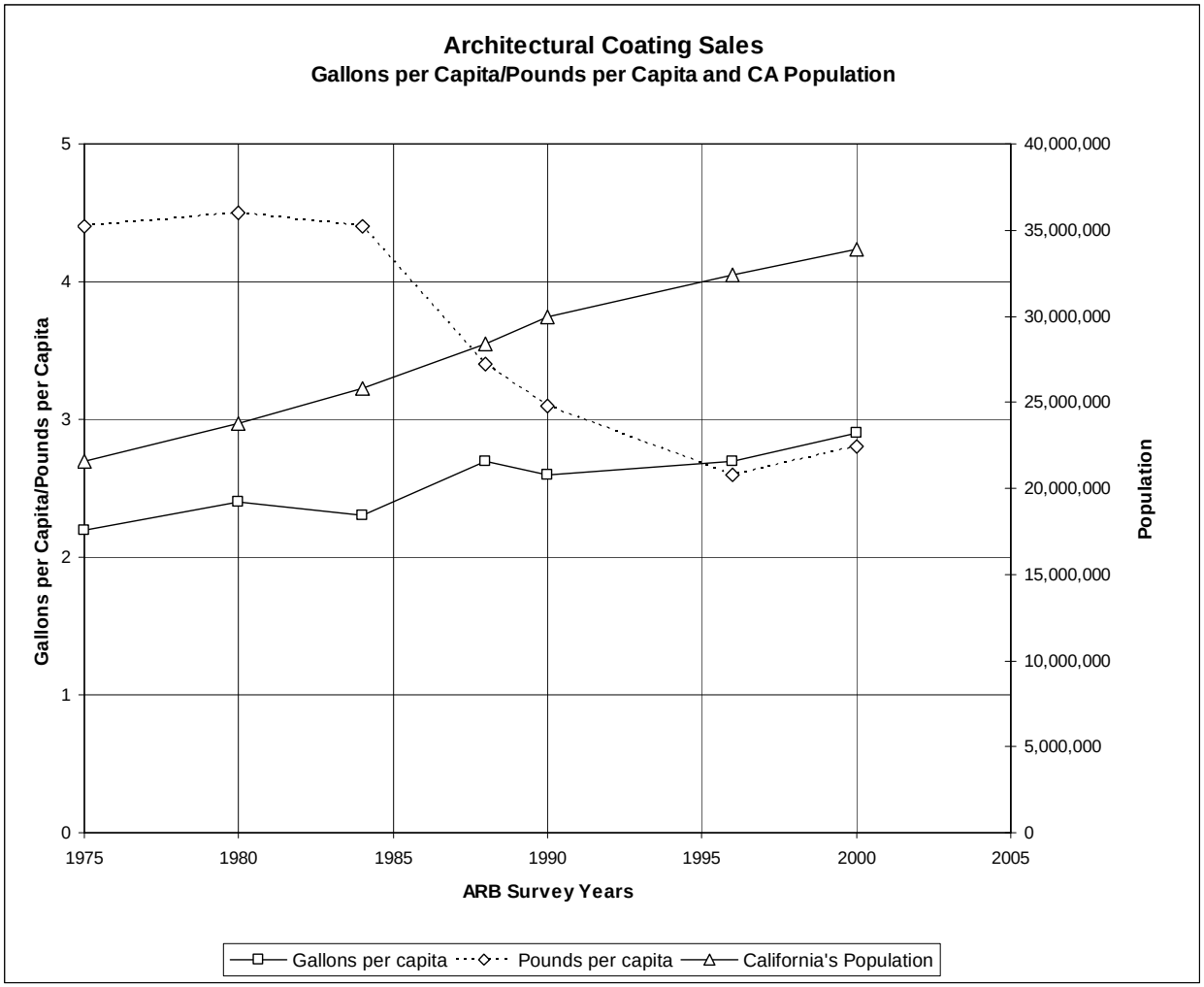
Graph 1 details the trends shown in Table 3, specifically sales volume, emissions and California's population.

Graph 1



In summary, the chart shows that while California's population and sales volume of coatings grew significantly over the last 25 years, statewide VOC regulations requiring lower VOC limits have managed to keep the emissions from architectural coatings slightly lower than the 1975 emission levels. Regulations began having an effect on architectural coating emissions by 1984. Emissions continued to decline through the real estate recession until 1996, reflecting the real estate recession and resumed their increase from that point until 2000. Graph 2 further demonstrates, that based on the data provided in Table 3 although sales volumes show a marked increase over the years, the pounds of emissions per capita continued to decline until the recession was over and then indicates only a slight increase. Most of the state regulatory action after 1996 should begin to show some effect on emissions after 2000. The CARB 2005 Architectural Coatings Survey will contain 2004 sales and emission data.

Graph 2



Specific Coating Category Assessments by AQMD Staff

Rule 1113 requires lower VOC limits effective July 1, 2006, for the following categories:

- Clear Wood Finishes
- Floor Coatings
- Industrial Maintenance Coatings (IMC)
- Non-flat Coatings
- Primers, Sealers and Undercoaters (PSU)
- Quick-Dry Enamels (QDE)
- Quick-Dry Primers, Sealers, and Undercoaters (QDPSU)
- Rust Preventative Coatings
- Specialty Primers
- Waterproofing Sealers (WPS)
- Waterproofing Concrete/Masonry Sealers (WPCMS)

An analysis of Technical Data Sheets (TDS) and Material Safety Data Sheets (MSDS) published by coating manufacturers is one methodology used to complete assessments of available coatings. Table 4 summarizes staff assessments of web based searches for available coatings with more complete details of those findings presented in Appendix A of this report. The list in Appendix A contains coatings that comply with the 2006 rule limits and also include super-compliant coatings for each of the categories studied. The term "super-compliant" refers to architectural coatings that have a VOC content less than the VOC content limits set forth for the current and/or future limits in the Table of Standards found in paragraph (C)(2) of Rule 1113 and specify a VOC content of less than 10 grams per liter. This list is continually updated as staff reviews additional information on available architectural coating products. The TAC has also contributed to and reviewed this list for accuracy.

Table 4
Web Based Search For Available Future Compliant Coatings

Coating Category	Number of Coating Types	No. of Products	Exterior(E), Interior(I), Dual(D), Undetermined(U)	Substrates
Clear Wood Finishes	39	77	6-E 55-I 16-D	Wood surfaces for residential & commercial floors including log and timber frame homes, siding, railings, fences, unsealed wood decks, marine trim, new or previously painted wood, masonry, metal, plaster or drywall surfaces, cabinets, paneling, molding, furniture, top coat over faux-finished.
Clear Wood Finishes, Sanding Sealer	15	20	14-I 6-D	Residential and commercial architectural finishing or use under alkyd and polyurethane varnishes. Doors, trim, cabinets, new wood furniture, paneling, bare or stained wood fixtures such as hardwoods, softwoods, plywood, particle board or masonite.
Pigmented Lacquers	7	10	2-E 6-I 2-D	Substrates include steel, aluminum siding, concrete/block, masonry, wood, masonry, prepared vinyl, stucco, brick, pumice, and primed metal surfaces.
Floor 7 Single Component 15 Multi-Component	15	20	3-E 9-I 8-D	For mechanical room floors, walking decks and vehicular traffic decks on floors of concrete such as tennis courts, playgrounds, arenas, walkways, balconies, steps and bike paths. For use on wood, steel, aluminum, plywood, metal, asphalt and concrete/masonry surfaces. Used as a chemical resistant coating and lining system for secondary containment structures, concrete floors, and other process applications.

Table 4 Cont'd

Web Based Search For Available Future Compliant Coatings

Coating Category	Number of Coating Types	No. of Products	Exterior(E), Interior(I), Dual(D), Undetermined(U)	Substrates
Industrial Maintenance	49	288		For tanks, metal buildings, structural steel, piping, handrails, masonry construction, marine exposures such as ballast tank interiors, well deck overheads, oil storage tank interiors and refined fuel storage tank interiors.
Non-flat, High Gloss	4	5	1-E 4-D	For steel surfaces, aluminum, masonry, wood, properly primed, timber, plywood, concrete, plaster, drywall, fiber cement, stucco, block, brick, particleboard, properly primed galvanized steel concrete and previously coated surfaces.
Non-flat, Medium Gloss	25	40	2-E 35-I 3-D	Ideal for walls, ceilings, wallboard, properly cured and primed plaster, sheetrock, masonry and primed metal.
Non-flat, Low Gloss	25	36	2-E 27-I 7-D	For ceilings, walls, and properly prepared galvanized and structural steel surfaces in industrial, commercial and institutional buildings and warehouses.
Primer, Sealer, Undercoater	45	110	15-E 51-I 44-D	For wallboard, ceilings, wood and wood trim, fully cured plaster, metal, steel, galvanized iron, aluminum, brick, stucco, masonry, new or previously painted drywall, sheetrock, composition board, concrete, plaster, and other porous surfaces.
Quick Dry Primer, Sealer, Undercoater	17	33	3-E 6-I 24-D	For steel, galvanized metal, wood, aluminum, masonry surfaces, piping, and handrails.
Rust Preventative	23	28	5-E 2-I 19-D 2-U	Can be used as a finish coat when applied to a primed or previously coated substrate, wood, metal, or masonry surfaces including walls, doors, trim, sash, and piping, aluminum, galvanized steel,

Table 4 Cont'd
Web Based Search For Available Future Compliant Coatings

Coating Category	Number of Coating Types	No. of Products	Exterior(E), Interior(I), Dual(D), Undetermined(U)	Substrates
Stains, Exterior	21	30		For furniture, molding, millwork, cabinets, doors, decks, masonry, brick, concrete, tilt-up, block, stucco, plaster, exterior metal, for horizontal or vertical wood siding clapboard, hardboard, shakes, shingles, beams, fences.
Water Proofing Sealers	17	23		For concrete, masonry, stucco, most wood & metal substrates, new or previously painted vertical surfaces, vertical masonry substrates such as stone, tilt-up concrete, brick, clay tile, stucco and block.
Water Proofing Concrete/Masonry Sealers	26	50		For masonry, stucco, cement block, hollow tile, split face block, cinder block, roof, brick, stone, adobe, clay tile, slate, and exposed aggregate, drywall, plaster, roof tiles, grout, galvanized metal, vinyl siding, wood decks, sandblasted block or concrete, construction grade plywood or siding, previously coated surfaces, and most porous substrates. Used on steel surfaces subject to continuous abrasion service, chlorine water immersion, salt water immersion such as fountains, aquariums, and water slides.

