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Control Techniques Guidelines for Flat Wood Paneling Coatings

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Control Techniques Guidelines for Flat Wood Paneling Coatings

Sector Policies and Programs Division
Office of Air Quality Planning and Standards

U.S. Environmental Protection Agency
RTP, NC

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I. Introduction

Clean Air Act (CAA) section 172(c)(1) provides that state implementation plans (SIPs) for nonattainment areas must include "reasonably available control measures" (RACM), including "reasonably available control technology" (RACT), for sources of emissions. Section 182(b)(2)(A) provides that for certain nonattainment areas, States must revise their SIPs to include RACT for sources of VOC emissions covered by a control techniques guidelines (CTG) document issued after November 15, 1990 and prior to the area's date of attainment.

The United States Environmental Protection Agency (EPA) defines RACT as "the lowest emission limitation that a particular source is capable of meeting by the application of control technology that is reasonably available considering technological and economic feasibility." 44 FR 53761 (Sept. 17, 1979). In subsequent Federal Register notices, EPA has addressed how states can meet the RACT requirements of the Act.

CAA section 183(e) directs EPA to list for regulation those categories of products that account for at least 80 percent of the VOC emissions, on a reactivity-adjusted basis, from consumer and commercial products in areas that violate the NAAQS for ozone (i.e., ozone nonattainment areas). EPA issued the list on March 23, 1995, and has revised the list periodically. *See* 60 FR 15264 (March 23, 1995); *see also* 71 FR 28320 (May 16, 2006), 70 FR 69759 (Nov. 17, 2005); 64 FR 13422 (Mar. 18, 1999). Flat wood paneling coatings are included on the current section 183(e) list.

This CTG is intended to provide state and local air pollution control authorities information that should assist them in determining RACT for volatile organic compounds (VOCs) from flat wood paneling coating. In developing this CTG, EPA, among other things, evaluated the sources of VOC emissions from the flat wood paneling coating industry and the available control approaches for addressing these emissions, including the costs of such approaches. Based on available information and data, EPA provides recommendations for RACT for flat wood paneling coating.

States can use the recommendations in this CTG to inform their own determination as to what constitutes RACT for VOCs for flat wood paneling coatings in their particular nonattainment areas. There are several HAP that are also VOCs. The information contained in this document is provided only as guidance. This guidance does not change, or substitute for, applicable sections of the CAA or EPA's regulations; nor is it a regulation itself. This document does not impose any legally binding requirements on any entity. It provides only recommendations for state and local air pollution control agencies to consider in determining RACT. State and local pollution control agencies are free to implement other technically-sound approaches that are consistent with the CAA and EPA's implementing regulations

The recommendations contained in this CTG are based on data and information currently available to EPA. These general recommendations may not apply to a particular situation based upon the circumstances of a specific source. Regardless of whether a State chooses to implement the recommendations contained herein through State rules, or to issue State rules that adopt different approaches for RACT for VOCs from flat wood paneling coatings, States must submit their RACT rules to EPA for review and approval as part of the SIP process. EPA will evaluate the rules and determine, through notice and comment rulemaking in the SIP process, whether they meet the RACT requirements of the Act and EPA's regulations. To the extent a State adopts any of the recommendations in this guidance into its State RACT rules, interested parties can raise questions and objections about the substance of this guidance and the appropriateness of the application of this guidance to a particular situation during the development of the State rules and EPA's SIP approval process.

CAA section 182(b)(2) provides that a CTG issued after November 15, 1990 and before the date of attainment must include the date by which States must submit SIP revisions in response to the CTG. States subject to section 182(b) should submit their SIP revisions within one year of the date of issuance of the final CTG for flat wood paneling coatings. States subject to CAA section 172(c)(1) may take action in response to this guidance, as necessary to attain.

