Green Purchasing Best Practices: Traffic Paint

Prepared for:

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HIGHLIGHTS

- This guide focuses primarily on waterborne and solvent-based *traffic-marking paints* used on highways and roads. It also covers *zone-marking paints* used on parking spaces, cross walks, handicapped zones, and airport runways. In addition, it includes a short section on glass beads that are often added to traffic paints to increase reflectivity. It does NOT address thermoplastic or chlorinated rubber road-marking products, or tree- or field-marking paints.
- Waterborne (water-based) traffic- and zone-marking paints present far lower human health risks and negative environmental impacts than equivalent solvent-based products. They have become industry standard. Price differences between solvent-based and waterborne traffic paints are negligible due to high market demand.
- While the federal government set a 150 g/l limit on volatile organic compounds (VOCs) on traffic paint, products meeting a 100 g/l VOC limit set by the South Coast Air Quality Management District (SCAQMD) are widely available and cost-competitive.
- Some zone-marking paints are certified as environmentally preferable by the Master Painters Institute (MPI) under its Green Performance Standard (GPS) or UL/EcoLogo under its CCD-047: Architectural Surface Coatings standard.

WHY BUY LESS-TOXIC TRAFFIC PAINTS? (page 2)

- Waterborne (water-based) traffic- and zone-marking paints present far lower human health risks and negative environmental impacts than equivalent solvent-based products. Price differences between solvent-based and waterborne traffic paints are negligible due to high market demand.
- Low-VOC traffic- and zone-marking paints emit fewer smog-producing compounds than conventional traffic paints.
- Some solvent-based (alkyd) traffic- and zone-marking paints contain solvents that can cause cancer (e.g., benzene, ethyl benzene, and methylene chloride) or reproductive toxicity (e.g., toluene). Safer solvent-based traffic paints typically use acetone as their primary solvent, which is much less toxic.
- Some traffic- and zone-marking paint products contain lead, chromium and other toxic heavy metals that can end up in water supplies and expose workers handling these products. High-performance products devoid of these toxic heavy metals are now widely available and cost-competitive.

BEFORE BIDDING (page 6)

- Create a Traffic Paint Contract Development Team. Invite high-use agencies (e.g., your transportation and parks departments, airport, etc.) as well as your procurement office and environmental department to participate.
- Review historical usage data to identify the types and amounts of high-usage products to include on your contract.
- If new products may be added to your contracts, your end-users may want to performance test sample products.

What Types of Products Are Needed?

- Waterborne traffic paints can be used for most road- and zone-marking applications, including highways.
- Solvent-based traffic-marking paints may be needed for extremely low-temperature applications or by agencies or jurisdictions that have not yet transitioned to stainless-steel-lined application equipment.
- Zone-marking paints can meet the same (or stronger) environmental criteria as traffic-marking paints, although they have less rigorous technical requirements; traffic paints may be used for some zone-marking applications.

What Green Products Are Out There?

- Waterborne traffic- and zone-marking paints with ≤100 g/l VOCs (i.e., SCAQMD-compliant) and devoid of heavy metals are widely available and have become industry-standard.
- Some specialty traffic paints such as those used in extremely low-temperatures may need up to 150 g/l VOCs.
- At least three major US manufacturers offer solvent-acrylic traffic paints with acetone as the primary solvent; these products contain ≤100 g/l VOCs and are devoid of toxic heavy metal pigments.
- MPI has certified over 20 brands of environmentally preferable traffic- and zone-marking paints that meet its Green Performance Standards (GPS-1 and GPS-2). Most are **water-based traffic and/or zone-marking paints**, while a few are **low-VOC solvent-based traffic-marking paints**.

Are there Cooperative Purchasing Contracts for Green Products?

- Look for traffic- and zone-marking paints that contain ≤100 g/l VOCs on existing cooperative purchasing agreements such as the **WSCA contracts with Grainger, Fastenal, and MSC**. Some are labeled SCAQMD-compliant. These contracts may only offer products in relatively small containers (1-5 gallon).

Are There Useful Model Specifications from Other States?

- California **specified waterborne, rapid-dry traffic paint** with ≤100 g/l VOCs and toxic chemical restrictions.

"GREEN" CERTIFICATIONS AND STANDARDS FOR TRAFFIC PAINTS (page 11)

- The Master Painters Institute (MPI) certifies traffic- and zone-marking paints under its Green Performance Standards (GPS 1 & 2). MPI's GPS criteria include VOC limits, prohibitions on certain chemical components (such as lead, toluene, ethyl benzene, and other toxic chemicals found in some traffic paint products), and performance requirements. MPI has certified over 40 traffic paint products made by nearly 20 companies under its GPS-1 and GPS-2 standards. Most certified products are water-based zone-marking paints. They all meet a 150 g/l VOC limit, although most have <100 g/l VOCs and several have <50 g/l.
- Some MPI-certified products meet **TT-P-1952E**, the US federal government's *Specification for Waterborne Traffic and Airfield Marking Paints* (August 2007) and can be used on highways, other roadways and airport landing strips.
- Federal regulations (under the Clean Air Act) require traffic-marking paints to contain no more than 150 g/l VOCs. This VOC limit is included in TT-P-1952E, along with prohibited materials such as lead, mercury, hexavalent chromium, toluene, chlorinated solvents, and any carcinogens.
- California's South Coast Air Quality Management District (SCAQMD) has set a more stringent VOC limit of ≤100 g/l for traffic-marking paint products that are offered for sale in and around the City of Los Angeles. Consequently, there is growing availability of products with <100 g/l of VOCs and some <50 g/l.
- The federal VOC limit for zone-marking paints (in containers of 5 gallons or less) is much less stringent: 450 g/l.

BID SPECIFICATIONS (page 13)

Minimum Requirements (Specifications) for Traffic- and Zone-Marking Paints

- Vendors shall submit documentation verifying that each *waterborne traffic-marking paint* product offered on this contract meets the federal specification for waterborne traffic and airfield paints (TT-P-1952E)
- The VOC content of all *waterborne traffic paints* shall not exceed 100 g/l. This includes standard-dry, rapid-dry, and high-build traffic- and zone-marking products. All "SCAQMD-compliant" products meet this requirement.
- *Waterborne zone-marking* paints shall be certified by either the Master Painters Institute (MPI) under its Green Performance Standard (GPS) or UL/EcoLogo under its *CCD-047*: *Architectural Surface Coatings* standard.
- *Solvent-based traffic paints* shall contain acetone as the primary solvent. VOCs shall not exceed 150 g/l.
- No traffic- or zone-marking paint products offered on this contract shall contain lead, cadmium, chromium, mercury, aromatic or chlorinated solvents, (e.g., methylene chloride, benzene, ethyl benzene or toluene), or ethylene-based glycol ethers or their acetates.
- Proposers shall submit with their bid a current materials safety data sheet (MSDS) and technical data sheet (TDS) for each product they offer and submit complete information about the VOC content, "green" certifications, and other environmental attributes of their products using the accompanying bid sheet.

Additional Desirable Attributes

- *Waterborne traffic-marking paints* that (1) contain ≤50 g/l VOCs; (2) are certified by MPI to meet GPS-1 or GPI-2; and/or (3) are devoid of additional toxic chemicals of concern (e.g., other carcinogens or reproductive toxins such as phthalates, tert-butyl acetate, n-methyl pyrrolidone, and crystalline silica).
- *Waterborne zone-marking paints* that (1) contain ≤50 g/l VOCs; (2) are certified by MPI to meet GPS-2; and/or (3) are devoid of other toxic chemicals of concern (e.g., other carcinogens or reproductive toxins)
- *Solvent-based traffic- or zone-marking paints* that (1) contain ≤100 g/l VOCs; (2) are certified by MPI to meet GPS-1 or GPI-2; and/or (3) are devoid of other toxic chemicals of concern (e.g., other carcinogens or reproductive toxins)
- **Develop a Green Bid List**
- Consider using a bid sheet (see model) for bidder submissions to facilitate product comparison and evaluation.
- **Consider Including a "Brown List"**
- A "Brown List" for traffic and zone-marking paints may include waterborne paints that contain >100 g/l VOCs; or solvent-based paints that contain >150 g/l VOCs, or >1% of any chlorinated solvents (e.g., methylene chloride), toxic heavy metals (e.g., lead, chromium, or cadmium) or chemical ingredients that are known to cause cancer (such as ethyl benzene, tert-butyl acetate, DEHP, etc.) Or, the brown list could restrict alkyd zone-marking paints altogether.

ONCE THE BIDS ARE IN… (page 17)

- Review MSDSs, technical data sheets and information supplied by each bidder in the Model Bid Sheet to ensure that the VOC limits, toxic chemical restrictions, green certifications, and technical requirements referenced in your specifications are met.
- Use the Model Bid Sheet to compare prices between products of the same type and quality that meet your specs.
- Choose a single vendor for all traffic paint products, or multiple vendors to increase product availability.