In addition to TDS and MSDS review, staff continues to visit sites where architectural coatings are applied, and has conducted follow-up visits to previously documented applications of low- and zero-VOC coatings. The data gathered is used to substantiate the availability, use and continuing performance of low-VOC coating products.

AQMD staff has visited more than 100 new construction sites in 2004 and 2005 in order to determine compliance with Rule 1113. Some of the sites visited by staff had coatings specified that either did not meet current VOC limits in the rules, or were not covered under the Averaging Compliance Option under Rule 1113. Staff was able to point out the inconsistencies and have them corrected prior to the application of the non-compliant products during the construction phase. Overall, most of the construction sites visited had applied architectural coatings that are much lower than the current specified limits in many different categories and had used many super-compliant products that meet the future limits in Rule 1113.

Table 5 lists a portion of the project locations visited by staff, as well as some of the coatings specified and applied at those sites.

Table 5

Examples of Construction Sites Utilizing Future Compliant & Super-Compliant Coatings

Facility	Location	Product	Coating Category	Product VOC	Future Limit
Alliance Residential Company	Upland	Dunn-Edwards Super Wall	Flat	50 g/l	50 g/l
"	"	Dunn-Edwards Ultra Grip	PSU	45 g/l	100 g/l
Bridgeport Cove	Santa Clarita	Vista Paint 3600 Flat	Flat	49 g/l	50 g/l
Chaparral Elementary School	Chino Hills	Vista Paint 4200 Terminator II	PSU	50 g/l	100 g/l
Gateway Village	Santa Clarita	Dunn Edwards Ultra Grip Primer	PSU	45 g/l	100 g/l
The Heights	Chino Hills	Frazee Int/Ext Prime Plus	PSU	60 g/l	100 g/l
"	"	Frazee W/B Lacquer Undercoater	PSU	49 g/l	100 g/l
LA Regional Transportation Management Center	Los Angeles	Sherwin Williams Promar High Holdout Primer	PSU	82 g/l	100 g/l
Macys	Rancho Cucamonga	ICI Devflex 4020PF	Rust Prev.	91 g/l	100 g/l
"	"	ICI Prep & Prime W/B Primer	PSU	100 g/l	100 g/l
Sommerville Conzelman	Rancho Cucamonga	Dunn-Edwards W101	PSU	60 g/l	100 g/l
Hector Godinez High School	Santa Ana	MonoChem Aqua Seal ME7	WP Sealer	0 g/l	100 g/l
"	"	MonoChem Aqua Seal Silane 29	WP Sealer	65 g/l	100 g/l
"	"	MonoChem Primer Sealer	PSU	0 g/l	100 g/l
Kaiser Permanente Medical	Ontario	C&A Floorcoverings C-36E Floor Primer	Floor Coatings	0 g/l	50 g/l
"	"	Monokote	Fire Proofing	0 g/l	350 g/l
Cal Trans District 7 Headquarters	Los Angeles	Edoco Finishing Aid	Concrete Curing Compound	0 g/l	350 g/l
Aegis of Chino Hills	Chino Hills	A/S FireFilm II	Fire Proofing	0 g/l	350 g/l
"	"	A/D Base Coat	Fire Proofing	0 g/l	350 g/l
Desert Art Center & Palm Canyon Theatre	Palm Springs	Sta-Crete 1500	Industrial Maintenance	0 g/l	100 g/l
"	"	Col-R-Tone III Acrylic Urethane	Non-flat	< 50 g/l	50 g/l
"	"	Kemiko Stone Tone Sealer	PSU	< 50 g/l	100 g/l
Westfield Shoppingtown Parking Structure	Palm Desert	Col-R-Tone III Acrylic Urethane	Non-flat	< 50 g/l	50 g/l
"	"	Kemiko Stone Tone Sealer	PSU	< 50 g/l	50 g/l
Park Side Villa	Stevenson Ranch	Sherwin Williams	Flat	48 g/l	50 g/l

The following pages summarize staff's findings relative to the specific coating categories that have to meet lower VOC limits by July 1, 2006.

Clear Wood Finishes

Rule 1113 defines clear wood finishes as products applied to wood substrates to provide a transparent or translucent solid film. An analysis of product data sheets supplied by various manufacturers supports staff's conclusions that the future limit of 275 g/l VOC and much lower is currently achievable. Appendix A of this report shows more than 100 products that have a lower VOC content than the future limit. Additionally, staff continues to visit sites where future compliant products in this category have been applied showing excellent performance, even when subjected to harsh conditions (high traffic) such as manufacturing areas.

Comments received from previous reports presented to the Board questioned the long-term durability of these low-VOC coatings. Staff has re-inspected many of those sites where low-VOC products were applied, and has documented the results. One such follow-up was at Barneys of New York in Beverly Hills where BonaKemi products were applied. As mentioned in the annual report to the Board in December of 2003, BonaKemi USA manufactures and sells the BonaTech MEGA® Brand Floor Finish that has a VOC of 250 g/l. This product is specifically designed for use on interior residential and commercial wood flooring subject to heavy traffic. The resin system used in this single-component product is polyurethane. Independent testing conducted by Colorado State University and the Taber Abraser testing indicate that the "MEGA® outperforms all other competitor's waterborne and oil-modified finishes." The BonaTech MEGA® Satin Floor Finish was applied to the fourth and fifth story wood floors at the Barneys of New York site during September of 2003. The contractor applying the less than 250 g/l VOC product stated that he uses the clear coating on most of the commercial and residential jobs he does and says he is a "big fan" of the product and that it is very durable. He estimated that Barneys of New York would not need a maintenance coat for approximately five years. Staff returned to the site nearly a year after the coating was applied and spoke with the Director of Store Operations. The Director stated that the coatings were holding up well and that no touch-ups had been required. While staff was present, the third floor was under restoration by a different contractor utilizing the same products.

Industrial Maintenance Coatings (IMC)

The IMC category continues to be part of every study conducted by the AQMD and is considered to be the most challenging. Results of past studies indicate that coatings meeting the future limit of 100 g/l are currently available for the industrial maintenance coating category. Staff continues to obtain additional information on IMCs from TDS and MSDS analysis. Appendix A includes over 280 Industrial Maintenance Coatings (more than triple the number reported in the 2003 annual report to the Board) that are well below the July 1, 2006 100 g/l VOC limit.

Various public service agencies have completed testing of low-VOC products in recent years and have found compliant products with acceptable performance. For example, the Southern California Alliance of Publicly Owned Treatment Works (SCAP) conducted its own independent evaluation of IMCs. SCAP is a non-profit corporation organized to help ensure that regulations affecting Publicly Owned Treatment Works (POTW) are reasonable and in the publics best interest. Their testing of IMCs was conducted to identify low-VOC coating systems suitable for wastewater treatment and conveyance facilities. Participants in this study included the Los Angeles County Sanitation District, the Orange County Sanitation District, the Eastern Municipal Water District, Las Virgenes Municipal Water District and the City of Los Angeles.

SCAPs evaluation of the performance of low-VOC atmospheric and immersion coating systems, completed in February 2003, indicated that compliant coating systems meeting the performance criteria for wastewater environments and the 2006 limits in Rule 1113, performed similarly to existing coating systems.

Metropolitan Water District (MWD) initiated its own independent evaluation which is ongoing to test new products that meet their very stringent internal standards for performance and that also meet the future VOC limit of 100 g/l. As mentioned in previous annual reports, a committee was formed in September 1999 comprised of representatives from the Los Angeles Department of Water and Power (LADWP), the Department of Water Resources (DWR), the California Department of Transportation (CalTrans), and the Metropolitan Water District of Southern California (MWD). The committee, referred to as the "Essential Public Service Agencies" (EPSA), was initially tasked with identifying and testing low-VOC products and continues with the program today, through MWDs leadership.

Typical IMCs are expected to have a 7 year longevity, whereas under their more stringent criteria, MWD desires an IMC to last at least 15 years. MWDs list of approved IMCs that meet their stringent standards is utilized by the EPSA. The testing to date indicates that:

1) Available low-VOC industrial maintenance **immersion** coatings meeting the 2006 limits, conform to their stringent standards.
2) They continue to look for IMC **atmospheric** products that also meet their stringent criteria.

AQMD staff recognizes that there is a lack of atmospheric coatings available that meet MWDs rigorous standards. MWD has completed testing of some atmospheric IMCs with Tertiary-Butyl Acetate (TBAc), a solvent that EPA and CARB has determined to be VOC exempt, that they are extremely optimistic about. AQMD staff agrees that TBAc has low photochemical reactivity and understands that TBAc is a desirable solvent from the formulator's standpoint. ~~The ESPA and~~ ~~many~~ Many IMC manufacturers are seeking delisting of TBAc for use in coatings critical to the support of the public infrastructure. Staff is currently evaluating the limited information on TBAc's toxicity and its potential

health impacts to determine whether this solvent should be recommended to the Governing Board as exempt for use in certain IMC applications.

The MWD along with the EPSA and AQMD staff will continue to identify, test, and evaluate compliant high performance industrial maintenance coatings in the future.