II. Background and Overview

In June 1978, EPA published a final CTG for flat wood paneling coatings, entitled "Control of Volatile Organic Emissions from Existing Stationary Sources, Volume VII, Factory Surface Coating of Flat Wood Paneling," EPA-450/2-78-034 (June 1978).[1] The cover page of the 1978 CTG is included as Appendix A to this CTG. In September 1979, EPA published guidance to provide assistance to State and local air pollution control agencies in preparing RACT regulations for a variety of categories, including flat wood paneling.[2] In 2003, EPA promulgated national emission standards for hazardous air pollutants (NESHAP) covering surface coating of wood building products (including flat wood paneling). See 68 FR 31746 (May 28, 2003).

At least 28 State and local jurisdictions have regulations that control VOC emissions from surface coating operations that include flat wood paneling. Most of these regulations are general surface coating rules; a few are specific to flat wood paneling. Almost all of the jurisdictions that specifically address flat wood paneling have based their rules on the 1978 CTG. However, there are two jurisdictions in California that have requirements specific to flat wood paneling that go beyond the 1978 CTG. These jurisdictions are Placer County California Air Pollution Control District (Placer County) and South Coast Air Quality Management District (South Coast). A discussion of the applicability and control options found in the 1978 CTG and in the Placer County and South Coast rules is presented in Section V of this document.

The remainder of this document is divided into six sections. Section III describes the scope of sources to which this CTG could apply. Section IV describes the flat wood paneling industry along with the types of flat wood products, and identifies the sources of VOC emissions from flat wood related processes. Section V describes the available control approaches for addressing VOC emissions from this source category and summarizes state and local regulatory approaches for addressing such emissions. Section VI provides our recommendations for RACT for flat wood paneling coatings. Section VII discusses the cost-effectiveness of the recommended control approaches. Section VIII contains a list of references.

III. Applicability

This CTG applies to facilities that apply flat wood paneling coatings that emit at least 6.8 kg/day (15 lb/day) of VOC before consideration of controls. Flat wood paneling coatings means wood paneling products that are any interior, exterior or tileboard (class I hardboard) panel to which a protective, decorative, or functional material or layer has been applied.

This threshold of 6.8 kg/day (15 lb/day) is consistent with the applicability threshold level contained in many previous final CTGs. It is also consistent with the purpose of the section 183(e). In section 183(e), Congress directed EPA to assist States in achieving VOC emission reductions from consumer and commercial products. These products individually may result in relatively small amounts of VOC emissions but, in the aggregate, they contribute significantly to ozone formation in nonattainment areas. Given the nature of the products and sources at issue here, we believe that the 15 lb/day applicability threshold is appropriate.

We used the 2002 National Emission Inventory (NEI) as the source of emissions data and statistical information concerning the flat wood paneling industry as a whole. Plants are located throughout the United States, with the Pacific Coast and the Southern States having the largest numbers of facilities. There are approximately 80 facilities in the United States that produce flat wood paneling products. We found that there are 24 flat wood paneling coating facilities that meet the 15 lb of VOC per day applicability threshold for this CTG that are located in current ozone nonattainment areas (based on April 2006 designations) in eight States. Appendix B shows the distribution of these facilities and the current State and/or local requirements that apply to them. Information on flat wood paneling coatings facilities in the South Coast area of California was not contained in the 2002 NEI database. We have other information, however, which indicates that there are two flat wood paneling facilities in the South Coast area. Appendix B does not identify these facilities because Appendix B focuses solely on the information we obtained from NEI.

IV. Process Description and Sources of VOC Emissions

A. Types of Flat Wood Paneling

Flat wood paneling products are used in construction and can be classified as three main product types: decorative interior panels, exterior siding, and tileboard.

1. *Decorative interior panels*

Interior wall paneling is usually grooved, frequently embossed, and sometimes grain printed to resemble various wood species. Interior panels are typically manufactured at the same facilities as tileboard, although in much smaller quantities.