VENDOR EVALUATION (page 18)

- Consider including the cost of paint "take-back" and recycling services in your "best value" price evaluation.
- If your bid evaluation process includes a "Green Point Weighting System", consider giving points to bidders that offer paint recycling and training services; use sustainable packaging or delivery vehicles, source products from local, sustainable or disadvantaged businesses; have developed user-friendly green product labeling systems, or have experience providing agencies with a "Green Spend Report".

*For more information, see **Vendor Sustainability Questionnaire***

MAXIMIZE GREEN IMPACT (page 19)

- Make your contract a cooperative purchasing agreement so that other jurisdictions can utilize it.
- Require the same specifications for contractors working on state property or on state-funded projects.
- Proactively publicize the bid to "green" traffic paint suppliers and certifiers as well as through **AASHTO** (American Association of State Highway and Transportation Officials) to promote increased competition.
- Hold a pre-bid conference with potential bidders to present your specifications and answer questions.
- Pilot test innovative products to identify additional products to include on future contracts.
- Ask vendors to help you track green purchases on this contract. This should be relatively easy if all products on your contract meet your environmental specifications (i.e., green certifications, VOC limits and heavy metal restrictions).
- Purchase paints in returnable totes whenever possible to avoid disposal costs associated with drums.
- Consider including contracts for equipment to apply waterborne traffic marking paints in order to help public agencies and institutions in the state make the transition from solvent-based paints to safer water-based products.
- Avoid aerosol traffic- and zone-marking paints (due to relatively high costs and toxic chemical exposures). If aerosol products are needed, use water-based products whenever they are available and reasonably priced.

WHAT'S ON THE HORIZON? (page 20)

- Currently, three of the six major U.S. traffic paint manufacturers evaluated offer waterborne and solvent-based traffic paints meeting the SCAQMD VOC limit of 100 g/l, the strictest in the country. Others may soon follow suit.
- By choosing vendors that offer products that have used the **GreenScreen**, **Health Product Disclosure** form, or a similar tool to publicly disclose the components and health impacts of their ingredients, purchasing agents can make more informed decisions in the future.
- The **AASHTO Subcommittee on Materials** is working to standardize the yellow pigments specified in traffic paint contracts in order to increase uniformity, decrease price, and reduce waste. Industry-standard pigment colors are yellow 33538, white 37925, blue 35180, green 34108, red 31138, and black 37038.

SCOPE OF THIS ASSESSMENT

This *Green Purchasing Best Practices Guide to Traffic Paint* provides background information and recommendations for specifying and otherwise procuring environmentally preferable *traffic-marking paints* used largely on highways and other roadways. According to the federal specification for traffic and airfield paint (TT-P-1952E), these include the following types of traffic paint:

- *Type I*: For use under normal weather conditions, i.e., 50% relative humidity, moderate temperatures and slight breezes. Not for use at the greater thickness required for the larger diameter Type IV beads.
- *Type II:* For use under adverse conditions, i.e., night striping, higher humidity (around 80%), low air movement and lower surface temperatures, down to 10°C (50°F). Not for use at the greater thickness required for larger diameter Type IV beads.
- *Type III*: For use under normal weather conditions where higher durability and greater adhesion to glass beads is desired. Minimum application temperature should be 12.8°C (55°F) and rising. Low temperature will result in greater dry time, especially when specifying increased thickness as required when using Type I beads.[1]

This Guide also addresses, but to a lesser extent, *zone-marking paints* that are commonly used on parking lots, crosswalks, airports and other similar applications. These products typically are purchased in high volume in white and yellow, and in lower volumes in blue (e.g., for handicapped zones), green and other colors.

Both types of traffic paint products are applied to traffic-bearing surfaces such as concrete and asphalt; they may be used either alone or to bind reflective beads.

This guide does not discuss line-marking paints that are used on trees, athletic fields or other types of turf. Moreover, it does not cover traffic-marking products other than paint such as thermoplastic or rubber traffic markings. It does, however, present information on the environmental benefits and availability of recycled-content glass beads that can be used to add reflectivity to traffic paints; see Appendix A.

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[1] *Federal Specification, Paint, Traffic and Airfield Marking, Waterborne*, TT-P-1952E, August 6, 2007; **http://www.wbdg.org/ccb/FEDMIL/ttp1952e.pdf**.

WHY BUY LESS-TOXIC TRAFFIC PAINTS?

The market for environmentally preferable traffic marking paints is relatively mature, with many high-performance products available that are water-based, that contain relatively low levels of volatile organic compounds (VOCs), and that are devoid of lead, chromium, cadmium, and other toxic chemicals of concern. These new-generation traffic paints emit fewer VOCs, which can contribute to smog, into the air; pose less risk to workers; and offer easier cleanup and disposal than the solvent-based traffic paints of the past. Waterborne traffic paints must be used in equipment lined with stainless steel, and may be challenging to work with under extremely cold weather conditions because they do not dry as quickly as their solvent-based predecessors. Nonetheless, waterborne traffic paints are the industry standard and offer the best option for protecting human health and the environment. The best-in-class, or least toxic traffic marking paints available, are waterborne products containing ≤100 g/l VOCs that are also devoid of toxic heavy metals. These paints meet the South Coast Air Quality Management District's (SCAQMD) low-VOC requirements on traffic paints sold in and around the City of Los Angeles, CA.

Agencies and jurisdictions without stainless steel-lined "striping" equipment must use solvent-based traffic paints. Traditional alkyd, solvent-based traffic paints often contain relatively high concentrations of VOCs, including some solvents such as methylene chloride, benzene or ethyl benzene that are "known to the State of California to cause cancer, birth defects or other reproductive harm (under **California's Proposition 65** law, officially know as The Safe Drinking Water and Toxic Enforcement Act of 1986). The newer generation "solvent-acrylic" traffic-marking paints suspend pigments in a mixture of acrylic paint and solvents, effectively reducing the amount of solvents (and VOCs) they contain. The primary solvent used in these paints is typically acetone, which poses lower human health and environmental risks than traditional chlorinated and benzene-based solvents, such as the ones listed above. Although these solvent-acrylic traffic paints are preferable to traditional alkyd, solvent-based traffic paints, some products contain small to moderate amounts of the carcinogens and reproductive toxins listed above as well as other chemicals of concern. See **Table 1** for information on toxic components found in a sampling of low-VOC solvent-based traffic paints currently on the market. **Appendix B** offers a more detailed analysis. Solvent-based traffic marking paints containing ≤100 g/l VOCs are also available for standard, normal-conditions applications.

Zone marking paints (commonly used on parking lots) are typically lower quality and have a slower drying time. In addition, they tend to have higher VOC content because there are no federal VOC limits on zone marking paints. Low-VOC solvent-based traffic paint can be used in lieu of zone marking paint if solvent products must be used (in very cold temperatures, for example) without much difference in price or performance. However, waterborne paints are preferred because of their reduced health and environmental risks.

Purchasing traffic paints that meet SCAQMD's VOC limits (in lieu of high-VOC zone-marking paints) can help a facility qualify for LEED credits under *Innovation In Design* credits, especially when paints are used in areas that impact indoor air quality.

Regulatory Compliance

Limits on Volatile Organic Compounds: The U.S. Environmental Protection Agency (U.S. EPA) limits the VOCs in traffic paints to 150 g/l under the **Clean Air Act**. This applies to both waterborne and solvent-based traffic marking paints, with the exception of products sold in containers smaller than 1 liter (1.057 quarts) in size or in aerosol cans. Waterborne traffic-marking paints easily comply with this VOC limit. To comply with this regulation, manufacturers of solvent-based paints must use a solvent that is exempt from the U.S. EPA's VOC measurements[2] such as acetone, which does not contribute to smog.

Zone-marking paints are also subject to the federal government's 150 g/l VOC limit.[3] However, in 1999, EPA issued regulations clarifying that while all traffic-marking paint products must meet the 150 g/l VOC limit, traditional solvent-based (alkyd) zone-marking paints sold in containers of five gallons or less may contain up to 450 g/l VOCs.[4]

The **South Coast Air Quality Management District (SCAQMD) Rule 1113** established a more-stringent VOC limit of 100 g/l for all architectural coatings, including both traffic- and zone-marking paints sold in and around the City of Los Angeles, California. Today, many waterborne traffic- and zone-marking paint products sold outside California meet this requirement. Some acrylic solvent-based traffic paints also comply with this VOC limit, but they may be less available and more expensive than those that do not.

Health & Environment

Environmentally preferable traffic marking paints are waterborne (rather than petroleum-based), contain ≤100 g/l VOCs, and are devoid of heavy metals such as lead, chromium, cadmium, cobalt, and mercury as well as other toxic chemicals of concern. Traditional alkyd (solvent-based) traffic paints often contain high concentrations of solvents that pose serious health risks such as cancer (e.g., benzene, ethyl benzene, methylene chloride, tert-butyl acetate, xylene, and DEHP, a type of phthalate[5]) and reproductive harm (e.g., toluene, n-methyl pyrrolidone, and several types of phthalates). **Table 1** below details the types of ingredients found in low-VOC solvent-based traffic paints, and **Appendix B** offers a more complete analysis of ingredients of concern found in these paints.