Non-flat Coatings

Rule 1113 – Architectural Coatings defines non-flat coatings as registering a gloss of 5 or greater on a 60-degree meter and a gloss of 15 or greater on an 85-degree meter. The rule does not delineate various gloss ranges into distinct categories such as high, medium or low gloss.

There have been comments received from some manufacturers that a high gloss category should be developed in Rule 1113, similar to the 2000 CARB State Suggested Control Measure (SCM) for Architectural Coatings. In the SCM, high gloss coatings are those that register a gloss of 70 or above on a 60-degree meter and are allowed a higher VOC limit of 250 grams per liter. Although Appendix A lists several high gloss coatings that are currently available and are below the 50 g/l limit that will be in effect in July 2006, several coating manufacturers commented to staff that the expected performance for certain key characteristics such as dirt pickup, may not be high enough. This issue, which is due to the softer resin technology used for 50 g/l products in the high gloss non-flat and the companion quick-dry enamel category, was last brought to staff's attention within the past year. As a result, this technology assessment focused on more carefully evaluating this criteria. Subsequent discussions with other manufacturers, however, indicated that with the latest resin and additive technologies, they were able to overcome the dirt pick up issue. Discussions with raw material suppliers also reinforced the point of view that new resins that were recently made commercially available to the market will address these issues. Based on the state of technology, it appears that it is reasonable to expect that all manufacturers will be able to soon produce good performing products.

Despite this expressed concern with non-flat high gloss coatings, overall, the list of currently available super-compliant non-flats continues to grow as indicated by staff reviews and updates of information based on TDS and MSDS. There are currently over 50 coatings below 10 g/l (super-compliant) and a total of over 80 coatings below 50 g/l listed in Appendix A. This is more than double the number of coatings listed in the report to the Board in December of 2003, indicating an increasing number of available compliant products. Consumers in the Do-It-Yourself (DIY) market purchase these compliant products for their personal use in and around their homes on a daily basis.

In spite of the increase in the availability of coatings in this category below 50 g/l, the rule still incorporates alternative compliance options, such as the averaging provision and an allowable three-year sell through provision for coating manufacturers to take advantage of. However, since staff's research to date has found few low-VOC products meeting the definition of high gloss, and in light of recent test results, AQMD staff is

supportive of creating a new category specifically for non-flat high gloss effective July 1, 2006 with a VOC of 150 g/l, reducing to 50 g/l VOC by July 1, 2007. This additional time would allow manufacturers to incorporate the latest resin technologies. In addition, this would also include giving the same time extension and VOC limit of 150 g/l for the companion category of quick-dry enamels (discussed below) which are also high gloss. AQMD staff is committed to continuing further research in this area and remains open to further discussions on the issue with the TAC, and the possibility of conducting additional testing for non-flat high gloss coatings.

Primers, Sealers and Undercoaters (PSU)/Quick-Dry Primers, Sealers, and Undercoaters (QDPSU)

An analysis of currently available PSUs clearly shows that the future VOC limit of 100 g/l VOC by July 1, 2006 is attainable today. More than 100 coatings have been identified, through TDS, MSDS and on site inspections that are well below the future 100 g/l VOC. As previously shown, Table 5 lists construction sites that were randomly visited by staff throughout the AQMD jurisdiction, where PSUs were applied that met the future limits. Those coatings are applicable to a wide variety of substrates and provide physical coating characteristics that meet or exceed the performance standards typically expected of products from industry and consumers. Although not specifically called a quick dry product, many standard PSUs meet the definition of a quick dry coating and consequently are included in the staffs' analysis as a primer, sealer or undercoater.

Quick-Dry Enamels (QDE)

A subcategory of non-flats, QDEs have gloss values greater than 70 on a 60º meter and should be capable of achieving set-to-touch in at least two hours, dry-hard in at least eight hours and be tack-free in at least four hours. AQMD staff recognizes that the same problems associated with dirt pickup for non-flat high gloss coatings exist with the QDEs, and is recommending the same interim limits.

Rust Preventative Coatings

CARB surveys continue to show an increase in the number of rust preventative coatings for sale at VOC levels that meet the future limit of 100 g/l. AQMD staff evaluation indicates that super-compliant coatings with zero-VOC are currently available. These are single component, direct-to-metal (DTM) coatings that provide corrosion resistance for interior and exterior metal surfaces. Appendix A lists 28 DTM rust preventative coatings that meet the future VOC limit and are currently available from various manufacturers. Additionally, numerous products labeled as non-flats, and not specifically rust-preventative coatings, have anti-corrosive characteristics that make them suitable for application and use for the prevention of rust on metal surfaces, as indicated in manufacturer product literature. An example of a zero-VOC rust preventative coating is a product made by Sierra Performance (Rust-Oleum) called Metalmax™ DTM Acrylic Urethane Enamel, listed on Page 45 of Appendix A.

During a random field visit to a Macy's Department Store construction site in Rancho Cugamonga, AQMD staff encountered the specification and application of a rust preventative coating manufactured by ICI Devoe. The coating is called ICI Devflex 4020PF and contains 91 g/l VOC.

Specialty Primers

Specialty primers are defined in Rule 1113 as coatings intended to seal fire, smoke or water damage, or to condition excessively chalky surfaces. Many of the coatings that fall within other categories, such as PSUs, have characteristics similar to requirements for specialty primers, such as the need to condition excessively chalky surfaces. A review of the available specialty primer products are listed under PSUs and the associated characteristics in Appendix A indicates a vast amount of coatings available that meet those needs. As mentioned in the report to the Board in December 2003, sales data supplied by manufacturers and available for review in the 2001 CARB Survey, indicate that approximately 80% of the total market volume within this category is below the future limit of 100 g/l VOC, effective July 1, 2006 (including stain-blocking products).

Waterproofing Sealers (WPS)/Waterproofing Concrete Masonry Sealers (WPCMS) & Floor Coatings

Appendix A of this report lists over 70 coatings that are less than 100 g/l VOC meeting the July 1, 2006 limits for the WPS and WPCMS categories. Also, many of those same coatings listed are utilized in vertical and horizontal floor applications with VOCs that easily meet the future limit in the floor category of 50 g/l VOC.

In addition to the many floor coating products currently available and being applied throughout the AQMD, staff has met with ultra violet (UV) curable coatings manufacturers and suppliers whose products, according to MSDSs contain little to no VOCs. These companies have demonstrated the application and instantaneous curing of these UV coatings on concrete floors utilizing state-of-the-art portable UV curing equipment to staff. Although in its infancy relative to architectural coating applications, these types of coatings continue to show promise, and as the resin technology and associated portable curing equipment continue to be developed, the future of these products in the architectural coatings market will continue to grow. Applicators of these products have shown staff the versatility of these types of coatings for use on other substrates as well, including, but not limited to wood and vinyl.

Point of Distribution Product Inventory Survey

AQMD staff conducted a survey of store inventories in the spring of 2004. The purpose of the survey was to gather usable data that would provide a snapshot of the currently available architectural (and adhesive-Rule 1168) products that are being sold from various store shelves. This survey also provided data on the compliance level of the store inventories. The additional benefit to this project was that many of the store owners, corporate executives, and suppliers were made aware of the AQMDs current and future VOC limits relative to Rule 1113.

As part of this expansive outreach effort, AQMD staff prepared a distribution list for the survey along with useful compliance information on Rule 1113. The list was generated from various sources, including the Yellow Pages, internet web pages, and recommendations from retail outlet personnel. An outreach letter was then drafted and mailed to 654 stores within the AQMDs jurisdiction. Staff received a total of 131 inventory lists back from the stores. Many of the stores had their corporate offices handle the inventory list. For example, stores such as Sears and Home Depot, with multiple individual store locations in the AQMDs jurisdiction, had their headquarters provide the inventory lists to the AQMD. The submitted surveys were transcribed into a database (an Excel® spreadsheet) and each product was evaluated. The tremendous amount of data received was then examined for each coating and AQMD staff determined which coating category each would fit into. The data from the submitted surveys (the reported store sales universe) shows 21,053 line items for all products obtained from the store surveys. This data is available electronically and was used to provide the working model for the sales of architectural coatings. All of the calculations conducted by AQMD staff were based on the reported data obtained from the submitted surveys. This limited survey indicates that products meeting the 2006 VOC limits in Rule 1113 for many categories are currently available and being sold to consumers. In 2006, staff intends to randomly audit stores who failed to respond to the survey request to further evaluate their compliance.

The entire analysis and breakdown of the individual coating categories is available for further review in Appendix B of this report.

Super-compliant Coatings

Architectural coating manufacturers continue to improve the coating characteristics of their products while lowering the VOC content by introducing new types of resins and other paint constituents that are extremely low in VOC or have none at all. Table 6, updated from previous annual reports to the Board, reflects a portion of super-compliant coatings currently available. Staff has given the nomenclature “Super-compliant coatings” to those coatings that are well below the current and/or future limits for the applicable coatings categories as set forth in the Table of Standards and are indicated by the manufacturer as having less than 10 g/l of VOC. These also include those coatings that meet future limits in advance of their effective date. This list is also posted to the AQMDs website showing companies that have expressed an interest in having their products included on the page.