Coated board used for interior panels are subject to industry performance specifications (consensus standards) which have more decorative coating requirements than other products. These standards require multiple coating layers and coating steps. Production speeds of 30 to 35 boards per minute require the use of solvents that evaporate without leaving cure blisters and without leaving residual solvent in the coating film or substrate. The substrate can be hardboard, plywood, medium density fiberboard (MDF), or particleboard.

2. *Exterior Siding*

Exterior siding may be made of solid wood, hardboard, or waferboard. Siding made of solid wood and hardboard is typically primed at the manufacturing facility and finished in the field, although some finishing may be performed during manufacturing on a limited basis. Field-applied coatings are not subject to this CTG. Exterior trim (material made out of siding panels and used for edges and corners around the siding) is typically manufactured at the same facility and coated with the same coatings as siding.

This industry segment involves exterior products that must have coatings able to withstand extreme and long-term weather conditions. These requirements impact the amount of VOC emitted from the coating of exterior siding.

3. *Tileboard*

Tileboard is a premium interior wall paneling product made of hardboard that is used in high moisture areas of the home such as kitchens and bathrooms. Specifically, tileboard meets the specifications for Class I hardboard as approved by the American National Standards Institute. The standard specifies requirements and test methods for water absorption, thickness swelling, modulus of rupture, tensile strength, surface finish, dimensions, squareness, edge straightness, and moisture content for five classes of hardboard.

Product specifications for tileboard are established by consensus standards. Tileboard has more stringent product performance requirements (i.e., adhesion and hardness

standards, household stain, scrub and moisture resistance, while maintaining a relative smooth surface) compared to standard interior wall paneling.

B. Sources of VOC Emissions

Flat wood paneling, like most wood products, are vulnerable to light, moisture and insects. Coatings are used for three principal purposes: protection, appearance, and surface modification. Surface coatings are applied to reduce potential damage from environmental elements such as moisture and temperature extremes and other climate-related hazards and from insect infestation. Coatings are also applied to enhance surfaces to make other coatings more effective. Finally, coatings are applied to improve the appearance of the wood product. Releases of VOC occur during the coating process as the coatings are mixed or thinned, as they are applied to the substrate, and as they dry and the VOC within the coating evaporate into the air.

A typical flat wood coating facility applies stains and varnishes to natural plywood panels used for wall coverings. Other plants print wood grain patterns on particle board panels that were first undercoated with an opaque coating to mask the original surface. Coatings applied to flat wood paneling include fillers, sealers, "groove" coats, primers, stains, basecoats, inks and topcoats. Most coatings are applied by direct roll coating. Filler is usually applied by reverse roll coating. The offset rotogravure process is used where the coating and printing operation requires precision printing techniques. Other coating methods include spray techniques, brush coating and curtain coating. A typical flat wood paneling coating line includes a succession of coating operations. Each individual operation consists of the application of one or more coatings followed by a heated oven to cure the coatings. A typical production line begins with mechanical alterations of the substrate (filling of holes, cutting of grooves, sanding, etc.), followed by the coating operations, and packaging/stacking for shipment.

Emissions of VOC from a flat wood coating facility occur primarily at the coating line, although some emissions also occur at paint mixing and storage areas. To assist facilities and regulatory agencies in estimating emissions, VOC emission factors for conventional solvent based coatings applied to interior printed panels are as follows (expressed as kilograms of VOC per 100 m^2 coated): 3.0 for filler, 0.5 for sealer, 2.4 for basecoat, 0.3 for inks, and 1.8 for topcoats.[1]

V. Available Controls and State and Local Regulatory Approaches

A. Available Controls

1. *Low-VOC Coatings*

The use of low-VOC, waterborne coatings has increased since 1978. Paint manufacturers have developed and are continuing to develop waterborne coating formulations that replace conventional organic solvent-borne coatings. These coatings are generally available and often are not produced and marketed specifically for the flat wood paneling industry. Conversion to waterborne coatings can lower VOC emissions greatly, and most coatings operations are capable of converting to waterborne coatings.