Pigments: Lead chromate was typically used to make a yellow color, but has largely been replaced with lead chromate-free yellow pigments with no decrease in performance. Some pigments traditionally also contained mercury, cobalt, or cadmium. Though metal-based pigments are less expensive to produce than their successors, which are typically made of organic (carbon-based) compounds, they have largely been phased out because of their health and environmental costs and are typically only available in products manufactured for the export market. According to several manufacturers, only one US state still allows traffic paint containing

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[2] Exempt solvents are those not contributing to the production of ground-level smog.

[3] Source: U.S. Environmental Protection Agency, Detailed Fact Sheet: Architectural Coating Rule for Volatile Organic Compounds, undated; <**http://www.epa.gov/ttnatw01/183e/aim/aimfact.pdf**>

[4] Center for Environmental Excellence by AASHTO (American Association of State Highway and Transportation Officials), *Best Practices Manual*, Chapter 5, 5.5: Pavement Marking Materials, undated, **http://environment.transportation.org/environmental_issues/construct_maint_prac/compendium/manual/5_5.aspx**.

[5] While xylene is not listed as a known or suspected carcinogen by authoritative bodies, it typically contains ethyl benzene, a carcinogen, as a contaminant.

leaded pigments. Some paint manufacturers claim to have zero heavy metals in their paints. Others claim there are trace amounts of naturally occurring heavy metals, and are only willing to say their traffic paint products meet federal limits set out in **29 CFR 1910**. Leaded pigments have not been used by Sherwin-Williams since 2005, and Ennis-Flint only produces them upon special request.

Solvents are used in traffic paints to hold the resin emulsion in solution until it dries on a surface. Petroleum-based solvents tend to be higher in VOC content than water-based solvents. Traditional solvents such as toluene, xylene, and methylene chloride not only elevate the VOC content of traffic paints, they also pose other serious health risks to the workers that are handling them. A few solvents (such as acetone and tert-butyl acetate) have been declared "exempt" from these regulations because they have not been shown to contribute to the creation of ozone smog. Acetone is the most common primary solvent found in solvent-acrylic traffic paints and offers a low-toxicity and low-cost option for these products. RPN analyzed ingredients listed on MSDSs from eight solvent-acrylic traffic paint products made by five major US traffic paint manufacturers. In addition to acetone, the following solvents and ingredients of concern were found. A more detailed analysis is offered in **Appendix B**.

Table 1. Components of Solvent-based Traffic Paints

Solvent	Chemical Class	% Range	# of Products Out of 8	Health and Environmental Impacts
Xylene	Aromatic hydrocarbon	2%-7%	6	Central nervous system (CNS) depressant, skin and respiratory irritant; typically contains ethyl benzene (a CA Prop 65 carcinogen)
Ethylbenzene	Aromatic hydrocarbon	0.1%-1%	4	CA Prop 65 carcinogen; can be absorbed through; may cause CNS effects and organ damage
Naphtha	Aromatic hydrocarbon	2%-4%	3	CNS depressant, and skin and respiratory irritant; chronic exposure may damage liver; may contain benzene (a CA Prop 65 carcinogen)
Toluene	Aromatic hydrocarbon	0.1%-2%	3	CA Prop 65 developmental & female reproductive toxin; may be absorbed through the skin causing damage to liver, kidneys, blood, and nervous system
n-Methyl pyrrolidone	Aromatic hydrocarbon	0.1%-1%	1	CA Prop 65 reproductive toxin and skin irritant
Chloroalkanes	Chlorinated solvent	1%-5%	2	Marine pollutant; not inherently biodegradable
Methylene chloride	Chlorinated solvent	7%-13%	1	OSHA/CA Prop 65 carcinogen; toxic to lungs and CNS; skin irritant
Tert-butyl acetate	Unique compound – volatilizes acetone	1%-2%	1	Carcinogen per National Institutes of Health (NIH); skin and respiratory irritant; severe eye irritant; may cause liver, kidney and lung damage; may be absorbed through skin; CNS depressant
Titanium dioxide	White pigment, adds hiding power	1%-5%	8	CA Prop 65 carcinogen when airborne unbound particles of respirable size
Crystalline silica	Pigment	0.1%-5%	5+	CA Prop 65 carcinogen when airborne of unbound particles of respirable size
DEHP	Phthalate plasticizer/softener	<1%	1	CA Prop 65 carcinogen and male developmental toxin; asthmagen per NIH
DINP	Phthalate plasticizer/softener	1%	2	CA Prop 65 reproductive toxin; asthmagen per NIH

Fiscal Impacts

Water-based traffic- and zone-marking paints devoid of heavy metals are roughly equivalent in price to their higher-VOC and heavy metal-containing counterparts. There is no apparent reason (other than a shorter drying time) to include solvent-based traffic- and zone-marking products on most contracts. Switching from a solvent-based paint to a water-based product can lower disposal costs and eliminate the need to use a solvent-based paint thinner (which often contains toluene, a reproductive toxin) when cleaning up. Vendors that offer to collect unused paint and recycle it can lower contract user's disposal costs.

Retail Price Comparison of RAE Traffic- and Zone-Marking Paints Offered by Grainger								
Product Description	**Product #**	**Base Type**	**Solvent Type**	**Dry Time/ Tack-free (@ 40-90F)**	**Coverage Linear Feet @ 4" stripe (per Gallon)**	**Maximum VOCs (grams/liter)**	**Price**	
							(1 gallon)	**(5 gallons)**
Traffic Paint, Acrylic, Yellow	RAE-8511	Water (Latex)	Water	1 hour/ 5 minutes	420	88	N/A	$184.50
Traffic Paint, Low-VOC Alkyd, Yellow	RAE-7300	Solvent	Acetone	30 minutes/ 15 minutes	420	148	$60.15	$235.50
Zone Marking Paint, Latex, White	RAE-4907	Water (Latex)	Methyl alcohol	1-2 hours/ 30 minutes	420	69	$45.90	$154.00
Zone Marking Paint, Alkyd, White	RAE 2408	Solvent (Alkyd)	Heptane, Toluene	30 minutes/ 20 minutes	420	378	$62.40	$267.75
Zone Marking Paint, Fast-Dry, White	RAE 4510	Water (Latex)	Methyl alcohol	1 hour/ 5 minutes	420	90	N/A	$197.00

BEFORE BIDDING

Build a Stakeholder Team

Developing a representative and engaged stakeholder team will help ensure that the contract meets the State's technical, human health and environmental protection goals. It is important to encourage agencies and institutions that are high-volume users of traffic- and zone-marking paints to participate in your contract development team along with your environmental agency staff, which can often offer valuable technical support. This may include representatives of the transportation and parks departments, as well as agencies and institutions that operate facilities with large parking lots or roads such as corrections, colleges and universities, health care facilities, school districts, local governments, and airports, especially if they have historically utilized state contracts for this product category.

Engage a committee of end-users and other stakeholders to develop environmental and technical specifications, a bid list or high-volume market basket list, a vendor questionnaire and/or the other pieces of the bid solicitation package; make procurement strategy decisions (e.g., developing an all-green contract versus adding green products to a contract along with conventional products, awarding to a single vendor or multiple vendors, etc.); and help verify the environmental and technical attributes of offered products, evaluate the prices of products from responsive bidders, and select vendors that will bring the state the best overall value. The stakeholder team may also want to pilot test products prior to awarding contracts, monitor the contract implementation process, and publicize the availability of environmentally preferable products on the new contract(s) through the State's cooperative purchasing program and other means.

Which Types of Products Are Needed?

The most important question to ask is: *"What types of traffic- and zone-marking paints are needed on your contract?"* According to the American Association of State Highway and Transportation Officials (AASHTO), the most common type of traffic paint is Type I: single-component, rapid-dry line striping paint for use under "normal" conditions. Type II paints are traffic paints for use in colder temperature or higher humidity conditions. Type III paints are high-durability products, for use in high-traffic or high-abrasion conditions, usually in conjunction with reflective glass beads.

Another critical question that needs to be answered is: *"Do contract users need solvent-based traffic- or zone-marking paint as well as waterborne products, which are inherently safer and environmentally preferable?"* While less-toxic waterborne traffic- and zone-marking paints are now considered industry standard and are available for most applications, solvent-based traffic paints may also be needed when line striping must take place in temperatures below 40°F. In addition, while most state agencies have modern line-striping equipment suitable for use with waterborne traffic paints, some smaller agencies or other contract users that have not yet upgraded their line-striping equipment to a stainless steel-lined machine may require solvent-based products until they do so.

Vendors will also need to know how much of each type of traffic- and zone-marking paint they can expect to sell on your contract; this will help them give you a discount commensurate with expected usage. You can determine estimated usage by reviewing information on historical purchases based on sales data in your

procurement computer system, by asking vendors to provide you with "historical spend data" and/or by surveying the largest (or all) contract users about their past contract use and future needs.

