



Environmentally Preferable Purchasing Program

Painting the Town Green

Aberdeen Proving Ground's Paint Pilot Project





Environmentally Preferable Purchasing Program

Environmentally preferable purchasing ensures that environmental considerations are included in purchasing decisions along with traditional factors such as product price and performance. The EPP program provides guidance for federal agencies to facilitate purchases of goods and services that pose fewer burdens on the environment.

For more information about environmentally preferable purchasing or EPA's EPP Program, please visit our Web site at <www.epa.gov/opptintr/epp>, or contact:

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This document provides an overview of a federal government EPP initiative and includes references to specific products and companies. These references are included to provide additional detail and do not constitute endorsement or recommendation for use by the U.S. Environmental Protection Agency or the Department of Defense.

Foreword

The federal government purchases more than \$200 billion worth of goods and services each year. Recognizing that purchasing decisions can have environmental consequences, the federal government is incorporating environmental considerations into its purchasing practices. As mandated in Executive Order 13101, *Greening the Government Through Waste Prevention, Recycling, and Federal Acquisition*, the U.S. Environmental Protection Agency (EPA) issued guidance to help federal agencies consider environmental concerns when making purchasing decisions. The guidance establishes principles to help identify products and services that have a reduced impact on human health and the environment.

EPA also issued a policy statement describing how federal agencies could make environmentally preferable purchasing (EPP) decisions based, in part, on information provided by nongovernmental entities such as third-party environmental standards or certification organizations. In its policy statement, EPA emphasizes that federal agencies must make all final determinations regarding environmental preferability and purchasing decisions and cannot rely on nongovernmental entities to make such determinations.

EPA, through its guidance and policy statements, recognizes that EPP is a dynamic concept that, depending on the product category or other product- or case-specific criteria, will not necessarily be implemented in the same manner from agency to agency or even within a specific agency. To demonstrate some of the ways EPP principles are being applied, EPA is documenting pilot projects undertaken by executive agencies, state and local governments, and the private sector.

This case study documents one of those projects. It describes efforts by the U.S. Department of Army's Aberdeen Proving Ground (APG) to purchase paint it deems environmentally preferable. As part of its overall pollution prevention strategy, APG worked closely with a third-party, nongovernmental environmental standards organization to examine its paint purchases and to identify the multiple environmental attributes relevant when purchasing paint. This case study examines APG's EPP strategy, the assistance provided by the environmental standards organization, the resulting cost savings and environmental benefits, lessons learned, and next steps. It also highlights another successful strategy for incorporating environmental concerns into federal purchasing decisions. Perhaps most importantly, it demonstrates that EPP can be an integral part of the government's overall pollution prevention efforts. We hope the lessons and insights documented in this case study will help you and your organization as you begin including environmental preferability into your purchasing decisions.

Environmentally preferable products are “products and services [that] have a lesser or reduced effect on human health and the environment when compared to other products and services that serve the same purpose.” This comparison may consider raw materials acquisition, production, manufacturing, packaging, distribution, reuse, operation, maintenance, or disposal of the product or service.

—Executive Order 13101,
*Greening the Government Through Waste Prevention,
Recycling, and Federal Acquisition*

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Introduction

As a result of a recent series of Executive Orders, Department of Defense (DoD) policies, and an obligation to “do the right thing,” the U.S. Army’s Aberdeen Proving Ground (APG), an installation in Harford County, Maryland, has adopted a variety of pollution prevention strategies. Its numerous projects to minimize the installation’s adverse environmental impacts include purchasing alternatively fueled vehicles, reducing solvent use, minimizing packaging requirements, using rechargeable batteries, reducing aerosol use, adopting integrated pest management methods, implementing a “green building” policy, installing energy efficient lights and equipment, and training its work force in proper hazardous materials handling and pollution prevention techniques. APG’s efforts have been so effective that the installation won the Secretary of the Army’s 1998 Pollution Prevention Award in the nonindustrial installation category and second place in the National Pollution Prevention Roundtable’s 1999 MVP2 (Most Valuable Pollution Prevention) Awards Program, a national award open to public and private sector participants.

Of the many pollution prevention initiatives adopted by APG, one of the most interesting is its approach to minimizing the adverse environmental impacts associated with its purchase of interior and exterior architectural and anticorrosive paints. APG began examining pollution prevention opportunities associated with its paint purchases for two important reasons—cost savings and air quality.

The large quantity of paints used at APG presented an opportunity to substantially reduce the installation’s hazardous materials handling and disposal costs. Before modifying its purchasing practices, APG used or stored 2,200 different paints and coatings, excluding color differences. Of those, 565 were architectural and anticorrosive paints used to maintain the more than 2,100 buildings on the installation. The remaining paints and coatings included spray paints and reflective paints or speciality paints used on military equipment. In addition, many of the paints stored on the installation were outdated or no longer needed.

Air quality is a concern at APG because the installation is located in an ozone nonattainment area, meaning the ground-level ozone concentration in the region surrounding the installation exceeds the safety thresholds established in the Clean Air Act. While stratospheric ozone, commonly referred to as the ozone layer, protects the Earth from excessive ultraviolet radiation and helps maintain the global climate,

Environmental Executive Orders

The Executive Orders listed below provided incentives for APG to institute an EPP program for paint. To obtain copies of the Executive Orders, please visit www.pub.whitehouse.gov/search/executive-orders.html.

- **Executive Order 12856**, *Federal Compliance with Right-To-Know Laws and Pollution Prevention Requirements*, August 3, 1993: Directs agencies to cut toxic emissions 50 percent to improve indoor and outdoor air quality.
- **Executive Order 13101**, *Greening the Government Through Waste Prevention, Recycling, and Federal Acquisition*, September 14, 1998: Strengthened and replaced an earlier order, **Executive Order 12873**, *Federal Acquisition, Recycling, and Waste Prevention*. Executive Order 12873 required federal agencies to purchase recycled-content products designated by EPA and to buy other environmentally preferable products according to guidance developed by EPA’s EPP Program.

ground-level ozone is a health hazard that can irritate lungs and make breathing difficult. Also known as smog, ground-level ozone is caused by a chain reaction between volatile organic compounds (VOCs) and nitrogen oxides in the presence of sunlight.

While a large portion of ground-level ozone is produced by combustion engines such as those powering automobiles, lawn mowers, and boats, many consumer products such as paint contain significant quantities of VOCs that also contribute to the problem. As part of Maryland's State Implementation Plan (SIP), the state encourages facilities and residents in nonattainment areas to minimize activities that contribute to ground-level ozone formation, including minimizing the use of high-VOC paints and solvents. APG is in a nonattainment area.

DoD Policy Statement

According to DoD Instruction 4715.4 on pollution prevention, "It is DoD policy to...reduce the use of hazardous materials, the generation or release of pollutants, and the adverse effects on human health and the environment caused by DoD activities."

A copy of the policy is available at <www.denix.osd.mil/denix/Public/ES-Programs/Pollution/Instruction/note1.html>.

Aware of the potentially adverse environmental effects associated with paint products, APG investigated ways to properly deplete stocks of paints it no longer uses and to reduce the number of paints it purchases so as to minimize the environmental effects of hazards such as VOC emissions. As part of its investigation, APG learned that Green Seal, a nonprofit environmental standards organization, had developed environmental standards for paint. After reviewing the standards, APG invited Green Seal to help develop an EPP plan for paint and to review the installation's paint purchases.