2. *Ultraviolet Cure and Electron Beam Cure Coatings*

A process change that is an alternative to waterborne coatings is the use of coatings that cure by ultraviolet (UV) light. This technology is gaining greater acceptance and, where applicable, achieves a near 100 percent reduction of VOC emissions. In the flat wood paneling industry, UV systems have been found useful on specialty coatings operations. UV curing is extremely fast usually taking approximately 10 seconds. UV coatings are found only in the application of clear to semitransparent filler and topcoats for paneling and cabinetry products. Opaque UV coatings are not available for the flat wood paneling industry; however, electron beam (EB) cure systems can use opaque coatings and are available for use in the flat wood paneling industry. Over 99 percent reduction can be achieved by using EB cure coatings, but the costs of both the cure system and coatings themselves limit the applicability of this technique at this time.[1]

3. *Add-On Controls*

For applications where performance requirements or other needs dictate the use of high-VOC coatings, flat wood paneling coaters can employ add-on controls to reduce their VOC emissions. Currently, an overall control and capture efficiency of 90 percent is a widely-accepted and readily available technique.

4. *Work Practices*

Another effective means to reduce VOC emissions associated with flat wood paneling coatings is the implementation of work practice standards. Work practice standards that have proven particularly effective include: (1) frequent visual inspections for all equipment used to transfer or apply coatings, adhesives, or organic solvents; (2) cleaning and wash off solvent accounting system; (3) collecting and containing all VOCs when cleaning coating lines and spray guns; and (4) using low-VOC or low-vapor pressure cleaning materials.

To provide structure and consistency to their work practices, facilities can develop and implement a work practice plan. Such a plan is a compliance option under the 2003 NESHAP for Surface Coating of Wood Building Products and is equally applicable to VOC emissions. The work practice plan is a proven and traditional approach for cleaning that is easily adopted and managed by various industries, including flat wood paneling coatings. The work practice plan sets forth the steps to be taken to ensure that work practices are implemented properly and that VOC emissions are minimized from mixing operations, storage tanks and other containers, and handling operations for coatings, thinners, cleaning materials, and waste materials.

B. The 1978 CTG and Existing State and Local Regulatory Approaches

1. *Summary of the 1978 Flat Wood Paneling CTG Document*

The 1978 CTG recommends emission limits for flat wood paneling surface coating operations. Table 1 summarizes these limits, which are expressed in pounds of VOC emitted per 1,000 square feet (lb VOC/1,000 ft^2) of coated surface. These limits could be achieved by either using coatings with VOC contents low enough to achieve these limits during application, or by reducing the amount of VOCs emitted through the use of add-on controls. Because the 1978 RACT recommended emission limit could be met by using coatings with sufficiently low VOC content to meet the limit, Table 1 also presents the equivalent VOC coating limit expressed as pounds of VOC per gallon of coating, less water and exempt compounds (lb VOC/gal-water-exempt compounds). The pounds of VOC per gallon of coating is the VOC content of a coating, taking into account such factors as coating coverage rate and solids content, that is expected to achieve the emission limitation (lb VOC/1,000 ft^2). The equivalent coating limit is especially useful in the context of this CTG, because it allows for comparison between the 1978 RACT recommended limit and the current Placer County and South Coast requirements discussed later in this section.

Table 1. 1978 RACT Limits for Factory Surface Coating of Flat Wood Paneling

Product	Emission rate limit, pound VOC per 1000 square feet coated surface (lb VOC/1,000 ft^2)	Equivalent coating limit, pound VOC per gallon of coating , less water and less exempt compounds (lb VOC/gal-water-exempt compounds)
Printed interior wall panels made of hardwood plywood and thin particleboard	6.0	2.5
Natural finish hardwood plywood panels	12.0	3.3
Class II hardboard panels	10.0	3.6

As indicated in Table 1, the 1978 CTG recommends emission limits for only three categories of flat wood paneling products. Other significant categories of factory finished flat wood paneling products, exterior siding, and tileboard, were not reviewed during preparation of the 1978 CTG. Consequently, emission limits for these product categories were not recommended in that document.