Some additional questions that may need to be answered about this product category include the following:

1. *Do contract users need traffic-marking paint in addition to (or instead of) zone-marking paint?* Zone-marking paint is designed for use on parking lots and garages, pedestrian cross-walks, loading zones, bicycle lanes, etc. Products formulated for these types of applications must meet less rigorous technical specifications than those that are designed to be used on highways. Zone-marking paints are available with a certification by the Master Painters Institute (MPI) verifying that it meets one of its two Green Performance Standards (GPS-1 or GPI-2). In contrast, there are very few traffic-marking paints that are certified by MPI as GPS-compliant.
2. *What other technical specifications do these products need to meet?* For example, how quickly do the products need to dry, what temperature rating does each product need to have, what colors do you need, and what size containers should the products be supplied in? Environmentally preferable products are available in a variety of colors and container sizes, and that meet various technical specifications, although it is easier to find environmentally preferable products for high-volume applications such as white and yellow zone-marking paint.

What Green Products Are Out There?

Waterborne Traffic-Marking Paints

Waterborne traffic paints, which do not contain petroleum-based solvents, are widely available and comprise the bulk of the traffic paint products sold in the United States. The standard offering of several large U.S.-based traffic paint manufacturers such as Ennis-Flint and Sherwin-Williams is a Type I waterborne, acrylic traffic-marking paint with a ≤150 g/l VOC content that is devoid of heavy metals such as lead and cadmium. *Resins* used in waterborne traffic paints are typically polyvinyl acetate latex, or a 100-percent acrylic resin. Acrylic resins are commonly used because they have relatively short "no track" times and less heat is needed during application.

The bulk of the products on the market conform to a federal specification for waterborne traffic and airfield marking paint, TT-P-1952E, which is also referenced by many states. These products not only meet the federal government's 150 g/l limit on VOCs, but are also devoid of "mercury, lead, hexavalent chromium, toluene, chlorinated solvents, hydrolyzable chlorine derivatives, ethylene-based glycol ethers or their acetates" as per the federal specification.

The growing availability of traffic-marking paint products with a VOC level of 100 g/l or less has been attributed largely to the adoption of a more stringent VOC limit on traffic paint by the South Coast Air Quality Management District (SCAQMD). This lower VOC standard can be met by all manufacturers with their waterborne paints and are often labeled SCAQMD-compliant.

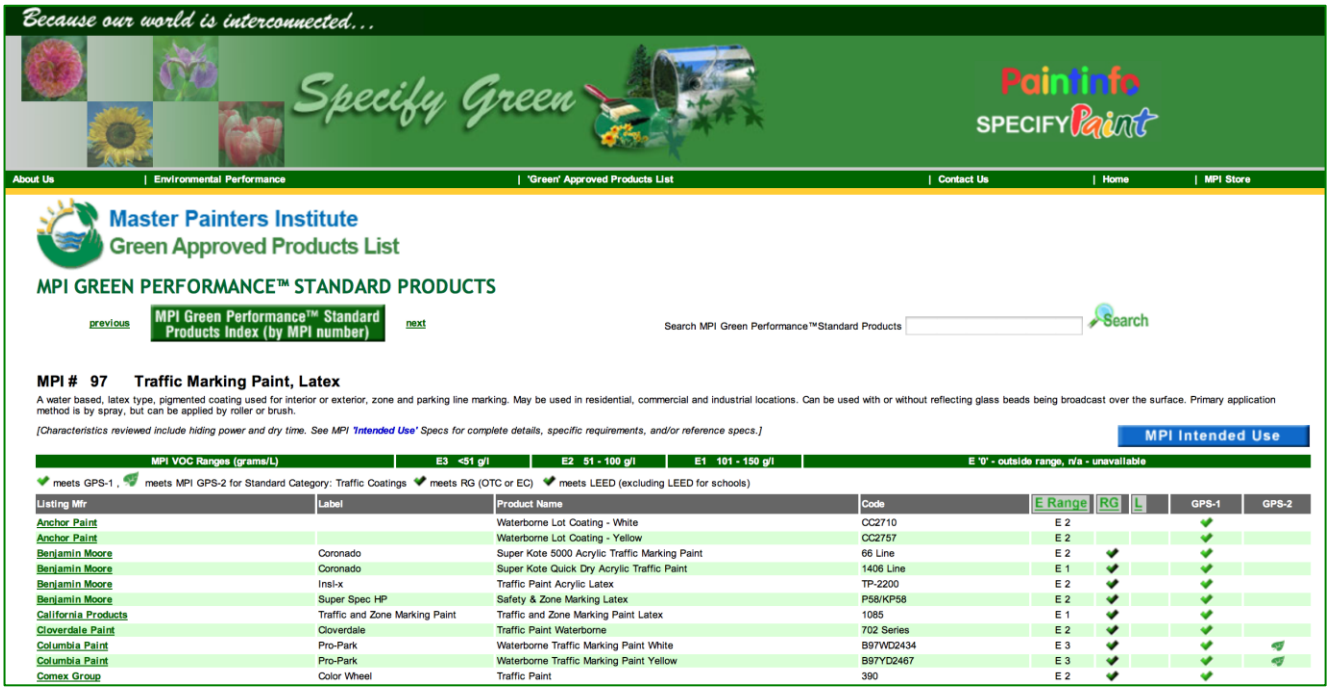
Solvent-based Traffic-Marking Paints

Solvent-based traffic-marking paints meeting the federal VOC limit of ≤150 g/l and devoid of heavy metals are widely available from most traffic paint manufacturers, and are often called "solvent-acrylic" because of their

resin mix. They typically use acetone as their primary solvent. These low-VOC solvent-acrylic traffic paints have almost entirely replaced the traditional alkyd paints in the commercial marketplace because of the federal VOC regulation. Some manufacturers such as Sherwin-Williams, International Coatings, and Ennis-Flint also offer solvent-acrylic paints meeting the 100 g/l VOC limit imposed by the SCAQMD for sale in southern California.

Waterborne Zone-Marking Paints

Water-based zone-marking paints, which are formulated for use on pedestrian cross-walks, parking lots and garages, curbs, airport runways, and many other applications, dominate the market, although solvent-based products are still available. Many manufacturers offer zone-marking paints that carry the Master Painters Institute (MPI) certification under one of its Green Performance Standards: GPS-1 and GPS-2.[6] For example, over 40 products manufactured by nearly 20 different companies can be found on MPI's List of GPS-certified products under ***Category 97: Traffic Marking Paint, Latex***. Some of the waterborne zone-marking paints on this list are offered by major manufacturers such as Benjamin Moore, Diamond Vogel, Kelly-Moore, PPG/Ennis, Rust-Oleum, and Sherwin-Williams. A few products are labeled "fast dry". Most of the products meet only the GPS-1 standard, while about a dozen products meet the more stringent GPS-2 standard. Over three-quarters of the products in this MPI GPS category have a VOC content of 100 g/l or less, which means they are SCAQMD-compliant. Many, but not all, zone-marking paints that contain 100g/l or less of VOCs are labeled SCAQMD-compliant and marketed as such, making them easy to identify.



At least one manufacturer, Micca, offers a line of waterborne zone-marking paint products (in white and yellow) that is certified by UL/EcoLogo (formerly called Environmental Choice) under its CCD-047 standard for *Architectural Surface Coatings*. According to the **Technical Data Sheet (TDS) for Micca Water Base Acrylic Traffic Paint**, these products contain a

[6]MPI's environmental standards, GPS-1 and GPS-2, are described below under the section of this guide on certifications and standards.

maximum of 80 g/l of VOCs and are "formulated without lead, mercury and chromates." (Note: Micca is a Canadian-based company so the availability of its products in the US may be limited.)

Solvent-based Zone-Marking Paints

Because the federal government does not require solvent-based (alkyd) zone-marking paints in containers of five gallons or less to meet the 150 g/l VOC limit that is applied to other traffic paint products, some on the market have a much higher VOC content (up to 450 g/l). Nevertheless, many alkyd zone-marking paints contain ≤150 g/l VOCs, and some are SCAQMD-compliant. Only two solvent-based traffic paint products are certified by MPI under its Green Performance Standard. Listed under ***Category 32: Traffic Marking Paint, Alkyd***, one is an alkyd zone-marking paint while the other is a chlorinated rubber traffic-marking product, which is outside the scope of this review. Because the performance and price of water-based zone-marking paints are often equivalent to (or better than) solvent-based zone-marking paints, there is a shrinking need for states and other jurisdictions and institutions to continue including them on their contracts.

Are there Cooperative Purchasing Contracts for Green Products?

Cooperative purchasing agreements offer purchasing agents the advantage of utilizing a contract that was developed by another state or municipality, including their negotiated prices, without having to go out to bid. It is important to ask the cooperative purchasing organization (or the lead agency) if environmental specifications were included in the bid solicitation, whether there are a significant number of "green" products offered on the contract, or if there is a core "market basket" of environmentally preferable items receiving the vendor's deepest discounts.