After developing its standards, APG reduced its architectural and anticorrosive paint purchases from 565 types of paint to 73, all of which meet both its environmental and performance standards. APG officials, who expect to expand this list over time, estimate APG's modified paint purchasing process will save the installation \$60,000 annually while improving environmental performance. This case study documents the development of APG's paint standards, Green Seal's advisory role, the success of the effort, lessons learned, and future steps.

Project Background

Under the Emergency Planning and Community Right-To-Know Act (EPCRA) and Executive Order 12856, APG is required to report its use, storage, and disposal of more than 600 Toxic Release Inventory (TRI) chemicals that have potentially adverse environmental effects. Several of the reportable chemicals are routinely included in architectural and anticorrosive paints, which then must be handled and disposed of as hazardous materials. Although the 2,200 paints used or stored at APG represented less than 5 percent of the 50,000 reportable hazardous chemicals and chemical products APG uses and tracks, APG faced significant reporting and disposal requirements due to its paint purchases.

In an attempt to reduce reporting requirements, APG began investigating ways to reduce the number of paints stored and used at the installation. It also researched ways to purchase paints without hazardous components that need to be reported. APG's emphasis on the purchasing process reflects the installation's understanding that its purchasing practices are an integral part of its pollution prevention program.

Since APG is in an ozone nonattainment area, it recognized VOCs as a significant concern. As part of its initial search for low-VOC paint, APG learned that many states, including California, New York, and New Jersey, have imposed VOC limits for paints due to concerns about its links with ground-level ozone formation. Its research into the environmental impacts of paint also revealed that many scientists were equally concerned about other potentially hazardous paint components, including lead.¹ Most importantly, APG's research revealed that as a result of these and other environmental concerns, many companies are reformulating paints to minimize adverse environmental effects.

After learning that Green Seal, an independent, nonprofit environmental product certification and consumer education organization, had developed environmental standards for paint, APG sought additional information from them to develop similar standards for the installation. After a review of the Green Seal

Overview of Aberdeen Proving Ground

APG is the U.S. Army's oldest active proving ground. It was established in October 1917, 6 months after the United States entered World War I, to test army vehicles and munitions. Every tank and wheeled vehicle used by the U.S. armed forces in the past 50 years was tested for performance and durability at APG. The installation also conducts research to help defend U.S. troops and soil against chemical, biological, and radiological weapons.

The installation employs 7,600 federal employees, 4,500 assigned military personnel, and 3,000 private sector contract personnel. It comprises 72,500 acres in Harford County, Maryland. More than 2,100 buildings with more than 14 million square feet of floor space occupy the installation, including 1,200 housing units in which 2,900 military family members live.

APG is, in reality, a small town. It includes:

- 300 miles of road.
- 30 miles of railroad.
- An airport with 567,000 square feet of paved runway.
- A 7-million-gallon per day water distribution system.
- 1,000 vehicles of all types and sizes.
- Its own police and fire departments.

¹ Although lead was banned from residential paints in 1978, "lead-free" paint can include up to 0.06 percent lead (16 CFR Part 1303). Many scientists are concerned that even these low levels of lead in paint still pose a danger to small children.

standards—*Environmental Standards for Household Paints* (GS-11) and *Environmental Standards for Anticorrosive Paint* (GC-03)—and a series of meetings, a working relationship was established.

Developing APG's Paint Standards

When developing its paint standards, APG began by reviewing Green Seal's existing standards.² The Green Seal standards include strict VOC limits, prohibit 25 organic and inorganic materials, and include product performance and packaging requirements. APG determined that Green Seal's VOC limits and its list of prohibited materials were reasonable and scientifically valid. The VOC limits were based on the lowest VOC levels achieved by at least 15 percent of the paint market. Green Seal prohibits the organic and inorganic materials because of their known or suspected adverse impacts on human health, including liver and kidney damage, central nervous system depression, pulmonary and neurological problems, anemia, cancer, and infertility. APG also noted that eight of the prohibited materials were among the 17 priority chemicals targeted by EPA's 33/50 program, which attempts to discourage releases and transfers of the most hazardous chemicals.

After completing its review, APG incorporated Green Seal's VOC limits and list of prohibited materials into its own environmental standards for paint. APG believed adopting the standards would significantly reduce both the toxicity of APG's paint purchases and its associated reporting requirements under EPCRA and Executive Order 12856.

APG chose not to incorporate Green Seal's performance and packaging requirements into its standards because the installation was already aware of and satisfied with the performance and packaging of the paints being purchased for use on the installation. (The installation, for example, already prohibited the use of lead in paint cans.) As a result, APG did not feel it needed to modify its own performance and packaging requirements. APG decided, however, to compare its newly developed VOC limits and list of prohibited materials with the installation's paint supplies to determine which paints met its environmental standards. Based on the results of the comparison, APG would continue buying the paints it traditionally used with the confidence that the paints also met its new environmental standards.

Considering Recycled-Content Options

In addition to examining hazardous constituents, APG considered, but decided against, including a recycled-content requirement in its paint standards. Federal government agencies are required under Section 6002 of the Resource Conservation and Recovery Act to purchase recycled-content products designated by EPA. In 1997, EPA's Comprehensive Procurement Guidelines (CPG) program designated recycled-content latex paint, which means federal agencies purchasing latex paint are required to purchase recycled-content latex paint if it meets the agency's price, performance, and availability requirements.³ Other federal, state, and local government agencies also promote the use of recycled-content latex paint.

² Additional information on Green Seal, including a description of how Green Seal developed its standards, is included in Appendix A.

³ For additional information on CPG's paint designation and recommended recycled-content levels, please visit <www.epa.gov/cpg/products/paint.htm>.

Recycled-content paint includes both consolidated and reprocessed paint. Consolidated paint is recovered paint that has been sorted by a variety of characteristics such as type (interior or exterior), color, and finish (high-gloss versus flat). After sorting, it is consolidated and sold in a limited variety of colors as 100 percent recycled-content paint. Reprocessed paint, like consolidated paint, is recovered paint that has been sorted by type, color, and finish. After sorting, the recovered paint is consolidated and blended with new paint as part of the paint manufacturing process to produce a large variety of colors. The resulting paint has a recycled content between 1 and 99 percent.

Unlike traditional paints, recycled-content paints vary slightly from one batch to the next because the components of each batch are dependent on the ingredients of the consolidated paints. As a result, it would be impossible to know if a recycled-content paint met APG's environmental standards unless each batch was tested, a prohibitively expensive proposition. Because APG is located in an ozone non-attainment area and VOCs contribute to unsafe ground-level ozone concentrations, APG thought it was very important to ensure that paints meet the installation's strict VOC-content levels. Furthermore, one of APG's objectives was to minimize the purchase of toxic materials that must be reported as hazardous; without testing each batch of recycled-content paint, APG would be unable to verify VOC-content levels or the absence of toxic materials.

As a result of the limited local availability of recycled-content paint, the limited color selection, and the limited feasibility of verifying VOC and prohibited materials content, APG decided not to include a recycled-content requirement as part of its environmentally preferable paint standards. This means that APG can consider paints to be environmentally preferable even if they do not contain recycled content; it does not mean that the installation will refuse to use all recycled-content paints, only those that fail to meet its standards. Any paint meeting APG's environmentally preferable paint standards and its other price, performance, and availability requirements will be considered for use on the installation.