2. *Summary of Existing State and Local VOC Requirements*

At least 28 State and local jurisdictions have regulations that control VOC emissions from surface coating operations that include flat wood paneling. Most of these regulations are general surface coating rules; a few are specific to flat wood paneling. Appendix B lists the jurisdictions where the 24 facilities that meet the applicability criterion in this CTG are located.

Almost all of the jurisdictions that specifically address flat wood paneling have based their rules on the 1978 CTG. However, there are two jurisdictions in California that have requirements specific to flat wood paneling that go beyond the 1978 CTG. In Placer County, VOC emissions from flat wood paneling operations in a nonattainment area are limited to 250 g VOC/l (2.1 lb VOC/gal) of coating (excluding water and exempt compounds) or the overall control device efficiency must be at least 90 percent (see Appendix B).

The South Coast rule defines flat wood paneling as "interior wood panels and exterior wood siding, which include, by way of illustration and not limitation, redwood, cedar or plywood stocks, plywood panels, particle boards, composition hard boards, and any other panels or siding constructed of solid wood or a wood-containing product." The emissions limit established by the South Coast rule is identical to the emission limit established by Placer County, and also covers exterior siding, which the Placer County rule does not.

VI. Recommended Control Options

Based on a review of the recommendations in the 1978 CTG, the current State and local requirements discussed above, and the 2003 NESHAP, we recommend emission limits for the inks, coatings and adhesives used by the flat wood paneling coating facilities and work practices for cleaning materials used.

The recommended emission limits for inks, coatings, and adhesives can be achieved either by using materials with VOC contents low enough to achieve the limits during application, or by reducing the amount of VOC emitted through the use of add-on controls. There are two alternative limits recommended for the use of low VOC inks, coatings and adhesives. These limits are expressed in different units, but are equivalent. Table 2 summarizes the VOC emission limits recommended in this CTG.

A. Emissions Limit based on Low-VOC Coatings for Inks, Coatings and Adhesives

The low-VOC materials recommendation for inks, coatings and adhesives include an emissions limit of 250 g VOC/l (2.1 lb VOC/gal) of material (minus water and exempt compounds). An equivalent limit, expressed as units of weight of VOC per volume of solids in all coatings would is 350 grams of VOC per liter solids (2.9 lb of VOC per gal of solids). The default VOC density used for making this conversion was 0.88 kg/liter (7.36 lb/gal).

B. Optional Add-On Controls for Inks, Coatings and Adhesives

Should product performance requirements or other needs dictate the use of higher-VOC coatings than specified above, a facility could choose to use add-on control equipment to meet an overall control efficiency of 90 percent. Add-on devices include oxidizers and solvent recovery systems, which coupled with their attendant systems to capture the VOC being released at the affected facilities, can achieve an overall control efficiency of 90 percent. This control option, like the low-VOC material option noted above, applies to surface coatings, inks, and adhesives applied to all types of flat wood paneling.

C. Work Practices

This CTG also recommends work practices for use in all flat wood paneling coating facilities meeting the applicability threshold noted above. We recommend that the work practice plan include steps to ensure that VOC emissions are minimized from mixing operations, storage tanks and other containers, and handling operations for coatings, thinners, cleaning materials, and waste materials. Examples of work practice standards include: storing all VOC coatings, thinners, and cleaning materials in closed containers, minimizing spills of VOC containing coatings, thinners, cleaning up spills immediately, conveying any coatings, thinners, and cleaning materials in closed containers or pipes, closing mixing vessels which contain VOC coatings and other materials except when

specifically in use, and minimizing emissions of VOC during cleaning of storage, mixing, and conveying equipment.