The **NASPO/WSCA Cooperative Purchasing Organization**, for example, has negotiated multiple cooperative purchasing agreements with vendors of facilities maintenance, repair and operations (Facilities MRO) (i.e., hardware) supplies that offer several types and brands of traffic- and zone-marking paint which meet the environmental specifications recommended in this guide. For example, one line of products, **Rust-Oleum's *2300 System Traffic Zone Striping Paint***, is SCAQMD-compliant and certified by MPI under its Green Performance Standard. These zone-marking paints are available in both one- and five-gallon containers, and in the following colors: white, yellow, blue, red, and black. **Grainger**, **Fastenal**, and **MSC** all offer some or all of these products on the NASPO/WSCA **Facilities MRO** contracts.

Are There Useful Model Specifications from Other States?

Many states reference the federal specifications for waterborne traffic paint in their bid specifications. For example, the State of Washington holds two contracts for traffic paint that include some model language:

- **Contract No. 07609** for Standard Waterborne Traffic Line Paint (2010) sets a VOC limit of 150 g/l per EPA Test Method 24 as well as several heavy metal restrictions, some of which go beyond the federal specifications. See language below.

  > *Pigments shall be first quality paint grade pigments. The pigment for the yellow paint shall be free from Lead and Chromium. The product will be considered to be Lead free if the dry film is tested according to ASTM D 3335 and found to have a total Lead concentration less than 0.06%. The product will be considered to be Chromium free if the dry film is tested according ASTM D3718 and found to be negative.*

The dry film shall not become classified as a hazardous waste when tested according to EPA Method 1311 Toxicity Characteristic Leaching Procedure for all identified toxic metal concentrations.

The Bidder, in conformity with TS 2.3, shall supply test results and certification that the paints dry film is compliant to the TCLP toxic metal limits for Arsenic, Barium, Cadmium, Chromium, Lead, Mercury, and Selenium. NOTE: Resolved as part of the bid evaluation process.

- **Contract No. 01312** for *Solvent Traffic Marking Paint* (2013). In addition to numerous technical requirements, which mandate that all products appear on a **Qualified Products List (QPL)** that is maintained by the Washington Department of Transportation, the State's specifications for fast-drying acrylic traffic paint include the following language:

  The white and yellow paint shall contain no lead, chromium, or cadmium. The VOC content of the paint shall be less than 150 grams per liter. DES reserves the right to review and modify product "green" requirements over the course of this contract.

The State of California's **contract number 1-10-80-03** for rapid-dry waterborne traffic line paint requires products to meet a more stringent VOC limit of 100 grams per liter, which is consistent with the VOC limit established by the South Coast Air Quality Management District (SCAQMD). The specification also set limits on lead (20 mg/kg), chromium (5 mg/kg) for all products offered (including white, yellow, and black paints). This **specification** also states the following:

In addition to being essentially lead and chromium free, the paint shall not contain any hazardous materials at levels that would cause the paint (when dry) to be classified as a hazardous waste under Title 22, Division 4.5 of the California Code of Regulations.

This provision protects workers handling the paint, and the environment, when it is removed at the end of its useful life.

"GREEN" CERTIFICATIONS AND STANDARDS FOR TRAFFIC PAINTS

Environmentally preferable traffic marking paints are waterborne (rather than petroleum-based), contain ≤100 g/l VOCs, and are devoid of heavy metals such as lead, chromium, cadmium, cobalt, and mercury as well as other toxic chemicals of concern. As noted above under the regulatory compliance section of this guide, U.S. federal regulations require traffic paints to contain no more than 150 g/l VOCs. Consequently, most states reference the federal government's specifications in their bid solicitations for this product category. Below is a summary of the federal specifications that apply to waterborne and solvent-based traffic and airfield marking paint.

- **Federal Specification TT-P-1952E** for *Waterborne Traffic and Airfield Marking Paint* (August 6, 2007) "covers three types of low-VOC (volatile organic compounds), ready-mixed, one-component, 100% acrylic waterborne airfield and traffic marking paint. The paint is suitable for application on such traffic-bearing surfaces as Portland cement concrete, bituminous cement concrete, asphalt, tar, and previously painted areas of these surfaces. The paint may be used either alone or to bind reflective beads."

  Environmental Criteria: To meet this specification, traffic paints must consist of a water-based acrylic resin and have a VOC content ≤150 g/l. In addition, "the manufacturer shall certify that the product does not contain mercury, lead, hexavalent chromium, toluene, chlorinated solvents, hydrolysable chlorine derivatives, ethylene-based glycol ethers and their acetates, nor any carcinogen, as defined in 29 CFR 1910.1200. When tested as specified in 4.3.1, the lead content shall not exceed 0.06 percent by weight of the dry film and the test for chromium content shall be negative."

Beyond the federal specifications for waterborne traffic paint, which include environmental criteria, there are a few green standards and certifications that purchasing agents can reference in their specifications:

- The *South Coast Air Quality Management District (SCAQMD)* requires traffic paints to contain no more than 100 g/l VOCs. The goal of this regulation (called **Rule 1113**) has been to reduce the amount of smog-generating VOCs in architectural coatings, including both waterborne and solvent-based traffic paints, used in and around the City of Los Angeles, CA, which has long had air pollution problems. This lower VOC limit has been referenced in the State of California's specification for waterborne traffic paint.

- The *Master Painters Institute (MPI),* which has a long history of certifying the quality and performance of all types of paint products, has established two Green Performance Standards (GPS) that cover traffic paints. Key aspects of the **MPI GPS Program** include VOC limits, chemical restrictions, and performance. See details below:
  - *GPS-1 (2012)* requires manufacturers to demonstrate that the VOC content of a traffic paint product does not exceed 150 g/l as determined by U.S. Environmental Protection Agency Reference Test Method 24 (Determination of Volatile Matter Content, Water Content, Density Volume Solids, and Weight Solids of Surface Coatings), Code of Federal Regulations Title 40, Part 60, Appendix A.
  - *GPS-2 (2012)* requires manufacturers to demonstrate that the VOC content of a traffic paint product does not exceed 50 g/l.

Both *GPS-1* and *GPS-2* require manufacturers to demonstrate that the following chemical compounds are not used as ingredients in the manufacture of the product.

Confirmed or suspected Human Carcinogens			
Acrolein	Diethyl phthalate	Formaldehyde	Methylene Chloride
Acrylonitrile	Dimethyl phthalate	Hexavalent Chromium	Naphthalene
Antimony	Di-n-butyl phthalate	Isophorone	Toluene (Methylbenzene)
Asbestos	Di-n-octyl phthalate	Lead	1,1,1 –trichloroethane
Benzene	1,2 –dichlorobenzene	Mercury	Vinyl Chloride
Butyl benzyl phthalate	Di (2-ethylhexyl) phthalate	Methyl ethyl ketone	
Cadmium	Ethylbenzene	Methyl isobutyl ketone	
IARC – Group 1 Carcinogenic to humans [excluding crystalline silica, not in the form of quartz or cristobalite dust].			

- EcoLogo, a Canadian-based green certification organization based in Canada, has adopted a standard, ***CCD-047: Architectural Paints and Coatings***, which includes traffic paints in its scope. It includes a wide array of environmental criteria including VOC limits (based on gloss level, measured using EPA Test Method 24), a minimum flashpoint of 142F, and chemical restrictions. For example, the standard states that EcoLogo-certified paints are not formulated with:
  - Aromatic compounds (e.g., benzene, ethyl benzene, toluene, etc.)
  - Halogenated compounds (e.g., methylene chloride)
  - Ethylene glycol monobutyl ether (aka butoxyethanol or "butyl")
  - Phthalates
  - Formaldehyde
  - Lead, cadmium, hexavalent chromium, mercury and other toxic heavy metal

Although this standard was last updated in 2005, which means it has been in effect for a relatively long time, EcoLogo has certified only a few traffic paint products.

Note: Green Seal does not certify traffic- or zone marking paints, and no products are "recognized" by the U.S. Environmental Protection Agency.

BID SPECIFICATIONS

Minimum Requirements (Specifications) for Waterborne and Solvent-based Traffic Paints

The most environmentally preferable traffic- and zone-marking paints are water-based, have a relatively low amount of volatile organic compounds (VOCs) (≤100 g/l), and do not contain heavy metal pigments. If solvent-based traffic paints are needed (for example, in cases where state agencies and jurisdictions have line-striping equipment that is incompatible with the use of water-based traffic-marking paints), the safest option is a low-VOC solvent-based paint (with ≤100 g/l) that contains acetone as its primary solvent, that is devoid of solvents known to cause cancer or reproductive toxicity, and that is free of heavy metal pigments and other toxic chemicals of concern.

Recommended Environmental Specifications for Waterborne Traffic Paint

All waterborne traffic paint products must meet all of the technical and environmental specifications included in TT-P-1952E, which means all products must be devoid of "mercury, lead, hexavalent chromium, toluene, chlorinated solvents, hydrolyzable chlorine derivatives, ethylene-based glycol ethers or their acetates" as per the federal specification. All products shall be devoid of aromatic solvents (e.g., benzene and ethyl benzene). (Note: states may use their own technical specifications or qualified products lists.)