The installation, however, does support paint recycling and consolidates its unused paint for transfer to a nonprofit organization that distributes it to low-income residents. In October 1998, as part of an installationwide cleanup effort to eliminate unneeded or outdated stock, 400 gallons of paint were consolidated for reuse by the local community. It was transferred to the county recycling center under a no-cost contract and was transported by a licensed hazardous materials commercial driver.

Finalizing the Standards

After reviewing and modifying Green Seal's standards, APG finalized the environmental requirements for its paint purchases, as described in Tables 1 and 2.

Table 1. Maximum Acceptable VOC Levels

Type of Paint	VOCs (grams/liter)	VOCs (pounds/gallon)
Interior Architectural		
Flat	50	0.42
Nonflat	150	1.25
Exterior Architectural		
Flat	100	0.83
Nonflat	200	1.66
Anticorrosive		
Flat	250	2.10
Semigloss	250	2.10
Gloss	250	2.10

Table 2. Prohibited Materials**Inorganic Materials:**

Antimony

Cadmium

Hexavalent chromium

Lead

Mercury

Organic Compounds:

1,1,1-trichloroethane

1,2-dichlorobenzene

Acrolein

Acrylonitrile

Benzene

Butyl benzyl phthalate

Di (2-ethylhexyl) phthalate

Di-n-butyl phthalate

Di-n-octyl phthalate

Diethyl phthalate

Dimethyl phthalate

Ethylbenzene

Formaldehyde

Isophorone

Methyl ethyl ketone

Methyl isobutyl ketone

Methylene chloride

Naphthalene

Toluene (methylbenzene)

Vinyl chloride

Applying the Standards

After developing its standards, APG wanted to determine which paints previously purchased for use on the installation already met the standards. APG evaluated its existing paint purchases in two phases, as described below.

Phase I

To ensure its paint standards were not so strict as to eliminate all of the paints used on the installation, APG provided Green Seal with a list of 178 randomly selected architectural and anticorrosive paints. It asked Green Seal to review each paint's Material Safety Data Sheet (MSDS), which lists ingredients and can include VOC content, and to call manufacturers to obtain VOC information if it was not provided on the MSDS. Based on the results of this review, APG asked Green Seal to determine which paints would be acceptable under APG's standards.



After reviewing the information, Green Seal found that 36 of the 178 paints appeared to meet the APG paint standards. It also reported that 21 of the paints, including 5 of the ones that appeared to meet the APG standards, were no longer available because the manufacturers had gone out of business or the products were no longer manufactured. Green Seal purchased pure-white samples of the remaining 31 paints and delivered them to APG for testing.

White paint samples were used because it is the basis for all other paint colors. Yellow paint, for example, is created by adding drops of yellow pigment to a gallon of white paint. The more drops of yellow tint added to the base paint, the more intense the resulting color.

According to Green Seal, the additional environmental impacts associated with the color-tinted paint are generally too minor to be of concern.

APG arranged to have the VOC levels of the 31 remaining paints verified by the Maryland Environmental Technology Demonstration Center (METDC) at APG, which was less expensive than the testing facilities available to Green Seal. Using EPA Reference Test Method 24, *Determination on Volatile Matter Content, Water Content, Density Volume Solids, and Weight Solids of Surface Coating* (40 CFR Part 60, Appendix A), a standard VOC test method, the test center determined that 24 of the 31 paints had acceptable VOC levels. Unfortunately, none of the anticorrosive paints tested had acceptable VOC levels. The table below summarizes the Phase I results.

Table 3. Phase I Testing Results

Element	Quantity	Percentage of Paints Evaluated
Paints evaluated	178	—
Paints eliminated due to unacceptable ingredients or reported VOC levels	126	70.1
Paints no longer manufactured	21	11.8
Paints tested for VOC levels	31	17.4
Paints meeting APG's paint standards	24*	13.5

* Note: None of the anticorrosive paints tested had acceptable VOC levels, but APG later identified two anticorrosive paints meeting the standards.

To ensure that the 24 paints meeting the APG environmental standards performed well, APG shared the findings with some of the paint contractors on the installation. “Although there was some concern that the painters wouldn’t like the product, the amazing thing,” according to Robert Solyan, Pollution Prevention Program Manager at APG, “is that the paints meeting our environmental standards were already some of the most widely used paints. The environmentally preferable products turned out to be the higher quality products.”

Some painters, however, were wary about using the products. Low-VOC paints have higher percentages of particulate matter, which tends to clog some paint guns. Other painters explained that the problem could be avoided by changing the mesh size in the paint gun’s filters and by increasing the nozzle size. A local paint supplier had similar concerns about particulate size. He was concerned he would have to invest in expensive new equipment to mix the paint colors but was happy to discover that he was already selling many of the paints APG deemed environmentally preferable. “Once folks learned that environmentally friendly didn’t mean a clogged paint gun or expensive new equipment,” explained Barry Decker, Directorate of Public Works at APG, “they were really excited about the products.”

Maryland Environmental Technology Demonstration Center

The Maryland Environmental Technology Demonstration Center (METDC) combines the facilities and expertise of federal, state, and private agencies to demonstrate, test, verify, and evaluate environmental technologies for government and industry customers. With top-of-the-line testing equipment and knowledgeable experts, METDC can satisfy almost any environmental research need.



For additional information, please contact Roy Weismiller at 410 278-5294 or <rweismil@atc.army.mil>, or William Newton at 410 278-7460 or <wnewton@atc.army.mil>.

An APG contractor who buys paint for the installation and whose wife is highly sensitive to traditional paint fumes tried one of the paints meeting the APG standards in his home. When his wife returned home about an hour after he finished painting, she could not tell he had been painting until she saw the repainted room. As a result of his success with the paint, he now purchases it for use at APG and for projects off the installation where he does not have to use APG-approved paints.

Phase II

Based on the promising results of the first phase, APG decided to evaluate all of its architectural and anticorrosive paints against its paint standards. APG provided Green Seal with a list of approximately 2,200 paints stored or used on the installation and asked Green Seal to determine which of the paints met the APG standards.

During its evaluation, Green Seal discovered numerous instances in which multiple stock numbers had been assigned to the same paint. After eliminating the duplicate stock numbers and paints not covered by the standards (e.g., spray paint and reflective paint), 565 paints remained to be evaluated. Green Seal collected and reviewed the MSDS for each one—frequently discovering that the MSDS was missing or out-dated—and called manufacturers to obtain VOC information.

When reviewing the 565 remaining paints, Green Seal discovered that several paints stored at APG were no longer manufactured. Green Seal also learned that some manufacturers were not immediately able to provide VOC information and some were not even aware they made low-VOC paints. “Traditionally, manufacturers only worry about performance, and low-VOC paints perform very well. It’s only recently that they’ve become concerned about environmental attributes,” explained Mark Petruzzi of Green Seal, “which might be why some manufacturers were unaware of their paint’s VOC content.”

After eliminating the paints that were no longer available and reviewing the MSDSs for the remaining paints to remove those that did not meet the APG standards, 107 paints remained. Green Seal obtained pure-white samples of each paint and provided them to APG for VOC testing. METDC conducted the tests and 71 of the 107 paints tested passed. The table below summarizes the combined Phase I and Phase II results.

Table 4. Combined Test Results

Element	Quantity	Percentage of Paints Evaluated
Paints evaluated	565	—
Paints eliminated due to unacceptable ingredients or reported VOC levels	351	62.1
Paints no longer manufactured	96	17.0
Paints unavailable for testing	11	1.9
Paints tested for VOC levels	107	18.9
Paints meeting APG’s paint standards	71*	12.6

* Note: None of the anticorrosive paints tested had acceptable VOC levels, but APG later identified two anticorrosive paints meeting the standards.