Table 6
Super-compliant Architectural Coating Manufacturers*

Manufacturer	Type of Coatings	Interior	Exterior	Phone Number
Alistagen Corporation http://www.caliwel.com	PSU, F	YES	NO	866-280-0001 305-936-8691
American Formulators Mfg http://www.safecoatpaint.com	F, NFE, NFSG	YES	NO	619-239-0321
Anchor Paint http://www.anchorpaint.com	WPC/MS	NO	YES	918-836-4626
Benjamin Moore & Co http://www.benjaminmoore.com	PSU, F, NFS, NFE, NFSG	YES	NO	201-573-9600
Cloverdale Paint Inc http://www.cloverdalepaint.com	PSU, NF, IM	YES	YES	604 596 6261
Coronado Paint Co http://www.coronadopaint.com	F, NF, PSU	YES	NO	386-428-6461 x115
Degussa Building Systems http://www.degussabuildingsystems.com	PSU, WPS, WPCMS	YES	YES	800-433-9517
Diamond Vogel http://www.diamondvogel.com	F, NF, P	YES	NO	800-728-6435
Dunn Edwards http://www.dunneedwards.com	F, NF	YES	NO	888-337-2468
E-3 Coatings, Inc http://www.envirolast.com	S	NO	YES	530-308-2189
Frazee Industries http://www.frazeepaint.com	PSU, F, NFS, NFE, NFSG	YES	NO	858-626-3490
Fuhr International, LLC http://www.fuhrinternational.com	PSU, F, NF	YES	YES	800-558-7437 816-809-4403
ICI Paints http://www.iciduluxpaints.com Pro painters http://www.devoecoatings.com IM coatings http://www.duspec.com MSDS & PDS http://www.glidden.com Retail for homeowners http://www.ici.com Corporate	PSU, F, NFS, NFE, NFSG**	YES	YES	440-826-5519
Kryton http://www.kryton.com	WPS	YES	YES	
Miller Paint http://www.millerpaint.com	PSU, F, NFE, NFS	YES	NO	503-407-2532
Monopole Inc. http://www.monopoleinc.com	IM, WPS, WPC/MS	YES	YES	818-500-8585
Polibrid Coatings http://www.polibrid.com	F, NF, PSU	YES	YES	956-831-7818
Richards Paints http://www.richardspaint.com/	F, NFS	YES	NO	800-432-0983
PPG (Pittsburgh Paints) Pure Performance Coatings http://www.ppg.com/ppgaf/pittsburgh/ppcon.htm & General PPF Architectural Finishes http://corporate.ppg.com/PPG/SBU/Architectural Finishes/default.htm	PSU, F, NF	YES	YES	412-434-3548
Rodda Paints http://www.roddapaint.com/	PSU, F, NFE, NFS	YES	NO	503-737-6031 x6051
Sampson Coatings, Inc. http://www.sampsoncoatings.com	PSU, F, NF	YES	YES	804-359-5011
Samuel Cabot, Inc http://www.cabotstain.com	WPS	NO	YES	800-877-8246
Seal-Krete Inc. http://www.seal-krete.com	PSU, F	YES	YES	800-323-7357 x541
Sierra Performance by Rust-Oleum http://www.rustoleum.com	PSU, F, NF	YES	YES	800-553-8444
Silvertown Products http://www.rhinoguard.com	S, CWF	NO	YES	909-986-7061

Table 6 Cont'd

Super-compliant Architectural Coating Manufacturers*

Manufacturer	Type of Coatings	Interior	Exterior	Phone Number
Spectra-Tone Paint http://www.spectra-tone.com/	F, NFE, NFSG	YES	NO	800-272-4687
Tried & True Wood Finishes http://www.triedandtruewoodfinish.com	CWF	YES	NO	607-387-9280
Vista Paint http://www.vistapaint.com	NF	YES	YES	714-680-3800
VOC Free No Website	FLOOR SEALER, PSU, F, NF	YES	YES	201-457-1221
Industrial Maintenance Coatings				
Manufacturer	**Type of Coatings**	**Interior**	**Exterior**	**Phone Number**
Ameron, Intl. http://www.ameroncoatings.com/welcome.cfm	VARIOUS SYSTEMS	YES	YES	800-926-3766
Duromar http://www.duromar.com/	VARIOUS SYSTEMS	YES	YES	781-749-6992
JFB Hart Polymers http://www.jfbhartcoatings.com/	VARIOUS SYSTEMS	YES	YES	630-574-1729
Novocoat (Formerly) Superior Environmental Products, Inc http://www.novocoat.com	VARIOUS SYSTEMS	YES	YES	972-490-0566
Pacific Polymer http://www.pacpoly.com/	VARIOUS SYSTEMS	YES	YES	800-888-8340
Specialty Products Inc. http://www.specialty-products.com	VARIOUS SYSTEMS	YES	YES	253- 983-7530
United Coatings http://www.unitedcoatings.com/	VARIOUS SYSTEMS	YES	YES	800-541-4383

CWF	Clear Wood Finish
F	Flats
NF	Non-flat
NFS	Non-flat - satin
NFE	Non-flat - eggshell
NFSG	Non-flat - semi-gloss
PSU	Primers, sealers, and undercoaters
S	Stains
WPS	Waterproofing Sealer
WPCMS	Waterproofing Concrete/Masonry Sealers

** Super-compliant coatings are defined as those coatings that have a VOC content less than the VOC content limits set forth for the current and/or future limits in the Table of Standards found in paragraph (c)(2)of Rule 1113 and specify a VOC content less than 10 g/L.*

*** Not available for exterior use.*

This is not an all-inclusive list of super-compliant coatings available from manufacturers/suppliers who have informed SCAQMD that they can provide the super-compliant products listed.

The SCAQMD in no way endorses any of these companies nor does it certify their ability to meet the requirements of Rule 1113 Architectural Coatings. If you want your company included in this page, please send your request to ddeboer@aqmd.gov or call David De Boer at (909) 396-2329.

Summaries of Select Articles on Advancements in Architectural Coating Technology

As AQMD staff continues to research new coating technologies that are available across all coating categories, it becomes clear that compliance has relied heavily on the research and development efforts of the raw material suppliers to the architectural coatings industry, and active follow up by individual coating company reformulations. Numerous articles, journal publications, and technical bulletins discuss progress in the area of lower VOC products for the coatings industry, primarily to meet the demand driven by regulatory concerns, as well as the desire of the general public and governmental agencies to specify and use environmentally-sound products.

The following summaries of articles are provided as testimony to the ongoing technology achievements based on those research and development efforts across a wide array of coatings manufacturers and raw materials suppliers throughout the world. Although some of the articles presented do not specify VOC contents, their premise is that the application of coatings with lower-VOCs are effective in lowering total volatiles, resulting in environmental benefits.

BASF introduces Acronal Optive® 130 all-acrylic latex polymer, www.basf.com/corporate/news2002/newsinfo_acronal_101802.html This article was released on October 28, 2002.

BASF Corporation's Architectural Coatings Raw Materials Business Unit has introduced Acronal Optive® 130, a technological breakthrough in exterior and interior architectural coatings in zero and low-VOC formulation that delivers high performance for flat through semi-gloss paints without sacrificing critical paint performance and at a lower formulated cost. Acronal Optive 130 provides formulators and manufacturers the ability to meet existing and expected future VOC regulations today without having to reformulate today and then again in a few years. For semi-gloss paints, Acronal Optive 130 delivers a high level of block resistance, scrub resistance, gloss, and wet adhesion in zero to 150 g/l VOC formulations. In flat paints, Acronal Optive 130 exhibits excellent low temperature touch-up, high scrub resistance and superb thickener efficiency in zero to 150 g/l VOC formulations. Acronal Optive 130 is composed of an all-acrylic backbone providing excellent outdoor durability and supported by long term exposure testing. Acronal Optive 130 does not require a coalescent to form a film, giving the formulator the option of reducing formulated costs and/or adding additional glycol for increased open time. The enhanced thickener efficiency of Acronal Optive 130 and the ability to replace several polymers with one gives manufacturers an additional economic and performance advantage.

This product is currently being used in large volumes by most of the manufacturers selling architectural coatings in California. In addition, BASF offers other Acronol products such as 110, 230 and 330 polymers that can be used for coatings at 50 g/l or less.

"The Effect of Water Resistance on the Durability of Waterborne Coatings." David Kelly, Project Leader, Architectural and Functional Coatings Research, Rohm & Haas, Spring House, PA., October 22, 2003.

Water resistance, UV resistance and the ability to resist damage on thermal cycling are some of the main components that determine exterior durability of many types of coatings. Coatings that are used on low-slope (or flat) roofs need to have high water resistance for good durability, due to the possibility of ponds forming on these roofs as well as needing good UV resistance and resistance to thermal cycling damage. Under conditions of ponded water, coating blistering is evidence of poor water resistance.

Water borne coatings are especially susceptible to durability issues pertaining to poor water resistance. Most formulation components for waterborne coatings are either water soluble or have colloid stability (e.g., latex polymer). In all cases, the functional groups on polymers that are used are susceptible to hydrogen bonding or are ionic. Unless the hydrophilic character is balanced with the hydrophobic, the coating will either be water sensitive or the formulation will not have colloidal stability. In addition, the water sensitivity of the latex polymer binder may also impact overall coating water sensitivity. In addition, the water sensitivity of the latex polymer binder may also impact overall coating water sensitivity. We have used coating water absorption, water vapor permeability and blister resistance to characterize the factors in waterborne coating formulations that pertain to water sensitivity. The factors studied include formulation components for stability and rheology control, as well as latex polymer hydrophobicity.

Our research shows that waterborne coatings can be made resistant to water and durable to ponded water situations such as those that might be encountered on low-slope roofs. We have found that hydrophobic components in the formulations, as well as the use of hydrophobic binders, will give the best combination for improving the water resistance of waterborne coatings. This will result in waterborne coatings that can resist blistering over hydrophobic substrates for up to four to six months of continuous immersion in water. However, in the design of polymers for ultimate durability, the UV resistance of hydrophobic materials must also be considered to give the best exterior durability.

Information from Paint Square and the Pugh & Co. International web site, January 21, 2005.