In addition, all products must meet the following environmental requirements:

- The VOC content shall not exceed 100 grams per liter (g/l) based on US EPA Test Method 24. This VOC limit applies to all Type I (standard-dry), Type II (rapid-/fast-dry), and Type III (high-build) traffic- and zone-marking products. Products that comply with the South Coast Air Quality Management District (SCAQMD) VOC limit meet this requirement.
- The product will be considered to be lead free if the dry film is tested according to ASTM D 3335 and found to have a total lead or lead compound concentration less than 0.06%. The product will be considered to be chromium and chromium-compound-free if the dry film is tested according ASTM D3718 and found to be negative, meaning it contains less than 0.005% chromium. The product shall be considered cadmium-free if no cadmium is detected during x-ray fluorescence tests, per ASTM D5381.
- The dry paint film shall not qualify as a hazardous waste. It shall be compliant with the Toxicity Characteristic Leaching Procedure (TCLP) limits for arsenic, barium, cadmium, chromium, lead, mercury, and selenium per Federal Code of Regulations **40 CFR §261.24**.

Bidders must indicate on the bid sheet the maximum VOC content of each product offered and provide a manufacturer's MSDS and technical data sheet stating the VOC content of each product offered.

The following shall be considered additional desirable attributes for waterborne traffic-marking paint:

- Products that are certified by the Master Painters Institute under its Green Performance Standard (either GPS-1 or GPS-2). GPS-compliant waterborne traffic paints can be found at **http://www.specifygreen.com/APL/MpiNumber.asp?ID=97000**
- Products that contain ≤50 g/l of VOCs (Note: products that are certified as meeting MPI GPS-2 automatically meet this VOC limit);
- Products that are devoid of additional toxic chemicals of concern (e.g., other carcinogens and reproductive toxins such as crystalline silica, phthalates, tert-butyl acetate, etc.)

Recommended Environmental Specifications for Waterborne Zone-Marking Traffic Paint

All products must be devoid of "mercury, lead, hexavalent chromium, toluene, chlorinated solvents, ethylene-based glycol ethers or their acetates" per federal specification TT-P-1952B. All products shall also be devoid of aromatic solvents (e.g., benzene and ethyl benzene). (Note: states may use their own technical specifications or qualified products lists.)

In addition, all products must meet the following environmental requirements:

- The product will be considered to be lead free if the dry film is tested according to ASTM D 3335 and found to have a total lead or lead compound concentration less than 0.06%. The product will be considered to be chromium and chromium-compound-free if the dry film is tested according ASTM D3718 and found to be negative, meaning it contains less than 0.005% chromium. The product shall be considered cadmium-free if no cadmium is detected during x-ray fluorescence tests, per ASTM D5381.
- The dry paint film shall not qualify as a hazardous waste. It shall be compliant with the Toxicity Characteristic Leaching Procedure (TCLP) limits for arsenic, barium, cadmium, chromium, lead, mercury, and selenium per Federal Code of Regulations **40 CFR §261.24**.
- The VOC content shall not exceed 100 grams per liter (g/l) based on US EPA Test Method 24. This VOC limit applies to all Type I (standard-dry), Type II (rapid-/fast-dry), and Type III (high-build) traffic- and zone-marking products. Products that comply with the South Coast Air Quality Management District (SCAQMD) VOC limit meet this requirement. Bidders must indicate on the bid sheet the maximum VOC content of each product offered and provide a manufacturer's MSDS and technical data sheet stating the VOC content of each product offered.

All products must meet one of the two following certifications:

- Certification by the Master Painters Institute (MPI) under its **Green Performance Standard.** Products must only meet GPS-1; additional credit will be given to products that meet GPS-2 (see below).
- Certification by UL/EcoLogo under its ***CCD-047: Architectural Surface Coatings*** standard; a list of certified products can be found at **www.ecologo.org**.

The following shall be considered additional desirable attributes for waterborne zone-marking paint:

- Products that are certified by the Master Painters Institute under its Green Performance Standard #2 (GPS-2). GPS-2-compliant waterborne (latex) traffic paints can be found at **http://www.specifygreen.com/APL/MpiNumber.asp?ID=97000**
- Products that contain ≤50 g/l of VOCs (Note: products that are certified as meeting MPI GPS-2 automatically meet this VOC limit);
- Products that are devoid of additional toxic chemicals of concern (e.g., other carcinogens and reproductive toxins such as crystalline silica, phthalates, tert-butyl acetate, etc.)

Recommended Environmental Specifications for Solvent-based Zone-Marking Traffic Paint

- States may have their own technical requirements or qualified products lists.
- Products offered on this contract may not contain any of the following types of solvents:
  - Chlorinated solvents (such as methylene chloride or chloroalkanes);
  - Aromatic solvents (such as benzene, ethyl benzene, toluene, or xylene);
  - Ethylene-based glycol ethers or their acetates
- The VOC content of the product shall not exceed 150 grams per liter (g/l) based on US EPA Test Method 24.

In addition, all products must meet the following environmental requirements:

- The product shall be devoid of the following metals: lead and lead compounds, chromium (including hexavalent chromium and chromium compounds), cadmium and mercury. The product will be considered to be lead free if the dry film is tested according to ASTM D 3335 and found to have a total lead or lead compound concentration less than 0.06%. The product will be considered to be chromium and chromium-compound-free if the dry film is tested according ASTM D3718 and found to be negative, meaning it contains less than 0.005% chromium. The product shall be considered cadmium-free if no cadmium is detected during x-ray fluorescence tests, per ASTM D5381.
- The dry paint film shall not qualify as a hazardous waste. It shall be compliant with the Toxicity Characteristic Leaching Procedure (TCLP) limits for arsenic, barium, cadmium, chromium, lead, mercury, and selenium per Federal Code of Regulations **40 CFR §261.24**.

The following shall be considered additional desirable attributes for solvent-based traffic paint:

- Products that are certified by the Master Painters Institute under its *Green Performance Standard* (GPS, either GPS-1 or GPS-2). GPS-compliant solvent-based (alkyd) traffic paints can be found at **http://www.specifygreen.com/APL/MpiNumber.asp?ID=32000**.
- Products that contain ≤100 g/l of VOCs (Note: products that are "SCAQMD-compliant" automatically meet this VOC limit);
- Products that are devoid of additional toxic chemicals of concern (e.g., other carcinogens and reproductive toxins such as crystalline silica, phthalates, tert-butyl acetate, etc.)

Develop a Green Bid List

When considering issuing a bid solicitation for environmentally preferable traffic paint products, identify all the information you want to know about each product as well as each bidder and include it in the solicitation's bid sheet.

Include space for all that information on an electronic bid sheet that can later be sorted and evaluated. Below is a snapshot of information requested in a sample excel-based **Model Bid** Sheet, which can be modified as needed for your bid solicitation.

				GREEN TRAFFIC PAINT BID SHEET												
				PRODUCT INFORMATION			ENVIRONMENTAL REQUIREMENTS				ADDITIONAL ENVIRONMENTAL		TECHNICAL INFORMATION		
CATEGORY NUMBER	ITEM NUMBER	Technical Specifications	Enironmental Specifications	Manufacturer Name	Product Name	Product # (OEM SKU)	Low-VOC (≤100 g/l VOCs)	Was MSDS Submitted with Offer?	Devoid of Lead, Cadmium and Chromium?	Devoid of Aromatic Compounds, Chlorinated Solvents & Ethylene-Based Glycol Ethers & Acetates	Environmental CERTIFICATIONS	VOCs 50 g/l or Less	Compliant with TT-P-1952E?	Water-based Acrylic Paint?	Drying Time/Tack-free (@40-90F)
		Traffic-Marking Paint, Acrylic, Type I, Compliant with TT-P-1952E	Waterborne, Low-VOC (100 grams/liter or Less)			OEM SKU (Not Vendor SKU)	Yes or No (All SCAQMD-Compliant Products Comply)	Yes or No	Yes or No	Yes or No	LIST (e.g, MPI GPS-2, MPI GPS-1, UL/EcoLogo, Green Seal)	Yes or No	Yes or No	Yes or No	Minutes
1	1T-White-1G	White	EPP	Vendor Input	Vendor Input	Vendor Input	Vendor Input	Vendor Input	Vendor Input	Vendor Input	Vendor Input	Vendor Input	Vendor Input	Vendor Input	Vendor Input
1	1T-White-5G	White	EPP	Vendor Input	Vendor Input	Vendor Input	Vendor Input	Vendor Input	Vendor Input	Vendor Input	Vendor Input	Vendor Input	Vendor Input	Vendor Input	Vendor Input
1	1T-White-55G	White	EPP	Vendor Input	Vendor Input	Vendor Input	Vendor Input	Vendor Input	Vendor Input	Vendor Input	Vendor Input	Vendor Input	Vendor Input	Vendor Input	Vendor Input
1	1T-White-325G Tote	White	EPP	Vendor Input	Vendor Input	Vendor Input	Vendor Input	Vendor Input	Vendor Input	Vendor Input	Vendor Input	Vendor Input	Vendor Input	Vendor Input	Vendor Input
1	1T-White-3250G Truckload	White	EPP	Vendor Input	Vendor Input	Vendor Input	Vendor Input	Vendor Input	Vendor Input	Vendor Input	Vendor Input	Vendor Input	Vendor Input	Vendor Input	Vendor Input
1	1T-Yellow-1G	Yellow	EPP	Vendor Input	Vendor Input	Vendor Input	Vendor Input	Vendor Input	Vendor Input	Vendor Input	Vendor Input	Vendor Input	Vendor Input	Vendor Input	Vendor Input
1	1T-Yellow-5G	Yellow	EPP	Vendor Input	Vendor Input	Vendor Input	Vendor Input	Vendor Input	Vendor Input	Vendor Input	Vendor Input	Vendor Input	Vendor Input	Vendor Input	Vendor Input
1	1T-Yellow-55G	Yellow	EPP	Vendor Input	Vendor Input	Vendor Input	Vendor Input	Vendor Input	Vendor Input	Vendor Input	Vendor Input	Vendor Input	Vendor Input	Vendor Input	Vendor Input

Requiring submission of this information in this format will help bid evaluators determine whether products meet your minimum environmental (and technical) requirements, compare equivalent products offered by competing bidders, and choose the best value product in a given category.