The 71 paints include interior and exterior architectural paints in all finishes from 13 different manufacturers. None of the anticorrosive paints traditionally used at APG met its standards, but APG continued looking. In October 1999, more than 2 years after completing the testing, APG located two competitively priced, anticorrosive paints meeting the standards. The addition of the two anticorrosive paints increased the number of paints meeting the standards to 73.

Making the Switch

Based on the Phase II results, APG prepared a list of the paints it tested that met its environmental performance standards and required all APG personnel, residents, and contractors to purchase and use them. It promoted the standards by distributing them along with a list of the 73 paints meeting the standards to everyone on the installation who uses, orders, or supplies paint. APG also labeled every can of paint on the installation meeting its standards with an APG Pollution Prevention sticker. People at APG already were familiar with the sticker because it is used at the Self Service Supply Center (the installation's PX or general store) to identify products that APG has determined are environmentally preferable. (See text box below.)

Self Service Supply Center

APG's Self Service Supply Center encourages environmentally preferable purchasing decisions throughout the store. Products that APG has determined to be environmentally preferable are identified with the APG Pollution Prevention (P2) sticker. Generally, products are eligible for the P2 sticker if they have any of the following environmental attributes:

- Include recycled content
- Are reusable or more durable than similar products
- Have reduced or zero VOCs
- Do not contain any materials reportable under the Superfund Amendments and Reauthorization Act
- Minimize chemical content
- Are available in nonaerosol bottles (for products traditionally available in aerosol cans)

Feather dusters and fly swatters, for example, display the APG P2 sticker, while dust and bug sprays do not. Similarly, WD-40™, an oil-based lubricant available in both pump sprays and aerosol cans, is labeled with a sticker when sold in the pump spray but not when sold in an aerosol can.

The Self Service Supply Center is self-supporting, which means it relies on profits to pay its operating expenses. As a result, it continues to sell products that do not meet APG's environmentally preferable criteria even when alternatives are available because it does not want to alienate potential customers. APG hopes that exposing customers to the more environmentally preferable alternatives will raise demand for such products. Based on sales, this strategy appears to be working.

In addition, APG recently awarded a new contract to Blind Industries to run the Self Service Supply Center beginning in October 1999. As part of the memorandum of understanding, APG incorporated a statement ensuring that Blind Industries will not stock hazardous materials without the consent of the APG Pollution Prevention Program Office. The Pollution Prevention Program Office will help identify environmentally preferable alternatives.

In December 1998, the APG garrison commander signed a policy stating that all architectural paints purchased by the garrison and its contractors must meet APG's environmental standards. Acknowledging that there could be situations in which the standards would be inappropriate, APG developed an exception form that can be used to justify the purchase of noncompliant paint. The form must be approved by the APG Directorate of Safety, Health, and Environment prior to the purchase. In the more than 2 years since the paint standards were developed, no one has submitted an exception form.

When the paint standards were first instituted in 1998, some personnel were concerned that APG was limiting paint choices unfairly. The residents in the 1,200 houses on the installation were particularly concerned that color selections and other quality concerns would be compromised. Resistance dissipated as the residents learned that the same color options existed and that APG's environmentally preferable paints performed better in many instances and were safer to use than traditional paints.

Re-Nu-It Center

APG's Re-Nu-It Center is similar to the large home improvement centers located in suburban shopping centers. The center makes products such as touch-up paint, light bulbs, and lawn mowers available free to the installation's residents.

As part of its pollution prevention efforts, four times a year APG encourages individuals to take any unused paint to the installation's Re-Nu-It Center rather than storing it themselves. Traditionally, many people keep unused paints for future touch-up jobs. In fact, although APG is working to change the contract language, many of the installation's painting contracts require the painters to leave 5 to 10 percent of the paint for future touch-up work. This practice poses significant disposal costs because the paint typically dries out before it is needed and then must be disposed of properly. The Re-Nu-It Center eliminates this problem by collecting and consolidating excess paint for recycling.

Lessons Learned

APG's environmentally preferable paint project has successfully worked with a nongovernmental environmental standards organization, developed its own environmental purchasing standards, purchased paints meeting the standards, saved money, and improved its environmental performance. This section highlights some of the lessons learned.

APG's Environmentally Preferable Paints Are Less Expensive

To the delight of the project's participants, paints meeting the APG paint standards are an average of \$1.76 less expensive per gallon based on a review of prices for compliant and noncompliant paints from the three most frequent suppliers. "We purchase an average of 300 gallons of paint a month," explained Robert Solyan, "which means we can enjoy an immediate monthly savings of \$528."

Additional savings accrue from decreased disposal costs. The paints meeting APG's environmentally preferable standards do not generate hazardous wastes and do not require hazardous materials to clean paint brushes and paint guns. According to Solyan, "This saves \$25,000 annually in avoided disposal costs. If all of DoD adopted our standards, it could avoid more than \$1 million a year in disposal costs."

The new importance placed on the Re-Nu-It Center, where individuals can drop off excess paint or pick up free paint for touch-up work, reduces paint purchases by \$10,000 a year. Based on APG's experience, individuals typically do not purchase paint when they can get it free from the Re-Nu-It Center. The center also further reduces disposal costs because paint that would have been disposed of is reused instead.

Even more savings result from lower administrative costs to track the paints. "We used to have to track the paints for inventory purposes and because they were considered a hazardous material," explained Solyan. "We were tracking hundreds and hundreds of different architectural paints. Now we only have 73 to track, and they do not have to be reported as hazardous materials."

Overall, Solyan estimates first-year savings of \$60,000. According to his estimates, the one-time costs of developing the environmentally preferable paint standards were recovered in 1.5 years.

Using a Nongovernmental Environmental Standards Organization Can Make Environmentally Preferable Purchasing Easier

When APG began investigating ways to improve the environmental performance of its paints, it was concerned that it did not have sufficient personnel with the appropriate expertise and available time to adequately review the literature on the subject. Locating a nongovernmental environmental standards organization with the appropriate expertise made APG's challenge easier.



As detailed in EPA's April 1998 policy letter on the use of nongovernmental entities such as environmental certification and standards organizations, APG was conscious of its responsibility to make the final purchasing decisions.⁴ Green Seal's role was to assist APG in developing its own environmentally preferable paint standards and to review APG's paint inventory for paints meeting the APG standards. Green Seal did not make any purchasing recommendations; it simply provided APG with the technical information necessary to make its own decisions.

While APG's paint standards are similar to Green Seal's, it is important to note that paints do not need to display the Green Seal Certification Mark (Green Seal of Approval) to meet APG's standards. Paints with the Green Seal certification label will meet APG's standards, but paint manufacturers do not need to seek Green Seal certification in order to meet the APG standards. Manufacturers simply have to provide independent certification that their products meet APG standards. At its discretion, APG can verify the information independently by reviewing the product's MSDS and testing VOC levels.

Significant Competition Exists Within the Current Market

Initial skeptics of APG's paint standards argued that there would be insufficient competition among vendors of the paints meeting its environmentally preferable paint standards. After completing its review of the paints used on the installation, however, APG identified 71 paints meeting the standards, which are produced by 13 different manufacturers and are available from numerous distributors. The 71 paints include interior and exterior architectural paints in all finishes. It later identified two anticorrosive paints meeting the standards, which brought the total number of paints to 73.