Pugh & Co. International has developed an ultra low-VOC primer, Actan® GS, with a VOC content of less than 0.1 g/l. The primer has been developed for treating galvanized and non-ferrous metals and bonds with the surface to form a film that is transparent, hard, flexible, impact resistant and non-porous. It gives great adhesion prior to the application of a wide range of one and two pack protective paint systems, including chlorinated rubbers, vinyls, acrylics, epoxies and polyurethane. This product has been certified by the British Board of Agrément under the Highways Authorities Product approval Scheme for use as part of a specification for the protection of steelwork in accordance with the Manual of Contract Documents for Highway Works. The primer is currently being used with a 100 percent water based paint system to protect pipe-work in one of the tunnels

beneath the Thames Barrier in London. In addition, Pugh & Co. International have also developed Kelate® which is a high quality water-borne product that neutralizes the corrosion process. It reacts quickly with the rust and transforms iron oxides into a stable and insoluble blue-black metallo-organic complex which is ready for painting after reaction. Reaction time is approximately three hours. This product is supplied to major paint manufacturers all over the world for making chelating surface treatment and is 100 percent VOC free. It is a chelating polymer that has been designed for field application to rusted steel which has been hand or power cleaned, or blasted.

Chemolak, Tovarenska 1, 91904 Smolenice, Slovak Republic, Tel: 421-805-55-60-611, Information found on internet website, www.rec.org/ecolinks/bestpractices.

In Slovakia there are 25,000 tons of VOC released yearly into the air and the reduction of VOC emissions is a high priority. Chemolak, a European paint manufacturer in the Slovak Republic produces approximately 20,000 tons of coatings per year. In 2000 Chemolak began a project to replace harmful organic solvents with water-based polyurethane dispersions in manufacturing paints and lacquers. With the substitution of this environmental friendly technology, emissions were reduced to 10 percent of former levels. The new process avoids the emission of 500 tons of VOC per year. The project resulted in environmental benefits as well as economic benefits such as the polyurethane product is 5 percent less expensive than other currently available similar products, a polyurethane dispersion produces quality varnish products, market potential is increased because of residential use, and the company is in compliance with new environmental legislation.

Market Updates for Resin Manufacturers, JCT Coatings Tech, January and February 2005

Lyondell Chemical Company commercialized its Acryflow™ line of acrylic polyols which are prepared in a proprietary process using hydroxyl-functional allylic monomers. Acryflow polyols maintain their functionality at a low molecular weight so coating formulators do not need to trade performance for lower VOC content. These Acryflow polyols are designed to be blended together for use in a variety of applications including high-solids, UV, and moisture-curable coatings. The blending approach optimizes formulation latitude while reducing resin inventory costs, increasing coating performance, and lowering VOC content.

The Rohm and Haas Company has introduced several new products for low-VOC architectural paint applications. Rhoplex™ AC-364 and Rhoplex Multilobe™ 300 are 50 g/l flat binders and they are developing and close to launching 50 g/l VOC semi-gloss and high gloss binders that will give the performance of their conventional counterparts.

The Lubrizol Corporation acquired Noveon which introduced Sancure® 20041 a low-VOC polyurethane dispersion for clear wood finishes. Noveon also launched several coatings resins for architectural and masonry/specialty construction applications. Carboset® XPD-2860 is an acrylic emulsion for zero-VOC interior and exterior latex

paints that possesses outstanding scrub resistance. Carboset® 7733 is an acrylic emulsion for low-VOC interior and exterior semi-gloss and gloss paints that also offers excellent scrub resistance. Carboset® XPD-2790 is an acrylic emulsion for low-VOC primers with excellent tannin and stain blocking. Noveon will be introducing a new low-VOC, high-solids, waterborne oil-modified polyurethane for clear or pigmented interior or exterior wood coatings.

BASF is investing in future opportunities for nanotechnology-based latex resins, and has demonstrated with early prototypes that nanoparticles can impart extraordinary strength and hardness with very low-VOC demand.

Reichhold is developing Arlon® 848, which is a water-based acrylic emulsion resin that is low in VOC and low in HAPS, designed for airless spray applications possessing excellent corrosion resistance and use in direct-to-metal applications.

Micro-Dispersion™ - A New Water-Borne Technology, Joseph Nothnagel, Eastman Chemical Co. Presented at the International Waterborne, High-Solids, and Powder Coatings Symposium, February 26-28, 2003.

Because of government regulation of VOC over concern for the environment and public health, competing technologies have developed in the coating industry to lower the VOC content. Two distinct types of waterborne coatings continue to command the bulk of research which are emulsion polymerization in which hydrophilic assistants are used in order to ensure the stability of the dispersion and replacement of some of the solvent with water as part of the medium to carry the film-forming components of the paint. These near zero VOC Micro-dispersion coatings have extremely low acid values, no external surfactants, small particle sizes and high molecular weight (equal to or greater than conventional solvent based polymers. This abstract devotes most of the discussion to the micro-dispersions and also briefly discusses other alternative compliant technologies.

Eartheasy.com

Indoor air is three times more polluted than outdoor air, and according to the EPA, is considered to be one of the top 5 hazards to human health. Paints and finishes release low level toxic emissions into the air for years after application. The source of these toxins is a variety of VOCs, which, until recently, were essential to the performance of the paint. New environmental regulations, and consumer demand, have led to the development of low-VOC and zero-VOC paints and finishes. Most paint manufacturers now produce one or more non-VOC variety of paint. These new paints are durable, cost-effective and less harmful to human and environmental health.

Radical Change in Research and Development, Dean C. Webster, North Dakota State University, JCT Coatings Tech, April 2005.

Paint and coating formulations are a complex mixture of one or more resins and crosslinkers, solvents, curing catalysts, flow and leveling additives, gloss modifiers, stabilizers, pigments and their dispersants and dispersion stabilizers and so. Coatings are also required to meet a combination of performance requirements. Coating formulators are challenged to use whatever information they can gather to help them decide what ingredients to use and in what ratios to mix the ingredients in order to achieve the optimum in performance properties. The process of formulating new coating products has largely remained unchanged for over 100 years and statistical experimental design has not yet become standard practice for coatings formulators. Combinatorial and high throughput methods have been practiced in the field of drug discovery for over a decade. It was recognized that it was almost impossible to predict what specific chemical compound would have a desired effect in treating a disease or condition. Synthesizing a series of compounds one at a time and testing them one at a time is an extremely inefficient use of resources. Methods were developed to facilitate synthesis of multiple compounds simultaneously and then to screen them for their activity. These techniques have evolved to the point that libraries of thousands of chemical compounds can be synthesized and screened in a single day. If these methodologies were used in the formulation of coating, the improved throughput of experiments is expected to have several important consequences. First, acceleration of the experimental process means that a series of experiments that once took six to 12 months can now take one to two weeks to arrive at the same result. This acceleration means that the time from product conception to product introduction can be shortened considerably.

Correlation Between Solids Content and Hiding as it Relates to Calculation of VOC Content in Architectural Coatings, Albert Censullo, Dane Jones, Max Wills, Dept. of Chemistry and Biochemistry, California Polytechnic State University, December 2004.

The researchers determined that although for a particular coating the hiding improves as the solids content increases, across different coatings, higher solids content does not necessarily equate to better hiding. In many cases, a 35 percent solids by volume water-based coating hides as well as a 60 percent solids by volume solvent-based coating. Accordingly, since the basis for using "VOC, less water and less exempts" was not supported by this study, this standard for the VOC content for house paints does not appear to be the ideal standard. The researchers developed a different standard, termed "hiding VOC", which is defined as the amount of VOCs emitted by hiding (as opposed to simply covering) one square meter with a paint. Using this measure, among the flat and non-flat paints tested, the solvent based coatings on average emitted over ten times as much VOC to hide the same area as the waterborne paints.

Rohm and Haas Introduces Rhoplex™ VSR-50 Emulsion An Innovative 100% Acrylic Binder for Interior/Exterior 50 g/l VOC Paints, Philadelphia, PA, November 1, 2005

The following information is taken directly from a Rohm and Haas News release dated November 1, 2005:

Rohm and Haas has launched an innovative binder, Rhoplex VSR-50 emulsion, into the coatings market. The new 100% acrylic binder is designed for premium-performance, interior and exterior, flat to gloss architectural coatings and is particularly useful in formulating paints to 50 g/l VOC.

Paints based on Rhoplex VSR-50 emulsion have shown performance benefits similar to those of other Rhoplex 100% acrylic binders but offers much lower VOC levels. Paints based on this innovative binder exhibit excellent durability, color retention, dirt pick-up resistance, block resistance, alkali and efflorescence resistance, and an excellent overall balance of properties which paint manufacturers have come to expect from the Rhoplex name.

Rhoplex VSR-50 emulsion is the latest addition to the Rhoplex family of binders which use a combination of innovative technologies from Rohm and Haas. Its composition has been designed to optimize the balance of properties with lower levels of co-solvent. For further information about this product or about any Rohm and Haas products, please contact you local Rohm and Haas Representative.

Rohm and Haas is a Philadelphia-based specialty materials company which makes products for the personal care, grocery, home and construction markets, and the electronics industry. The company had annual sales of approximately $7.3 billion in 2004 with operations in 27 countries. Additional information about Rohm and Haas can be found at www.rohmhaas.com.

Papers Presented at Recent Conference in 2005

In addition to the articles researched relative to the development for lower VOCs in architectural coatings, recent papers and presentations made at the 27th Biennial Western Coatings Societies Symposium & Show in November 2005 indicate the availability and support from resin and additive suppliers of low- VOC coating components that meet and exceed the future VOC limits in Rule 1113 and expected performance characteristics as compared to traditional higher VOC containing materials.

CARB/SCAQMD Reactivity Study

As a part of the 1999 amendments to Rule 1113 – Architectural Coatings, the AQMD Board approved a resolution, directing the staff to assess the reactivity and availability of solvents typically used in the formulation of architectural coatings. As a part of that effort, staff also included an assessment to further understand the interactions between various architectural coating emissions and mobile emission sources on particulate matter (PM) formation.