Table 2. Recommended Emission Limits for Flat Wood Paneling Coating Operations

Surface Coatings, Inks, or Adhesives Applied to the Following Flat Wood Paneling Categories	Should Meet One of These Emission Limits:		
	lb VOC per gallon material (grams VOC per liter material) [excluding water and exempt compounds]	lb VOC per gallon solids (grams VOC per liter solids)	Overall Control Efficiency Using an Add-On Control Device:
Printed interior panels made of hardwood, plywood, or thin particleboard	2.1 (250)	2.9 (350)	90%
Natural finish hardwood plywood panels	2.1 (250)	2.9 (350)	90%
Class II finishes on hardboard panels	2.1 (250)	2.9 (350)	90%
Tileboard	2.1 (250)	2.9 (350)	90%
Exterior siding	2.1 (250)	2.9 (350)	90%

* We also recommend that those facilities that meet the applicability threshold noted above follow work practice standards.

VII. Cost Effectiveness of Recommended Control Options

Cost-effectiveness estimates were determined based on South Coast district studies and on studies performed by EPA during development of the 2003 NESHAP.

Effective January 1, 2000, a new VOC limit was proposed for flat wood paneling facilities in the South Coast Air Quality Management District of California. The new regulation reduced the allowable VOC content for inks from 2.5 pounds per gallon (300 grams per liter) to 2.1 pounds per gallon (250 grams per liter) and reduced the allowable VOC content for exterior siding coatings from 2.9 pounds per gallon (350 grams per liter) to 2.1 pounds per gallon (250 grams per liter). At the time of proposal of the South Coast rule, there were two facilities in the district that would be affected by the regulation changes. One facility manufactured interior paneling and the other manufactured exterior siding. Only the exterior siding facility was not in compliance with the new limits. As part of the South Coast proposal, a cost effectiveness analysis was performed for the facility. It was determined that the facility could switch to two lower-VOC stains for an annual cost of $3,200 and reduce VOC emissions by 2,900 pounds per year (1.45 tons per year), which has a cost-effectiveness of approximately $2,200/ton in 2000 dollars. The facility applying coatings to exterior siding is believed to be representative of most exterior siding facilities.

The surface coating of wood building products NESHAP applies to various operations, including flat wood paneling coatings. The NESHAP sets requirements for emissions of hazardous air pollutants (HAP) and includes the use of low-HAP material as a compliance option. The majority of HAP are VOCs. In developing the NESHAP, EPA estimated in 1998 dollars, the cost-effectiveness of using low-HAP materials. The facilities

used in developing the NESHAP were also analyzed for VOC emissions so the cost effectiveness is described in terms of HAP and VOC. The cost of compliance for six facilities in the interior wall paneling and tileboard category was estimated to be $760,000 and result in VOC reductions of 480 tons ($1,600 per ton of VOC) in 1998 dollars.[7]

Using the Marshall and Swift Index, the costs in 1999 and 1998 dollars, respectively, were scaled to estimate 2005 dollars. The resulting cost effectiveness estimate, in 2005 dollars, for the California flat wood paneling facility that manufactures exterior siding is $2,600 per ton of VOC. Escalating the NESHAP figures to 2005 dollars, the cost effectiveness is $1,900 per ton of VOC for interior paneling/tileboard. The cost effectiveness of controls for exterior siding operations could vary substantially for facilities already complying with the 2003 NESHAP. When developing their requirements for the exterior siding operations, States should consider the impacts of such measures on facilities already subject to the NESHAP.

VIII. References

1. Control of Volatile Organic Emissions from Existing Sources - Volume VII: Factory Surface Coating of Flat Wood Paneling. Publication No. EPA-450/2-78-032. U. S. Environmental Protection Agency, Research Triangle Park, NC. June 1978.

2. Guidance to State and Local Agencies in Preparing Regulations to Control Volatile Organic Compounds from Ten Stationary Source Categories. EPA-450-2-79-004. U. S. Environmental Protection Agency, Research Triangle Park, NC. September 1979.