Companies Will Reformulate Products To Meet the Standards

APG and Green Seal have both heard anecdotal evidence that paint manufacturers are reformulating their products to meet the increasing demand for environmentally preferable paints. For example, Lasting Paint Company, Inc., an Aberdeen area paint manufacturer and distributor, reports that it is reformulating products to meet the increasing demand. "We're not just changing because of the Aberdeen standards," explained Jason Puig, a company sales representative, "but because we see a growing market for environmentally friendly paints, especially in the health care field—hospitals, nursing homes, and doctors' offices."

It Is Important To Verify Environmental Attribute Claims

Based on the information reported on MSDSs and provided by the manufacturers, 107 of the paints to be tested appeared to be within APG's VOC limits. After testing, however, only 66 percent (71) were within acceptable limits. Reported VOC levels were frequently different from the VOC levels as measured by APG. Of the 107 tested paints, 40 percent were at least 10 percent or more above their reported VOC lev-

⁴ For a copy of EPA's policy recommendations, please visit the EPP Web site at <www.epa.gov/opptintr/epp>.

els and 41 percent were at least 10 percent below stated VOC levels. Only 19 percent were within 10 percent of their reported levels. Alarming, 18 percent were more than 50 percent above their reported VOC levels and 8 percent were more than 50 percent below reported levels. The levels for two of the tested paints were more than 300 percent higher than reported by the manufacturers.

Two manufacturers wrote to suggest that APG's testing methodologies might be inaccurate; however, upon learning that the METDC was using a gas chromatograph to determine VOC levels, the manufacturers did not raise any additional concerns. This strongly suggests the need to verify environmental information for products. Like APG, several nongovernmental environmental certification and standards organizations, including Green Seal, verify environmental information before certifying a product. Some, like Green Seal, also include regular site visits to manufacturers to ensure they continue to provide products meeting the certification standards.

In addition, APG and EPA are investigating the legal consequences for manufacturers providing inaccurate MSDS information.

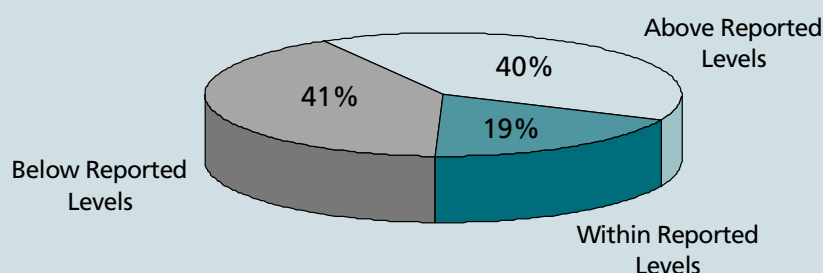
Environmental Champions Are Important

According to Mike Shor, Green Seal's Vice President for Marketing who has worked on numerous environmental purchasing projects, the APG project was successful because of the involvement of several strong environmental champions. "People don't like to change," Shor suggested, "which means you really have to show them that environmental purchasing can be easy and that the products work."

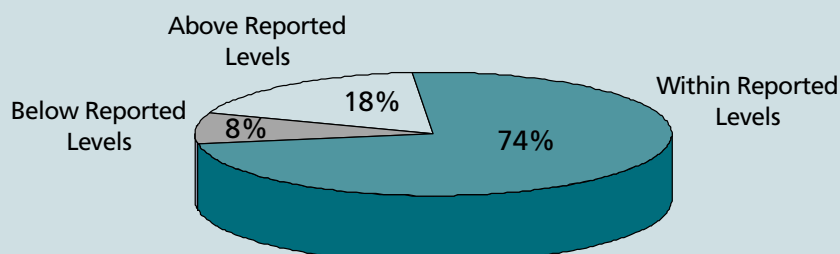
"The APG team really went out of its way to demonstrate the economic and environmental advantages of environmentally preferable products. They were willing to get their hands dirty, to consolidate the paints for reuse, to collect the outdated paints for proper disposal, to work with the painters to demonstrate the products, [and] to test VOC levels. They are an amazing team," explained Shor.

Actual Versus Reported VOC Levels

Within 10 Percent of Reported Levels



Within 50 Percent of Reported Levels



Only 19 percent of the 107 paints' actual VOC levels were within 10 percent of the levels reported by the manufacturers (see top chart). Eighteen percent of the actual VOC levels were more than 50 percent above the levels reported by the manufacturers (see bottom chart). The VOC levels for two of the tested paints were more than 300 percent higher than reported by the manufacturers.

Both the APG team and Shor agree on the following four general roles for an environmental champion:

- Identify areas for continual improvement in environmental performance
- Promote the initiative heavily
- Make it fun
- Get others involved

“I was amazed at how excited some people got once they realized the inherent advantages of the approach,” explained Elizabeth Longenecker, an APG pollution prevention specialist. “It was really rewarding to see people take the ideas and make them work.”

Persistence Is Important

When APG compared the paints in its inventory against its environmental paint standards, it identified 71 interior and exterior architectural paints meeting the standards but no anticorrosive paints. Rather than exempting anticorrosive paints from the standards, APG looked beyond the paints it traditionally purchased to locate anticorrosive paints that would comply. Throughout its search, APG depleted its supply of noncompliant anticorrosive paints and ordered limited additional supplies as needed, but it never stopped looking. APG’s persistence paid off and, more than 2 years after the initial testing, it began purchasing two anticorrosive paints meeting its environmentally preferable purchasing standards.

APG was confident its environmental standards were sound. It just needed to locate anticorrosive paints meeting the standards. The results of APG’s persistence prove that you do not have to lower environmental preferability standards to locate compliant products. Sometimes, you just have to look a little harder.

Environmentally Preferable Purchasing Is a Natural Part of Any Pollution Prevention Strategy

Like many other EPP pilot projects, APG’s paint project was initiated to meet a number of pollution prevention objectives, only one of which was complying with Executive Order 13101. APG adopted the EPP approach because it was a useful tool for meeting its pollution prevention goals. Examining the environmental attributes associated with its paint purchases allowed APG to select products that save money, perform better, and prevent pollution. As APG’s pilot and others have demonstrated, EPP can be an important component of any pollution prevention initiative.

Next Steps

While the APG paint pilot project has enjoyed many successes, the installation is constantly seeking ways to improve its environmentally preferable paint program as well as its overall pollution prevention efforts. This section describes some of APG's future goals.

Adopting a Just-in-Time Purchasing Process

To further decrease the volume of paints stored on the installation, APG is adopting a "just-in-time" purchasing approach. Traditionally, APG purchased large volumes of paint several times a year to benefit from the high-volume price discounts. Although the installation received a volume discount, the disposal costs of the unused and expired paint more than offset the initial savings.

Just-in-time purchasing will allow APG to order only the quantities needed and to avoid disposal costs associated with outdated stock. To implement the new purchasing system, APG is tracking its paint purchases in its Hazardous Inventory Tracking System (HITS) even though paints meeting the APG standards are not hazardous. HITS makes tracking paint and other product purchases easier. It is a user-friendly, Windows-based program that maintains chemical constituent data, chemical hazard information, MSDSs, and available quantities. The software notifies users when a product is within 90, 60, and 30 days of its expiration date so it can be used before it expires and becomes unusable.

APG also is considering centralizing its paint purchases so they can be controlled from a single location. Currently, paint is purchased by a variety of offices, making coordination a challenge and potentially leading to unnecessary purchases.