As an active member of the Reactivity Research Working Group (RRWG), a public-private partnership with a charter to conduct research on reactivity-based controls to determine whether it is feasible as an alternative compliance option, staff has coordinated their current efforts with CARB and RRWG. As part of the collaborative effort, a study was completed in 2005 using an environmental chamber at the University of California at Riverside (UCR). The study used the chamber to evaluate mechanisms for photochemical O_3 formation under low NO_x conditions (Carter 2004) and for other projects. A final report has recently been released and the CARB and AQMD will continue to address the possibility of an alternate ozone control strategy.

AQMD staff will continue to monitor all reactivity-related research at the RRWG, and plans to work closely with CARB staff. However, based on the latest research and analysis, as well as the recommendations of the researcher to conduct additional analysis, staff supports the continuation of a mass-based ozone control strategy, with future consideration for a reactivity-based approach. Appendix D of this report contains more detailed information regarding the research conducted relative to this study.

Alternate Means of Compliance

Averaging Compliance Option

In order to promote compliance flexibility and allow manufacturers additional time to reformulate certain compliant products of their choice, an averaging provision was added to Rule 1113. The November 8, 1996 amendments to Rule 1113, added an Averaging Compliance Option (ACO) for the Flats category. Subsequent amendments streamlined its implementation and added additional categories to provide additional compliance flexibility with the future limits. There are currently eight manufacturers that are utilizing the ACO for averaging a variety of coating categories including flats, non-flats, floor, industrial maintenance, primers, sealers, undercoaters, quick-dry primers, quick-dry sealers, quick-dry undercoaters, quick-dry enamels and rust preventative.

Three manufacturers submitted plans for the period of June 30, 2001 to July 01, 2002, all of which elected to average flat coatings. These three companies were Surface Protection Industries, Dunn-Edwards and Sherwin Williams. Staff completed audits for the first three participating manufacturers and concluded that they were fully compliant with rule requirements during that compliance period.

The second round of ACO audits is currently underway for eight participating manufacturers specific to the compliance period in 2003. The eight manufacturers' plans under review by staff include Dunn-Edwards, EVR-Gard, Frazee, ICI Dulux, Sherwin Williams, Surface Protection Industries, Tibbets Newport and Vista Paints.

The compliance period for 2004 included nine participating facilities. Staff intends to initiate auditing the 2004 ACO programs as soon as the 2003 ACO programs audits are completed. It should be noted that the eight manufacturers participating in 2003 opted to continue their plans in 2004 with slight modifications and one additional company, Rust-Oleum, was added.

The same manufacturers that have participated in the ACO since 2003 continue to do so for the current 2005 compliance period except for Rust-Oleum. Staff has been informed by Rust-Oleum that they have reformulated their product line to meet the limits as specified in Rule 1113 and no longer need to use the ACO program.

The ACO Program is available to manufacturers that desire to exceed specific coating category VOC limits by offsetting the emissions with reductions from coatings below the allowable VOC limits stated in the rule. The extensive ongoing audit process helps to verify that the ACO program results in equivalent emission reductions and is enforceable.

Sell Through Option

Another compliance option available to architectural coating manufacturers allows the sale or application of a coating manufactured prior to the effective date of the corresponding standard in the Table of Standards for up to three years after the effective date of the standard. This sell-through provision applies to all coatings listed in the Table of Standards and any effective dates applicable to the specific coating. Many manufacturers continue to take advantage of this available option in order to allow them additional time to reformulate their products just prior to the effective date change in the limits. This allows the manufacturers to eliminate any potential losses in revenue due to excess stock of non-compliant coatings.

Small Container Exemption

The small container exemption provides VOC regulatory relief to the manufacturers provided they submit an annual report within three months of the end of each calendar year for their products that are sold in 1 quart size containers or less. If a manufacturer fails to submit their annual report, the manufacturer can no longer claim the exemption. Staff does notify the manufacturers by letter or e-mail if their annual report has not been received on time. This is done to ensure that all the manufacturers are reminded of the small container exemption and to facilitate their compliance with the rule. The number of reporting manufacturers selling coatings within the AQMDs jurisdiction under this exemption has increased over the years. Table 7 below shows the trend.

Table 7
AQMD Small Container trends, 2000-2004, Companies Reporting

	2000	2001	2002	2003	2004
No of Companies Reporting	12	13	15	24	29

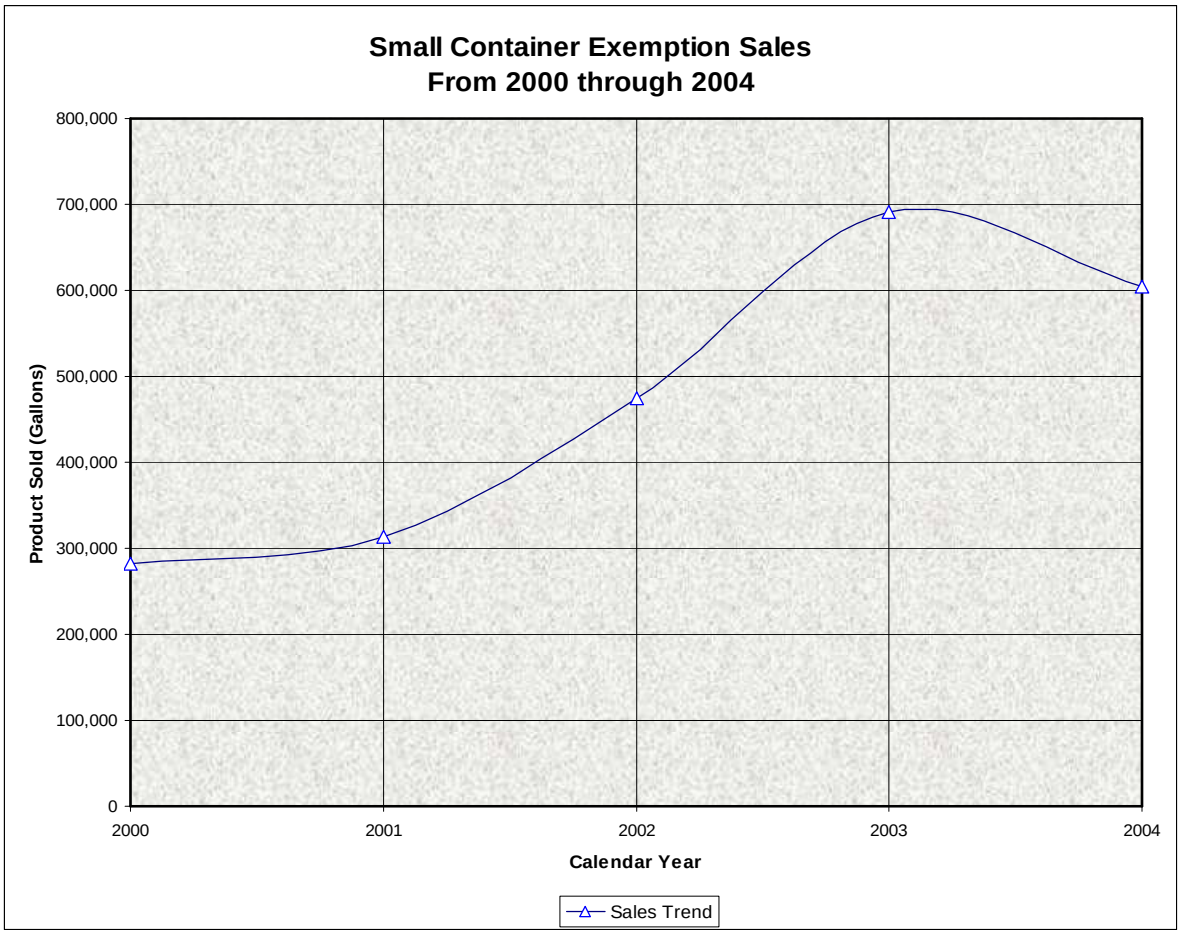
Staff has been actively tracking the statistics of the small container exemption under Rule 1113. Table 8 shown below displays the data from the year 2000 through 2004. The table also summarizes the total volume of coatings sold under the small container exemption in Rule 1113.

Table 8
AQMD Small Container Trends, 2000-2004, Product Category Sales

Coating Category	2000 (Gallons)	2001 (Gallons)	2002 (Gallons)	2003 (Gallons)	2004 (Gallons)
Faux	127.5	189.5	0.0	9,943.0	6,202.3
Flat	246.3	4,812.8	24,613.2	10,645.4	6,358.4
Floor	0.0	70.0	0.0	1,709.5	840.0
IMC	641.4	0.0	169.3	21,998.0	360.0
Lacquers	237.0	1,332.9	1,963.7	745.0	2,404.0
Mastic Coatings	0.0	0.0	0.0	35.0	0.0
Metallic Pigmented	0.0	101.0	0.0	1,487.0	153.8
Multi-color	109.0	0.0	0.0	0.0	0.0
Non-flat	13,818.6	19,748.4	9,502.9	98,752.9	36,640.5
PSU	18,864.0	13,225.2	26,196.8	25,043.3	21,903.7
QD-E	0.0	0.0	0.0	4,605.0	4,682.6
QD-PSU	1,335.0	1,651.0	327.0	4,465.0	14,826.3
Roof Coating	0.0	0.0	0.0	32,969.0	8.8
Rust Pre. (> Rule Limit)	0.0	0.0	0.0	70.0	107.0
Sanding Sealers	583.0	734.5	4,060.5	2,824.6	3,653.8
Stains	120,299.0	141,649.5	220,058.3	250,243.1	270,601.3
Traffic Coating	0.0	0.0	0.0	7,250.0	0.0
Varnishes	125,763.7	130,196.9	186,557.4	217,288.9	235,140.1
Waterproofing Sealers	196.5	48.0	1,797.5	1,477.5	92.0
WCMS	0.0	0.0	0.0	229.0	17.0
TOTALS	282,221	313,760	475,247	691,781	603,995

One can see from Table 8 that the total sales for each year increased except for year 2004. Graph 3 presents the totals shown in Table 8 in graphical format.