Because these specifications may be relatively new to vendors in your state, it may be important to host a pre-bid meeting with potential bidders to explain them and afford bidders the opportunity to ask questions. You may want to schedule at least two weeks into the bidding process to allow additional time for bidders to ask questions about your specifications (and for you to answer these questions). You may want to give yourself additional time to conduct your bid evaluation process since it will likely entail more than simply comparing prices.

Consider Creating a "Brown List"

Consider creating a "brown list" of prohibited products for which there is a plentiful supply of cost-effective environmentally preferable alternatives that meet the State's needs in terms of form, function and performance. A "brown list" of products can be included in the bid solicitation document notifying bidders that specific types of products may not be supplied on this contract. For this product category, the "brown list" could include any waterborne traffic paints containing more than 100 g/l VOCs or solvent-base traffic paints that contain chlorinated or aromatic (benzene-based) solvents. A brown list may be used when some conventional products are allowed on the contract, but others, which have particularly significant environmental or health impacts, are not.

ONCE THE BIDS ARE IN

Best Ways to Award

Once vendors have submitted bids, products can be chosen using a variety of methods. Below are two options for evaluating the traffic paints and associated bidders, with benefits and challenges of each.

Choosing a Single Vendor for All Traffic Paint Products

Strategy: Compare vendor prices on the bid list (or relevant market basket list if these items are part of a much larger solicitation for hardware or road maintenance supplies) and select the vendor offering the best combination of price and selection on products meeting the chosen criteria.

Benefits: Only one vendor for the procurement office to manage. End-users have a "one stop shop" for all items offered on contract. Agencies may get better pricing if one vendor is assured of all your business.

Challenges: It is possible that a single vendor may not offer all of the products needed by the range of expected end-users. Specialty products may need to be purchased off contract, possibly at significantly higher prices.

Choosing Multiple Vendors

The most important products to choose carefully are those used in high volumes. To determine the highest-volume paints and coatings, states can review their historic purchasing records or survey their primary end-users. Multiple vendors may be needed if all (or a subset of) green products are offered by different vendors than those that offer conventional products.

Strategy: Compare vendor prices and select the vendor offering the best price on each item or category of items.

Benefits: Reduces the need to purchase specialty items off contract because with multiple vendors more specialty items will be available for contracted prices. May promote competition over the life of the contract if vendors know end-users can choose products from multiple vendors.

Challenges: Procurement office will need to manage more than one contact and end-users may need to issue multiple purchase orders to get all of the products they need.

Verifying Compliance

When awarding contracts, the most important thing the bid evaluation team can do is to verify that the products offered meet the minimum environmental and technical requirements in the bid specification. To facilitate this, the bid solicitation document should ask bidders to demonstrate that each product is water-based, that it devoid of lead, chromium and cadmium (as well as other restricted chemicals), and that the maximum VOC content meets the limit. Vendors should also provide a link to (or a copy of) each product's material safety data sheet (MSDS) and technical data sheet (TDS). See the model traffic paint bid sheet, which states can tailor to meet their needs. The bid evaluation team should verify the accuracy of key data submitted by vendors on the bid sheet by reviewing the information that is provided in the MSDS and TDS for each product.

Evaluating Product Performance and Price

It is essential to compare equivalent products when choosing based on lowest price. Compare specification sheets and VOC content of each product to identify equivalent and unique products, making sure to compare only those paints with equivalent performance specifications (dry time, dry temperature, thickness). To facilitate this, use the Model Bid Sheet (above), which requires bidders to provide product attributes along with the offered contract price.

VENDOR EVALUATION

Consider awarding contracts to vendors offering the widest array of environmentally preferable traffic paints and give extra points in the bid evaluation process to vendors that offer products that exceed the mandatory criteria (e.g., products that 50 g/l VOCs or less). Bidders should also be encouraged or required to describe any services they have in place to assist with the reuse, recycling or proper disposal of unused traffic paint.

When multiple vendors offer similar products at competitive prices, consider allotting additional points to bidders offering products with additional environmental benefits as well as product take-back and recycling, delivery in alternative fuel vehicles, user-friendly green product labeling systems, "green spend" tracking and reporting, or other services that add value to the contract and assist in selection of vendors offering similar prices. See **Vendor Sustainability Questionnaire** for vendor questionnaire you may require vendors to answer to assist in gathering this type of information.

Consider awarding additional points to bidders supplying full disclosure of ingredients and product health/environmental impacts in a publicly accessible format for at least three top priority contract items. Existing disclosure frameworks include Health Product Declaration (HPD) forms or the Green Screen, which determines a hazard score for each product. Asking for full disclosure on high-volume products puts the onus of information collection on the manufacturer, who can supply the data most efficiently. Having access to this toxics exposure information can help purchasers answer questions about offered products in the short term, and can assist them in making more informed decisions in the future.

MAXIMIZE GREEN IMPACT

Below are some best practices an agency can consider to maximize the impact and usability of their 'green' contract.

- Ask vendors to help you track green purchases by submitting quarterly purchase reports with a separate "green spend" section detailing products meeting your environmental and human health criteria.
- States that secure attractive pricing for environmentally preferable painting supplies can make it easy for municipalities, school districts and other public agencies in the state to utilize their price agreements by making the contract a cooperative purchasing agreement.
- The world of traffic paint manufacturers is small, with about 6 companies manufacturing traffic paints and selling through myriad vendors. States may get more offers – and more competitive pricing - if they proactively publicize the bid solicitation to traffic paint suppliers in the state as well as ask AASHTO (American Association of State Highway and Transportation Officials) to publicize the solicitation to their members.
- States should consider identifying products meeting their chosen specifications which are available on existing contracts with vendors such as **Grainger**, **Fastenal**, **MSC**, or other suppliers, and make a list of "compliant products" available to purchasers.
- Relevant service agreements should specify the use of traffic and zone marking paints that meet the agency's environmental and technical specifications.
- Because use of waterborne traffic paints requires stainless steel-lined equipment, agencies and other contract users with outdated non-stainless steel-lined application equipment can take advantage of less-toxic and less expensive waterborne traffic paints by upgrading their equipment.
- Recycling or donating unused paint can prevent environmental contamination sometimes associated with its disposal.
- Purchase paints in returnable totes whenever possible to avoid disposal costs associated with drums.

WHAT'S ON THE HORIZON?

Using waterborne traffic paints presents an opportunity to reduce exposure to toxic chemicals, decrease the use of non-renewable fossil fuels, and drive the market toward more responsible products. Because a growing number of manufacturers produce high-quality paint in both waterborne and solvent-based formulations that meet the stringent VOC limits established by the South Coast Air Quality Management District (SCAQMD), there is no reason to buy higher VOC paints. Surveying or interviewing vendors – either informally or through a formal request for information (RFI) process – can help identify new environmentally preferable products that become available on the market. Pilot testing may be needed to ensure they meet your needs or to gain buy-in from field staff.

A wide range of colors – particularly yellows – is currently specified by agencies, requiring the paint industry to produce many small batches, a practice which is inefficient and expensive. The **AASHTO** (American Association of State Highway and Transportation Officials) **Subcommittee on Materials** is working to standardize the yellow pigments specified on traffic paint contracts. This may bring the price down to reflect manufacturing efficiencies, reducing waste, and increase uniformity. Agencies should consider including language to utilize AASHTO's universal recommendations when they are finalized, most likely sometime in 2013. In the absence of this standard, agencies can use the commonly referenced industry standards for traffic paint colors outlined in **Federal Airport Specification TT-P-1952E** for waterborne traffic paints or in **Federal Specification A-A-2886B** for solvent-based traffic paints, which are as follows:

Yellow: 33538	White: 37925	Blue: 35180
Green: 34108	Red: 31138	Black: 37038

By requesting bidders to publicly disclose the contents of their products and/or the health impacts of those contents through a framework such as **GreenScreen** or **Health Product Declaration** forms, agencies stand for public access to the information needed to make future decisions. This serves to alert the industry that agencies are concerned about product toxicity, and puts pressure on industry to provide more responsible products.