Promoting the Project

APG is promoting its success with its paint standards throughout DoD and the rest of the federal government. It is encouraging others to examine its research, methodologies, and successes and to implement similar projects. As a result of its efforts, others outside of the federal government also are learning about the installation's success. One example cited by both APG and Green Seal is the April 1999 issue of *Pollution Engineering*, with a circulation of 59,000, which includes an article on the APG paint standards.

The installation also is promoting the project in the communities surrounding APG. Some local manufacturers and distributors are reluctant to promote the APG standards fearing they will lead to decreased sales. However, Jason Puig, a sales representative for Lasting Paint Company, Inc., explained that his sales have not changed as a result of the APG standards. "Sales of some products rose, while [sales of] other products fell," explained Puig. "Overall, our sales remained about the same." The company, however, is developing additional paints to meet the standards in an attempt to further increase its share of the environmentally preferable paint market.

Including the Standards in All Contracts

Most of the current painting contracts at APG do not include specific language requiring the use of paints meeting the environmentally preferable paint standards because the contracts were awarded before the standards were developed. As a result, some contractors could be using noncompliant paints. APG is working with its contracting office to ensure that all future contracts include specific language addressing its environmental paint standards. It also is investigating the challenges associated with modifying the existing contracts to include adherence to the APG paint standards as a requirement. Including specific language in the contracts will help ensure everyone is complying with the standards and make compliance enforceable.

Minimizing the Use of Noncompliant Paint from Off-Installation Sources

APG is aware that installation residents might not find all of the household products a homeowner needs at its Self Service Supply or Re-Nu-It Centers. As a result, installation residents might also shop at large, convenient home improvement retail centers and unintentionally purchase paint that does not comply with APG's standards.

APG also is concerned about the potential affects of the government IMPAC cards, government credit cards that will soon have purchase limits up to \$25,000 for selected government purchasers and \$2,500 for most government purchasers. The IMPAC cards make it easier for designated government purchasers to buy products without going through the central government purchasing system. They also increase the number of government purchasers who must understand and abide by the APG paint standards.

To minimize the purchase of noncompliant paint, APG is increasing its educational efforts installationwide to explain the importance of its environmental standards. APG also is incorporating its paint standards into the training provided to all IMPAC card users.

Learning from Other Agencies

While exploring additional pollution prevention opportunities, APG learned that the National Aeronautics and Space Administration (NASA) was developing environmental standards for powder paint coatings and for cleaning products. APG and NASA are sharing information about their environmentally preferable product standards and each might soon adopt the other's standards. NASA also is examining APG's HITS software and might modify it to limit the overall quantity of hazardous materials stored onsite. APG provided its HITS software to NASA free of charge, and, in exchange, NASA will provide APG with copies of any improvements it develops.

Improving Pollution Prevention by Further Reducing Painting Requirements

In the true spirit of EPP, APG also is examining ways to minimize its overall paint purchases. The installation encourages the use of vinyl coverings or paneling on interior walls in high-traffic areas and the use of brick or vinyl siding for exterior walls to eliminate the need for repainting. The alternative wall coverings might be easier to maintain and more durable than painted walls. “Just as importantly, the wall coverings can be made with recycled content, which further improves their environmental preferability,” suggested Sheila Jones, a pollution prevention specialist with Dynamac, an APG contractor. APG is investigating the use of plastic lumber for similar reasons.

Using a Similar Process To Evaluate Degreasers

Perhaps the most important indicator of the overall success of APG’s environmentally preferable paint project is that the installation is using the same process and is working with Green Seal to develop environmental standards for its degreasing products and operations.



Appendix A—Green Seal

Founded in 1989, Green Seal is an independent, nonprofit organization whose mission is to encourage the purchase of environmentally responsible products and services. It also assists businesses and governments with green purchasing issues through its Environmental Partners Program. It shares environmental product information on its Web site <www.greenseal.org> and in its monthly *Choose Green Report*, which has more than 490,000 readers.

Product Standards and Certification

Green Seal's primary purpose is to establish voluntary environmental standards and to award the Green Seal Certification Mark (Green Seal of Approval) to products that meet its standards. More than 300 products have been certified.

Green Seal Standards

Green Seal standards are available on its Web site <www.greenseal.org>. They are available currently for the following product categories:

- Alternatively Fueled Vehicles
- Anticorrosive Paints
- Chillers
- Clothes Dryers
- Clothes Washers
- Coated Printing Paper
- Compact Fluorescent Lamps
- Cooktops/Ovens/Ranges
- Dishwashers
- Ductless Heat Pumps
- Fleet Vehicle Maintenance
- Freezers
- General Purpose Cleaners
- Lodging Properties
- Newsprint
- Paints
- Paper Products Used to Prepare Food
- Paper Towels and Paper Napkins
- Photocopiers
- Photo Voltaic Modules
- Plastics Labeling Systems
- Pollution-Reducing Vehicles
- Powdered Laundry Bleach
- Printing and Writing Paper
- Re-Refined Engine Oil
- Refrigerators
- Residential Air-Conditioning Systems
- Residential Heat Pumps
- Reusable Utility Bags
- Showerheads
- Tissue Paper
- Water Efficient Fixtures
- Water Heaters
- Watering Hoses
- Window Films
- Windows

Green Seal establishes environmental product standards in an open, collaborative process. It actively seeks input from all stakeholders including facility managers, manufacturers, government agencies, academic researchers, trade associations, environmental and consumer groups, and the general public. Once a product, such as paint, is selected for study, Green Seal takes a lifecycle approach in its assessment. It examines material extraction, manufacturing processes, use, and the ultimate recycling or disposal of the product to define the environmental effects and to determine if significant measures can be taken to reduce them.

When developing environmental standards, Green Seal recognizes that it is extremely important that a product work at least as well as others in its class. If a product contains toxic components integral to a product's performance, for which nontoxic substitutes are unavailable, the components are not prohibited under Green Seal's standards. Product performance is the most important criteria.

Upon completing its research, Green Seal releases draft standards, which are circulated widely for public review and comment. After reviewing the comments, publicly responding to all comments, and making any necessary changes, Green Seal publishes final standards. A formal appeals process is available. At the time of publication, approximately 15 to 20 percent of the market can meet the standards. If a larger percentage of the market is able to meet them at some point in the future, Green Seal reserves the right to modify the standards so they remain a means to identify industry-leading, environmentally responsible products.

APG's use of Green Seal's technical expertise is consistent with the April 1998 policy on the use of nongovernmental environmental certification and standards organizations issued by EPA and the Office of the Federal Environmental Executive. For a copy of the policy, please visit the EPP Web site at <www.epa.gov/opptintr/epp>.

Product Certification Process

Green Seal offers certification to all products meeting its standards. To become certified, a manufacturer must submit the product for evaluation and agree to a site visit and annual monitoring to ensure continued compliance. If the product meets its standards, Green Seal will grant the manufacturer the right to use the Green Seal of Approval, subject to ongoing testing and inspection. Should a product fail to meet the standards on evaluation, Green Seal informs the manufacturer of the reasons and will work with it to make the changes needed to meet the standards.