Graph 3
AQMD Small Container Trends, 2000-2004, Total Sales



Summary of Past AQMD Sponsored and Other Coating Studies

To address concerns by industry representatives and coating manufacturers that lowering the allowable VOCs in products to meet the future 2006 limits may compromise the coating characteristics such as applicability and durability, staff has contracted with industry experts and conducted several studies over the years. Staff also continues to review those completed by other agencies and the industry.

Prior reports and summaries of reports submitted to the Board regarding architectural coatings include coating technology assessments and product availability studies that indicated the availability of compliant coatings in the specific categories studied. A review of those studies supports staffs contention that super-compliant coatings meet or exceed expected characteristic performance standards compared to products that have much higher VOC content.

National Technical Systems

In 1998, during rule development efforts, the AQMD contracted with National Technical Systems (NTS) to obtain performance data for various coatings. The study analyzed the application and durability characteristics of 94 individual coatings and 44 coating systems. The findings of the laboratory testing portion of the study indicated that the zero- and low-VOC products showed similar and in some cases, better performance properties than the high-VOC coatings. Following the laboratory testing of the coatings, an accelerated weathering study of the coating systems including a 24-month exposure test was conducted to evaluate ambient conditions on the paint systems. At the end of the two-year outdoor test, the results continued to show that the zero and low-VOC coatings tested were similar in weathering and durability characteristics and in many cases outperformed the higher-VOC solvent borne counterparts. The same panels are still being exposed to the outdoor elements at two locations in the South Coast Air Basin. The periodic review by AQMD staff continues to show similar trends of degradation over time, further substantiating the overall good performance of the low- and zero-VOC coatings when compared to the higher VOC products in the same category.

AVES Study

In May of 1999 the AQMD awarded a contract to AVES, an affiliate of ATC Associates Inc. to develop architectural coatings with little or no volatiles. AVES was able to develop coatings that included various stains, waterproofing sealers and clear wood finishes and presented the findings in a final report titled, "Development and Demonstration of Zero- and Low-VOC Resin Technology for Advanced Control Measure Development", issued on March 29, 2001. AQMD laboratory analysis confirmed that the new coatings formulated for the project contained less than 10 g/l of VOCs.

AQMDs staff opinion was that the coatings formulated for the study could readily be applied in typical architectural settings. In actuality, the original company, and many of its employees, along with the rights to the formulation data had been bought by a major coating manufacturer and those initial products have been further improved upon and are now commercialized throughout North America.

KTA-Tator

In March of 2001, the AQMD awarded a contract to KTA-Tator, Inc. for the study of various coatings. The evaluation reviewed performance characteristics of 31 products in four architectural coating categories that included floor coatings, non-flat interior and exterior high gloss paints, interior and exterior primers, sealers and undercoaters and interior stains. AQMD staff concluded that the overall results substantiate current and future limits.

Public Service Agencies

SCAP Assessment

As previously mentioned, SCAP, (Southern California Alliance of Publicly Owned Treatment Works) a non-profit corporation organized to help ensure that regulations

affecting Publicly Owned Treatment Works (POTW) are reasonable and in the publics best interest, initiated an independent study separate from the EPSA study in September 2000 to identify low-VOC coating systems suitable for wastewater treatment and conveyance facilities. Participants in this study included the Los Angeles County Sanitation District, the Orange County Sanitation District, the Eastern Municipal Water District, Las Virgenes Municipal Water District and the City of Los Angeles.

An evaluation of the performance of low-VOC atmospheric and immersion coating systems both in laboratory testing and a two-year field exposure was completed. The industrial maintenance coating systems represented three VOC content ranges: the first group of coatings (250 g/l to (<340 g/l) complied with the January 01, 2003 VOC limits, the second group (100 g/l to <250 g/l) represents coatings that comply with the January 1, 2004 VOC limits; and the third group of coatings (<100 g/l) meets the July 1, 2006 VOC limits in Rule 1113.

The results of the study, completed in February 2003, indicated that compliant coating systems meeting the performance criteria for wastewater environments and 2006 limits are currently available and perform similarly to existing coating systems.

EPSA Assessment

The technology assessment for the Essential Public Service Agencies (EPSA) that was initiated in late 1999 at the Boards directive is complete. The assessment was established by a committee comprised of representatives from the AQMD, Metropolitan Water District of Southern California, the Department of Water Resources, Cal Trans and the Los Angeles Department of Water and Power. As previously mentioned in this report, the testing completed to date, indicates that available low-VOC industrial maintenance immersion coatings meeting the 2006 limits, conform to their stringent standards; however, they continue to look for IMC atmospheric products that also meet the criteria.

AQMD staff has recognized that the currently available 100 g/l VOC or less atmospheric coatings may not meet MWDs and the EPSA rigorous standards. Further testing by MWD of the federally exempted solvent, TBAc, shows much promise. ~~The EPSA and m~~Many IMC manufacturers would like to see the AQMD delist TBAc to make the development of compliant coatings easier. AQMD staff is supportive of the partial delisting of TBAc for use in heavy duty atmospheric IMCs, although staff is awaiting the completion of an analysis of any potential toxic risk fro this limited use.

The MWD along with the EPSA and AQMD staff will continue to identify, test, and evaluate other compliant high performance industrial maintenance coatings in the future.

Rule 1136 Technology Assessment

The technological assessment, issued in June 2003, for Rule 1136 – Wood Products Coatings indicates technology exists and is in use today in the form of many resin and

solvent systems that are less than 275 g/l of VOCs for application to wood substrates. There are many companies that conduct a variety of wood finishing operations that meet the proposed 275 g/l VOC limit for clear wood finishes in Rule 1113. Those companies support the feasible use of low-VOC products and staff discussions with the low-VOC coating manufacturers suggest a cross-over of use of the same products for shop- and field-finishing applications. This supports staff conclusions that the products far below 275 g/l VOC currently being utilized in the wood products manufacturing industry covered under Rule 1136 can make a transition to field applications under Rule 1113.

Current Coating Study

The requirements under Rule 1113 state that a technology assessment for certain coating categories shall be completed prior to July 1, 2005. Although not specific as to the type of assessment, the AQMD has continually sought additional funding to support laboratory testing of architectural coatings through the release of Requests for Proposals (RFP). In May of 2004, the AQMD released an RFP to solicit and qualify a consultant with technical expertise in the field of testing and analysis of recently developed and commercially available architectural and industrial maintenance coatings.

The overall results of this most recent architectural coatings laboratory evaluation by UMR, continues to support staff's conclusions. In all instances except non-flat high gloss and QDEs, commercially available products that meet the 2006 limits listed in the Table of Standards for Rule 1113 have performance characteristics that are similar to and in many cases better than their higher-VOC counterparts. The results of the findings are summarized on the following pages, with the empirical data available for review in Appendix C of this report.

University of Missouri - Rolla Coatings Institute (UMR)

In June of 2004, a contract was awarded to UMR to conduct an evaluation of various architectural coatings as selected and approved by the TAC and AQMD staff. The testing consisted of three phases, each analyzing a series of coatings in one or more categories.

Phase 1

The first phase was completed in April 2005 and tested twelve non-flat coatings ranging from 0 to 242 g/l of VOC. The results of the testing are included in Appendix C of this report. Table 9, shown below, lists the coatings tested in Phase I.

Table 9
Phase I UMR Study, NF

Product Name	Published VOC	VOC Determination	VOC Group
Group 1:	**High Gloss Non-flats**		
Product A1	242 g/L	>50 g/L	High-VOC
Product B1	149 g/L	>50 g/L	High-VOC
Product C1*	50 g/L	>50 g/L	High-VOC
Product D1	0 g/L	≤50 g/L	Low-VOC
Group 2:	**Medium Gloss Non-flats**		
Product E1	150 g/L	>50 g/L	High-VOC
Product F1	144 g/L	>50 g/L	High-VOC
Product G1	0 g/L	≤50 g/L	Low-VOC
Product H1	0 g/L	≤50 g/L	Low-VOC
Group 3:	**Low Gloss Non-flats**		
Product I1	150 g/L	>50 g/L	High-VOC
Product J1	112 g/L	>50 g/L	High-VOC
Product K1	<50 g/L	≤50 g/L	Low-VOC
Product L1	49 g/L	≤50 g/L	Low-VOC

*** Subsequent SCAQMD Laboratory analysis indicated actual VOC of 150 g/l**

The overall results of the Phase I testing for non-flat coatings continue to support prior testing and other research efforts conducted by staff that low-VOC coatings perform as well as higher VOC counterparts, and in many instances outperform them. For example, for the medium and low-gloss categories dry time properties for the low-VOC products were generally better than the high-VOC counterparts, whereas block resistance, scrub resistance, and UV resistance were overall similar. The freeze thaw properties were lesser for the low-VOC compliant products. However, freeze thaw properties are not as significant a concern in Southern California as in other parts of the country.

In the non-flat high gloss category, there was an issue with one of the two low-VOC high gloss coatings selected for testing. One of the products chosen as a low-VOC high gloss product based on manufacturer supplied data, listed above as C1, outperformed all other coatings in the testing phase. Unfortunately, it was determined through AQMD laboratory VOC testing that this product did not meet the future VOC limit. As a result, for the non-flat high-gloss category, only one low-VOC compliant coating was tested and it had lesser performance in some characteristics but equal or better performance in others, when compared to the high-VOC counterparts. For example, block resistance and stain resistance using carbon black properties were lesser, whereas UV resistance is overall similar.