APPENDIX A:

ENVIRONMENTAL ASSESSMENT OF GLASS BEADS USED TO ADD REFLECTIVITY TO TRAFFIC PAINT

Reflective glass beads (also called glass spheres) are often added to traffic paint to enhance safety because they enable drivers to see traffic lanes more clearly, especially at night and in wet weather. The glass beads may be pre-mixed with the traffic paint or applied separately as the striping paint is being applied to the road, curb or other surface. Either way, glass beads are almost always specified separately from traffic paint on which they are applied. Moreover, their ability to reflect light (retroreflectivity) and durability – two key technical requirements – need to be addressed in the specifications because glass beads vary based on their size, roundness, color, clarity, refractive index, and other factors. Variations in sizes and types of glass beads are matched for compatibility with paints used for different traffic marking needs including waterborne and solvent-based traffic- and zone-marking applications.

Two important environmental criteria apply to glass beads: (1) recycled content; and (2) heavy metal content. Below is an overview of these issues and specifications that can be used to ensure that environmentally preferable products are procured.

- *Recycled content:* Almost all glass traffic-marking beads are made with recycled glass, primarily pre-consumer glass cullet derived from businesses that manufacture window glass. Occasionally, some post-consumer glass may be used, for example, from glass recovered during the demolition of office buildings. However, post-consumer recycled glass is generally not specified because it has unreliable availability, inconsistent quality, and higher cost. Similarly, only a minute percentage of glass beads are made from virgin (non-recycled) "direct melt" glass processes because the cost is significantly higher than using recycled glass cullet and it is required only for a few very specialized applications.

- *Heavy metals:* Historically, glass-making methods often included adding heavy metals such as lead, arsenic and antimony to chemically alter the glass in order to enhance its clarity or prevent the formation of bubbles. Over 30 years ago, U.S. glass manufacturers converted to processes that avoid these toxic heavy metals, largely in response to U.S. Environmental Protection Agency (EPA) and Occupational Safety and Health (OSHA) regulations. However, in recent years, tests have shown that some imported glass beads contain elevated levels of lead and other heavy metals, which can leach these toxins into the roadside environment if they are used.

  In 2012, the U.S. federal government enacted Section 1504 of the federal highway law, **MAP-21**), which "requires the glass beads used in pavement markings on Federal-aid projects contain no more than 200 parts per million of arsenic or lead, as determined in accordance with Environmental Protection Agency testing methods 3052, 6010B, or 6010C." The Federal Highway Administration

(FHA, a division of the U.S. Department of Transportation) is encouraging states to take steps to implement Section 1504. Its website states:

> *The State DOT's specifications for glass beads used in pavement markings should be revised, if necessary, to comply with Section 1504 of MAP-21. Additionally, the State DOT must certify that the product is in compliance with Section 1504 by 1) testing the product using the statutorily mandated testing methods, 2) having the tests performed by an independent testing lab, or 3) requiring the manufacturer to certify that the product has been tested and meets the statutory requirements. If relying on the manufacturer's certification, State DOT's are encouraged to review and determine the acceptability of the manufacturer's testing procedures and quality assurance plan. The State DOT may also require the manufacturer to use an independent testing lab. Copies of certificates of compliance, and test results when applicable, should be retained with project records. (Updated 11/1/2012)*

These limits on heavy metals in glass beads have been incorporated into the specifications (M247-11) recommended by the American Association of State Highway and Transportation Officials (AASHTO), an organization representing all 50 states, the District of Columbia, and Puerto Rico that serves as a liaison between the state departments of transportation and the federal government.

Many states have inserted the federal limits on lead and arsenic into their specifications for glass beads. Moreover, at least one state, New Jersey, has gone further by including limits on antimony content as well as a more stringent limit on arsenic. On June 26, 2013, New Jersey Department of Transportation issued an **"Announcement"** on the subject of glass beads, which states that the following language has been incorporated into its *Standard Specifications for Road and Bridge Construction*:

> *[Vendors are required to] submit certifications of compliance…for each lot of glass beads used on the Contract. For each lot of glass beads, [vendors shall] submit test results indicating the parts per million of lead, antimony and arsenic as determined by testing according to Environmental Protection Agency testing methods 3052 and testing method 6010B or 6010C. Ensure that glass beads do not contain more than 200 ppm of lead, 200 ppm of antimony, or 100 ppm of arsenic.*

This is consistent with a state law that New Jersey adopted in 2012 that limits the use of heavy metals in glass beads for highway markings. According to a **news release** issued by the American Bead Manufacturers Association (ABMA), as of January 2012, "a total of 22 other states have adopted bid specification requirements which also prohibit use of heavy metals in glass beads." The ABMA noted that the legislation was impacted by a study by the New Jersey Institute of Technology that "revealed a growing number of imported glass bead products for highway markings exhibit high concentrations of heavy metals, including arsenic and lead."

Similarly, in 2009, the State of California issued a specification for glass spheres (beads) that sets a limit of 200 ppm on lead, arsenic and antimony. Other states, including the State of Washington, have adopted specifications with even lower limits on heavy metals. (Note: States may face greater challenges ensuring accurate testing of products when these lower limits are specified.)

Recommended specifications for reflective glass beads include the following:

All glass beads offered on this contract shall:

1. Contain 100% recycled-content glass;
2. Conform to AASHTO *M 247-11, Standard Specification for Glass Beads Used in Pavement Markings, Type 1 or Type 2* (to be determined by highway department depending on application and type of paint or other pavement marking material); and
3. Contain no more than 200 parts per million each of lead, arsenic and antimony, as determined in accordance with Environmental Protection Agency testing methods 3052 and either 6010B or 6010C. (Note: This conforms with Section 1504 of the U.S. federal highway law, MAP-21, but also adds the antimony limit.)

Each truckload must be certified by a third party laboratory (or state government laboratory, if the state prefers that method), according to the prescribed EPA testing methods.

Appendix B:

Ingredient Evaluation of Sample Solvent-Based Traffic Paint Products

Evaluation of Solvent based Traffic Paint

KEY:
Red text = PROP 65 chemical or other data showing carcinogenicity.
Vertical coloration = recommended for prohibiting
Green shading = meets proposed criteria

				Preferable alternative, low toxicity	Aromatic Solvents						Alcohol	Phthalates		Chlorinated solvents		pigments		Helps to volatalize acetone	Unique compound
PRODUCT NAME	MANUF.	PROD. #	MAX VOC	Acetone (67-64-1)	Xylene (1330-20-7)	Ethylbenzene (100-41-4), PROP 65 Carcinogen	Benzene (71-43-2)	Toluene (108-88-3), PROP 65, developmental and female reproductive toxin	Naphtha, Aromatic Petroleum Distillates (64742-94-5)	Methyl Pyrrolidone (872-50-4),, Prop 65 Carcinogen	2-butoxyethanol (111-76-2)	Di-isononyl phthalate (28553-12-0) (68515-48-0)	DEHP (Bis (2-ethylhexl) phthalate) (117-81-7), PROP 65, Carcinogen, Male developmental toxin	Chloroalkanes (61788-76-9)	Methylene chloride (75-09-2), PROP 65 Carcinogen	Titanium Dioxide (61788-76-9), PROP 65*	Crystalline silica (14808-60-7), IARC known Carcinogen, PROP 65 Carcinogen*	Glycol Ether DB (112-34-5)	Tert-butyl Acetate (540-88-5), Metabolizes into tert-butyl alcohol,carcinogen(1)
			g/l	%	%	%		%	%			%	%	%	%	%	%	%	%
Safety Yellow Acrylic Low VOC Traffic Safety Paint	Aexcel	22Y-D017	149.6	19	2			2	2			1							
Yellow Acrylic Low VOC Traffic Safety Paint	Aexcel	22Y-D008	149	18	3				2			1							
Lead-free, Yellow, Low VOC Solvent Traffic Paint	Ennis-Flint	985697	150	10 to 30		0.1 to 1	<0.1	0.1 to 1						1 to 5	7 to 13	1 to 5	0.1 to 1		
Lead-free, Yellow, Low-VOC Solvent Traffic Paint	Ennis-Flint	985672	100	15 to 40	3 to 7			0.1 to 1		0.1 to 1	1 to 5			1 to 5		1 to 5	0.1 to 1		
Line-PRO 4000 Low VOC Traffic and Parking Lot Paint, Lead-free	International Coatings	TP4201	100	14 to 16					3 to 4									0 to 2	1 to 2
Low VOC Yellow Traffic L/F	Diamond Vogel	TM3783	123.4	20 to 50	1 to 5	0.9							0.99				1 to 5		
PROMAR® Low VOC Solvent-Acrylic Marking Paint, L/F Yellow	Sherwin Williams	TM5713	115	25	4	0.7										2	0.3		
SETFAST® Low VOC Solvent-Acrylic Traffic Marking Paint, L/F Yellow	Sherwin Williams	TM5627	74	27	2	0.4										3	0.2		

(1) http://www.ncbi.nlm.nih.gov/pubmed/15450719
http://potency.berkeley.edu/chempages/tert-BUTYL%20ALCOHOL.html
* Only for airborne particles of respirable size