Appendix B—Examples of Paints Meeting APG Standards*

Interior Flat		APG Standard VOC Limit = 50 g/L
Manufacturer	Product Name	VOC Level (g/L)
Benjamin Moore	Pristine Flat	12
Benjamin Moore	Moore's Ceiling White Flat	51
Coronado Paint	Super Kote 1000 Vinyl Latex Flat	50
Duron	Texture Paint Flat	49
Duron	Builder's Masterpiece Interior Vinyl Latex Flat	47
Dutch Boy	Fashion Fresh Interior Latex Flat	28
Kurfee's Coatings - Servistar	Supreme Interior Odor Free Latex Primer-Sealer	47
PPG Industries	8 Year Interior Wall Deep Base	20
Sherwin Williams	Style Perfect Flat	51
United Coatings	Interior Latex Texture Paint Sand Texture	5

Interior Semigloss		APG Standard VOC Limit = 150 g/L
Manufacturer	Product Name	VOC Level (g/L)
Benjamin Moore	Pristine Interior Latex Semigloss	19
Benjamin Moore	Pristine Interior Latex Eggshell	57
Benjamin Moore	K&B Acrylic Latex Satin Finish	45
Benjamin Moore	Pristine Egg	16
Benjamin Moore	Pristine Semigloss	20
Benjamin Moore	Regal Satin	68
Benjamin Moore	Moore Kitchen & Bath Satin	81
Benjamin Moore	Moorcraft Super Hide Latex Semigloss Enamel	116
Bruning Paint	Pacon Supreme Latex Semi-Lustre Midtone Base	111
Bruning Paint	Pacon Supreme Latex Semi-Lustre Enamel	144
Duron	Plastic Kote Interior Acrylic Semigloss	123
Duron	Pro Kote Interior Acrylic Semigloss	112
Duron	Ultra Deluxe Interior Acrylic Latex Semigloss Enamel	96
Dutch Boy	Fresh Look Interior Latex Semigloss Enamel	119
Glidden Paint	3400 Spread Satin Latex Wall Paint	107

* This appendix was accurate as of November 15, 1999. The paints identified in these tables were chosen for analysis against the Aberdeen Proving Ground standard primarily because they were readily available in the Aberdeen Proving Ground stock. Therefore, this list serves only as an example of products that meet the Aberdeen Proving Ground architectural paint standard. Aberdeen Proving Ground does not endorse any particular brand, manufacturer, or distributor of paint.

Interior Semigloss (continued)**APG Standard VOC Limit = 150 g/L**

Manufacturer	Product Name	VOC Level (g/L)
Lasting Paints	Acrylic Latex Tint Base Eggshell	105
Lasting Paints	Acrylic Latex Pastal Base Eggshell Base	120
Lasting Paints	Latex Semigloss Pastel Base	62
PPG Industries	Lucite Interior Latex Semigloss Natural	81
Sears	Easy Living Semigloss Wall & Trim	111
Sherwin Williams	Super Paint Interior Semigloss	142
Sherwin Williams	ProMar Semigloss	81
Sherwin Williams	Classic 99 Interior Semigloss	35
Sherwin Williams	ProMar 700 Semigloss	81
Sherwin Williams	Style Perfect Semigloss	76
Sherwin Williams	ProMar 200 Semigloss	86
Sherwin Williams	ProMar 400 Semigloss	99
Sherwin Williams	Style Perfect	125
Sherwin Williams	ProMar 200 Interior Latex Semigloss	44
Sherwin Williams	ProMar 400 Interior Latex Semigloss	97
Sherwin Williams	Style Perfect Interior Latex Semigloss	120
Sherwin Williams	Style Perfect Interior Satin	90
Sherwin Williams	ProMar 200 Interior Latex Egg-Shell	137
Sherwin Williams	Classic 99 Interior Satin Latex	144

Interior Gloss**APG Standard VOC Limit = 150 g/L**

Manufacturer	Product Name	VOC Level (g/L)
Duron	Deluxe Gloss	117

Exterior Flat**APG Standard VOC Limit = 100 g/L**

Manufacturer	Product Name	VOC Level (g/L)
Benjamin Moore	Moore's Latex Exterior	44
Benjamin Moore	Moorcraft Super Special Premium Latex Exterior Flat	54
Benjamin Moore	Moorcraft Flat	80
Benjamin Moore	Fresh Start Exterior Primer	92
Benjamin Moore	Moorcraft Super Special Premium Latex Exterior House & Trim	67
United Paint Mfg. Co.	Exterior Latex House Paint	18

Exterior Semigloss		APG Standard VOC Limit = 200 g/L
Manufacturer	Product Name	VOC Level (g/L)
Benjamin Moore	Moorcraft Satin	111
Benjamin Moore	Moore Exterior Floor and Patio	176
Benjamin Moore	Moorglo House & Trim Exterior Non-Flat	191
Coronado	Super Kote 3000 Latex Semigloss 74	88
Coronado	Acrylic House Paint 12 Semigloss	169
Duron	Weathershield Semigloss	203
Duron	Weathershield Exterior 100% Acrylic Latex Satin	119
Duron	Ultra Deluxe Exterior 100% Acrylic Latex Semigloss	139
Duron	Weathershield Exterior Acrylic Semigloss	145
Sherwin Williams	Super Paint Exterior Satin Latex	104
Sherwin Williams	Super Paint Latex Satin	129
Sherwin Williams	A-100 Exterior Satin	158
Sherwin Williams	Exterior Satin Latex	52
Sherwin Williams	Weather Perfect Exterior Satin Latex	82
United Coatings	Wal-Mart 15 Year Semigloss Accent Base	150

Exterior Gloss		APG Standard VOC Limit = 200 g/L
Manufacturer	Product Name	VOC Level (g/L)
Dutch Boy	Performer Exterior Latex Gloss	96
Sherwin Williams	Super Paint Exterior Gloss Latex	80
Sherwin Williams	A-100 Gloss	107
Sherwin Williams	A-100 Exterior Gloss Latex	64
United Coatings	Wal-Mart Accent Base Exterior Gloss House & Trim	81

Anticorrosive		APG Standard VOC Limit = 250 g/L
Manufacturer	Product Name	VOC Level (g/L)
Sherwin Williams	Krylon - Rough Tough Latex - 1	217
Sherwin Williams	Krylon - Rough Tough Latex - 2	217

Appendix C—Other Environmentally Preferable Paint Pilot Projects

While this case study highlights a very effective means of increasing the environmental preferability of paint purchases, it is not the only EPP paint initiative. This appendix provides a brief overview and contact information for three additional ongoing projects seeking to identify environmentally preferable paint alternatives.

GSA's Paint Attribute Matrix

The U.S. General Services Administration (GSA), with technical assistance from EPA, is developing an environmental attribute matrix for interior and exterior latex paints. Similar to the environmental attribute matrix GSA and EPA developed for cleaning products*, the paint matrix will provide users with additional environmental and performance information about specific products available through GSA. The matrix will help customers determine which products to purchase but will not include any purchasing recommendations.

The matrix will include information on the following environmental and performance factors:

Environmental Factors

- *Air Pollution Potential*—based on the calculated VOC-content levels using a formula provided to manufacturers.
- *Product Packaging*—whether a manufacturer's product is distributed in minimal or reduced packaging, packaging containing recycled-content materials, or packaging that is recyclable.
- *Product Take-Back*—whether a manufacturer participates in a product take-back program in which it or a designated third-party collects unused paint for reuse or recycling.

Performance Factors

- *Dry Film Thickness*—the manufacturer's recommended paint application thickness.
- *Theoretical Spread Rate*—the size of the area 1 gallon of paint will cover when applied at the recommended dry film thickness.