Phase 2

The second phase was completed in November 2005 and consisted of testing primers, sealers, and undercoaters (PSU), waterproofing and concrete masonry sealers (WPCMS), exterior stains (ES) and clear wood finishes (CWF). The highest VOC containing coating had 390 g/L of VOC and the lowest VOC containing coating had 12 g/L of VOC.

The results of this second testing phase are also included in Appendix C of this report and includes the raw data. Table 10, shown below, lists the coatings tested in Phase II.

Table 10
Phase II UMR Study, PSU,WPCMS,ES,CWF

Product Name	Published VOC	VOC Determination	VOC Group
Group 4:	**Primers/Sealers/Undercoaters**		
Product A2	142 g/L	>100 g/L	High-VOC
Product B2	125 g/L	>100 g/L	High-VOC
Product C3	63 g/L	≤100 g/L	Low-VOC
Product D3	58 g/L	≤100 g/L	Low-VOC
Group 5:	**Waterproofing & Concrete/Masonry Sealers**		
Product E3	390 g/L	>100 g/L	High-VOC
Product F3	350 g/L	>100 g/L	High-VOC
Product G3	270 g/L	>100 g/L	High-VOC
Product H3	92 g/L	≤100 g/L	Low-VOC
Product I3	86 g/L	≤100 g/L	Low-VOC
Product J3	< 65 g/L	≤100 g/L	Low-VOC
Product K3	12 g/L	≤100 g/L	Low-VOC
Group 6:	**Exterior Stains**		
Product L3	250 g/L	>100 g/L	High-VOC
Product M3	0 g/L	≤100 g/L	Low-VOC
Product N3	0 g/L	≤100 g/L	Low-VOC
Product O3	0 g/L	≤100 g/L	Low-VOC
Group 7:	**Clear Wood Finishes**		
Product P3	439 g/L	>275 g/L	High-VOC
Product Q3	347 g/L	>275 g/L	High-VOC
Product R3	250 g/L	≤275 g/L	Low-VOC
Product S3	168 g/L	≤275 g/L	Low-VOC
Product T3	57 g/L	≤275 g/L	Low-VOC
Product U3	50 g/L	≤275 g/L	Low-VOC

The overall results for the Phase II testing can be broken down into their categories; PSU, WPCMS, ES, and CWF. The Phase II tests show that the low-VOC coatings perform as wells as or in some cases outperform the high-VOC coatings. For the PSU category, the low-VOC products performed as well as the high-VOC products in terms of enamel holdout, hiding, and overall adhesion. The low-VOC PSUs had superior dry time properties than the higher-VOC PSUs. Tannin bleed through performance varied between the types of wood.

For the WPCMS, two low-VOC sealers performed better than the high-VOC sealers in terms of prohesion, a key durability characteristic, as well as water vapor transmission, and similar in terms of efflorescence. One high-VOC sealer performed best in terms of stain resistance to a variety of products, including brake fluid, transmission fluid, diesel fuel, and motor oil.

For ES, the low-VOC products performed better in terms of stain resistance and direct adhesion to wood. Similar performance characteristics included UV resistance and taber abrasion.

For the CWF, the low-VOC finishes performed better in terms of stain resistance, taber abrasion and UV resistance, and similar in terms of mar resistance, as well as flow/level and sag.

Phase 3

The third and final phase of the UMR study was conducted on Rust Preventative (RP) and Industrial Maintenance Coatings (IMC) and was also completed in November of 2005. Table 11, shown below, lists the coatings tested in Phase III. The UMR raw data for this final phase may be found in Appendix B of this report

Table 11
Phase III UMR Study, RP & IMC

Product Name	Published VOC	VOC Determination	VOC Group
Group 8:	**Rust Preventative Coatings**		
Product A3-p	345 g/L	>100 g/L	High-VOC
Product A3-t	390 g/L	>100 g/L	High-VOC
Product B3-p	340 g/L	>100 g/L	High-VOC
Product B3-t	370 g/L	>100 g/L	High-VOC
Product C3-p	58 g/L	≤100 g/L	Low-VOC
Product C3-t	<50 g/L	≤100 g/L	Low-VOC
Product D3-p	0 g/L	≤100 g/L	Low-VOC
Product D3-t	0 g/L	≤100 g/L	Low-VOC

Table 11 Cont'd
Phase III UMR Study, RP & IMC

Product Name	Published VOC	VOC Determination	VOC Group
Group 9:	**Industrial Maintenance Coatings**		
Product E3-p	163 g/L	>100 g/L	High-VOC
Product E3-i	235 g/L	>100 g/L	High-VOC
Product E3-t	<250 g/L	>100 g/L	High-VOC
Product F3-p	0 g/L	≤100 g/L	Low-VOC
Product F3-i	40 g/L	≤100 g/L	Low-VOC
Product F3-t	66 g/L	≤100 g/L	Low-VOC
Product G3-p	0 g/L	≤100 g/L	Low-VOC
Product G3-i	0 g/L	≤100 g/L	Low-VOC
Product G3-t	0 g/L	≤100 g/L	Low-VOC

The overall results for the Phase III testing can be broken down into two categories, RP and IMC. Specifically for RP coatings, the low-VOC products had superior dry time characteristics, prohesion, and flash rusting. They were similar in terms of hide, taber abrasion, impact resistance, and adhesion (Battele). For IM coatings, the low-VOC products exhibited similar performance in terms of adhesion and superior in terms of UV resistance (gloss retention) and prohesion (gloss retention). The high-VOC IM system performed better in terms of flexibility.

Future Actions

Staff will continue to review and evaluate all coating categories within the Table of Standards for compliance with those limits effective in 2006 and beyond.

AQMD staff will continue work closely with the TAC to review the completed testing by UMR. In addition, staff will pursue further discussions with Cal Poly Pomona to conduct additional evaluations of coatings as selected by the TAC and staff in specific categories. Additionally, the National Paint and Coatings Association is currently in the process of releasing funding for a study that will closely follow the ongoing UMR study to determine performance and long term durability of low and ultra low-VOC coatings.

At the request of Governing Board Chairman William Burke, an ad hoc committee was formed for the purpose of improving communication between the National Paint and Coating Association and AQMD, and providing an open forum for discussion of key regulatory issues. This committee is made up of AQMD Board Members Michael Antonovich and Jan Perry, AQMD Management representatives Dr. Barry Wallerstein and Dr. Laki Tisopulos, and industry representatives Christine Stanley of Ameron and Ron Widner of Benjamin Moore. Steve Sanchez of U.S. Can Co. is an industry alternate. Periodic updates will be given by staff to the Board's Stationary Source Committee.

In addition to these technology assessments, staff will be involved in the following activities over the next year:

1. Meetings with the Ad Hoc Committee as requested;
2. Quarterly meetings and regular conference calls with the TAC;
3. Evaluation of the 2005 CARB Architectural Coatings survey for year 2004 sales;
4. Updates of low- and Super-Compliant- VOC product availability lists;
5. Review results of continued evaluations underway by Essential Public Service Agencies on performance of industrial maintenance coatings;
6. Continuing field audits and contractor surveys of in-use applications of all coatings with future compliance dates in Rule 1113;
7. Monitoring closely the technology advancements to be initiated by the actual paint and coatings manufacturers
8. Compliance audits of Averaging Compliance Plans, and
9. Refinement of performance evaluation criteria for future assessments.

The next Status Report will be presented to the Governing Board in July of 2006.

Recommendation

AQMD staff's research of technical information from many coating manufacturers, coating studies, assessments of sales data, marketing brochures, Material Safety Data Sheets and other sources clearly shows an ever increasing number and volume of products that meet the future proposed limits.

However, with the completion of the most recent technology assessment by the University of Missouri-Rolla-Coatings Institute and in meetings with the TAC, Rule 1113 Ad Hoc Committee and individual coating manufacturers and resin suppliers, AQMD staff recognizes the need to address certain difficulties in meeting the 2006 limits in several categories within the Table of Standards. Virtually all coating categories in Rule 1113 except for high gloss coatings, currently have more than adequate replacement products for solvent-based and other higher VOC counterparts, many of which are well below the current lowest effective limit of 50 g/l VOC. The MWD however, with its uniquely high performance needs, specify certain IM coatings to meet durability times about twice the expected times. As a result, for those users, IM coating technology needs additional flexibility to formulate compliant products that perform to such rigorous standards. Relative to the non-flat high gloss coatings, it appears that most coatings manufacturers have not yet taken full advantage of the most recent technological breakthroughs and some additional time may be helpful for their reformulations.

Therefore, staff is recommending to amend Rule 1113 to include a new category for non-flat high gloss coatings with a VOC limit of 150 g/l effective on July 1, 2006. On July 1,

2007 the limit for this new category will reduce back to 50 g/l VOC, coinciding with the general non-flat category. This suggested amendment would also include the companion category of QDEs that would otherwise reduce to 50 g/l VOC on July 1, 2006.

As part of the rule development process, in addition to the above suggested amendments, staff is proposing to evaluate the partial delisting of TBAc, a solvent that EPA and CARB has determined to be VOC exempt, for certain Industrial Maintenance coatings. AQMD Staff recognizes that the use of this exempt solvent will provide manufacturers with additional flexibility in reformulating products with exceptional performance characteristics while meeting the effective rule VOC limitation of 100 g/l VOC.

Finally, in an effort to offset the emission reduction impacts of the above proposals, staff will consider tightening or accelerating the VOC limits for several categories as suggested by the National Paint and Coatings Association, where low-VOC compliant products are available (i.e. Bond Breakers, Concrete Curing Compounds, Dry Fog Coatings, Traffic Coatings).

Appendices

A. Coatings Analysis

B. AQMD Point of Distribution Product Inventory Survey

C. UMR Coatings Institute Architectural and Industrial Maintenance Coatings Assessment

D. Excerpts from CARB/SCAQMD Reactivity Study

E. Comment Letters Received and Response to Comments