* For additional information on the GSA and EPA cleaning products attribute matrix, please see the following EPA publications: *Environmentally Preferable Purchasing in Action—Cleaning Products Pilot Project Fact Sheet* (EPA742-F-97-001), a 4-page fact sheet describing the project, and *Cleaning Products Pilot Project—An Environmentally Preferable Purchasing Case Study* (EPA742-R-97-002), a 20-page project case study. Both publications are available from the EPP Web site <www.epa.gov/opptintr/epp> or by calling the Pollution Prevention Information Clearinghouse at 202 260-1023.

- *Drying Time*—the maximum amount of time it will take the paint to dry when applied at the recommended dry film thickness.
- *Shelf Life*—the length of time a can of paint can be left undisturbed on a shelf at normal room temperature.
- *Application*—the methods that can be used successfully to apply the paint (brush, roller, or sprayer) and the thinning requirements necessary for each method.
- *Warranty Information*—details of the manufacturer’s product warranty.

To obtain the matrix information, GSA distributed a voluntary survey to paint manufacturers selling products through GSA. Paint manufacturers are not required to provide any of the environmental or product performance information requested by GSA, but GSA will publish the information provided in its product catalogs. As of October 1999, GSA was still collecting product information and the publication date for the matrix had not been determined.

For additional information, please contact Irving J. Ostrich of GSA’s Hardware and Appliance Center at 816 823-3087 or <irving.ostrich@gsa.gov>; or Conrad Flessner of EPA’s Exposure Assessment Branch within the Office of Pollution Prevention and Toxics at 202 260-3918 or <flessner.conrad@epa.gov>.

U.S. Air Force’s New Paint Products

Since 1995, the U.S. Air Force Research Lab at Wright Patterson Air Force Base in Ohio has been developing a more durable airplane paint that does not contain chromates. The Air Force’s maintenance costs for paint-related activities are more than \$700 million per year. Aircraft painting, stripping, and repainting represents approximately 75 percent of the hazardous waste materials generated by the U.S. Air Force. As a result, the Air Force would consider a more durable, less toxic paint to be environmentally, and economically, preferable.

A fleet of C-17 aircraft proved a good test for developing a new paint product. The anticorrosive paint traditionally used on the C-17’s contains chromium, which is potentially hazardous to humans, and begins peeling and fading after only 18 months, requiring significant touch-up painting that can be time consuming and costly. In addition, the touch-up frequently results in mismatched colors, making the coating appear mottled, which could make detecting damage to the aircraft more difficult. As a result, the entire aircraft must be stripped and repainted.

When deciding to investigate a more durable paint, the Air Force also decided to seek a paint that did not include chromium. The Air Force Research Lab asked its contractor, McDonald-Douglas, to approach the paint vendors with their problem. With the Air Force willing to pay a little extra for a more durable, less hazardous paint, McDonald-Douglas researched and identified a paint vendor that could develop such a product.

The Air Force began testing the new paint on the C-17 aircraft in February 1998. Thus far, the chromate-free paint appears to accomplish the dual objectives of increasing durability and lowering toxicity. After more than a year in the field, the test C-17’s topcoat had maintained its properties, showing few signs of peeling or fading. The coating proved easier to touch up, and the reduced painting-related maintenance

helped reduce the frequency and the costs of hazardous waste cleanup. Although the new paint has a different chemistry than standard paint, it is compatible with existing Air Force paint equipment. The new paint potentially could allow the Air Force to reduce touch-up work, increase the time between repainting, and save more than \$1.6 million per year per aircraft.

The Air Force Materials Lab is exploring other environmentally preferable paint opportunities. Using a preexisting contract with Battelle Columbus, an Air Force team composed of the Materials Lab, Air Combat Command, the Logistics Centers, and the Systems Program Offices responsible for procuring airplanes, the Air Force Material Lab developed new environmentally preferable paint specifications. The contractor forwarded the specifications to approximately 15 paint vendors, seeking paints that might satisfy the new requirements. Vendors sent samples of their products to Battelle for initial testing. Battelle submitted the test results and the Air Force has a list of products it will test further.

For more information, contact Steve Szaruga of the U.S. Air Force Research Lab, Wright Patterson Air Force Base, Ohio, at 937 255-9064 or <Steve.Szaruga@ml.afrl.af.mil>.

U.S. Army's New Painting Technology

The U.S. Army's Tank Automotive Research and Development Center (TARDEC) in Warren, Michigan, has been developing a new painting process that saves time, money, and paint and reduces VOC emissions. Reducing VOC emissions became an important TARDEC goal for two reasons. First, California's limits for VOC content in paint were lower than what was currently available to the Army, and other states appear to be adopting similar limits. Second, Department of Natural Resources offices around the country began requiring Army facilities to purchase and operate scrubbers to limit VOC emissions. As a result of these challenges, the Army began seeking paint products that would meet state VOC limits and eliminate the need to purchase costly scrubbing equipment.

While attending a trade show, TARDEC learned about UNICARB, the Union Carbide Super Critical Carbon Dioxide Application Process, which mixes paint with carbon dioxide (CO₂) instead of solvent to create a lower-VOC coating. TARDEC approached the manufacturer about testing the system for possible use by the Army. After securing initial funding through an EPA grant, administered by the Army Acquisition Pollution Prevention Support Office, TARDEC entered into an agreement with the contractor to supply the UNICARB system. The Army, however, also requested a unique low-VOC coating to use with the equipment to further reduce VOC emissions. Union Carbide did not have a paint product meeting the request but entered into a licensing agreement with paint manufacturers to develop the new coating.

Using the new paint and application process eliminates the need to acquire \$4.5 million dollar scrubbers. The results of two demonstration projects suggest additional savings. One of the projects reduced paint use by 67 percent, VOC emissions by 78 percent, and painting time by 33 percent and included savings of \$114 per gallon of paint used. A second project, which involved painting U.S. Army tanks and personnel carriers, achieved a 25 percent reduction in paint quantities and comparable VOC and cost reductions. In addition, the second project demonstrated significant time savings, thanks to a two-hose design that enabled two people to paint at the same time. Although the new paint is 20 percent more expensive than traditional high-VOC

paints, and the UNICARB equipment requires an initial investment of \$70,000, the avoided scrubber costs, reduced paint consumption, and other savings more than offset the costs.

TARDEC has been working with paint and equipment manufacturers to further refine the system to better meet its needs. While previous comparable systems were large and cumbersome, the UNICARB system is now portable, which makes it easy to maneuver within a work area and to transport to other destinations.

TARDEC is planning some additional testing before making any final decisions regarding full deployment of the system. A three- or six-month in-place comparison between the existing system and the UNICARB system will allow TARDEC to collect and compare data on maintenance, savings, and other characteristics. As of October 1999, it was still seeking financing for this part of the project. Following the initial grant, financing of the new painting process was provided by in-kind contributions from private companies, minimizing the dollar amount expended from government funds, and by the United Defense Limited Partnership, a Department of Defense contractor.

For additional information, contact Anna Wojciechowski of TARDEC at the U.S. Army Tank, Automotive, and Armaments Command, Warren, Michigan, at 810 574-5954 or <wojciea@cc.tacom.army.mil>.



We want to hear from you! Please tell us about your environmentally preferable purchasing activities and efforts. We are collecting and sharing information, tools, and hints about what works and what doesn't as environmentally preferable purchasing evolves and expands. Please contact the EPP program by e-mail, regular mail, or fax:

Environmentally Preferable Purchasing Program

U.S. Environmental Protection Agency

401 M Street, SW. (7409)

Washington, DC 20460

e-mail: epp.pilot@epa.gov

Fax: 202 260-0178



United States
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Official Business
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