3. Placer County (California) Air Quality Management District Rule 238, Factory Coating of Flat Wood Paneling. Amended August 14, 1997.

4. 1972 Census of Manufacturers, United States Bureau of Census, Vol. II, Industry Statistics, Part I. SIC 20-26, 2431, 2435, 2436, 2493, 2496

5. Flat Wood Paneling Surface Coating Plants. In: Directory of Volatile Organic Compound Sources Covered by Reasonably Available Control Technology (RACT) Requirements, Volume II: Group II RACT Categories, EPA 450/4-81-0075, U. S. Environmental Protection Agency, Research Triangle Park, NC. February 1981.

6. Control Techniques for Volatile Organic Compound Emissions from Stationary Sources. Publication No. EPA-453/R-92-018. U. S. Environmental Protection Agency, Research Triangle Park, NC. December 1992.

7. Background Information Document for NESHAP for the Wood Building Products (Surface Coating Industry). EPA-453/R00-003. U. S. Environmental Protection Agency, Research Triangle Park, NC. May 2001.

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Appendix A

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Appendix B

Flat Wood Paneling Coating Facilities in Current Nonattainment Areas and Associated State or Local Requirements (Based on 2002 NEI)

Ozone Nonattainment Area	Number of Facilities	Product Applicability	Applicable State Emission Limit	Alternative Control Device Limits
Placer County (California)	1	1978 CTG Not applicable to exterior siding.	<2.1 lb VOC per gallon of coating (excluding water)	Overall control efficiency of 90%
Michigan	1	Interior paneling. Not applicable to exterior siding, cabinetry, furniture or tileboard.	1978 CTG Limits	1978 CTG Limits
North Carolina	1	1978 CTG Not applicable to exterior siding and tileboard.	1978 CTG Limits	1978 CTG Limits
Ohio	1	No rule specific to flat wood, wood building products or tileboard.	1978 CTG Limits	1978 CTG Limits
South Carolina	1	Wood construction products for interior paneling Not applicable to exterior siding and tileboard.	1978 CTG Limits	1978 CTG Limits
Texas	2	Interior paneling and tileboard Not applicable to exterior siding.	1978 CTG Limits	1978 CTG Limits
Virginia	1	Interior panels Not applicable to exterior siding and tileboard.	1978 CTG Limits	1978 CTG Limits
Indiana	3	Interior panels Not applicable to exterior siding and tileboard.	1978 CTG Limits	1978 CTG Limits
Tennessee	1	Interior paneling Not applicable to exterior siding and tileboard.	1978 CTG Limits	1978 CTG Limits
Illinois	1	None	None	None
Pennsylvania	8	None	None	None
New Hampshire	2	None	None	None
Wisconsin	1	1978 CTG Limits Not applicable to exterior siding and tileboard.	1978 CTG Limits	1978 CTG Limits

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Appendix C

Estimated Costs Associated with the Recommendations Contained in the Control Techniques Guideline for Flat Wood Paneling Coating

I. Introduction

This appendix presents the estimated costs associated with implementing the recommendations in the Control Techniques Guidelines (CTG) for controlling volatile organic compounds (VOC) emissions from flat wood paneling surface coating facilities in ozone nonattainment areas. The CTG contains guidance for State and local pollution control agencies to use in determining reasonably available control technology (RACT) for VOC emissions from flat wood paneling coatings. State and local agencies are free to adopt the recommendations contained in the CTG or to implement other technically-sound approaches for RACT, provided these approaches are consistent with the Clean Air Act (CAA) and EPA implementation regulations. Accordingly, there is necessarily some uncertainty in any prediction of costs and emission impacts associated with the recommendations contained in the CTG. For purposes of this analysis, we assume that all states will adopt the recommendations of the CTG.

According to the 2002 National Emissions Inventory (NEI), there are 24 flat wood paneling facilities in the United States that are located in ozone nonattainment areas (based on April 2006 designations). These facilities emit greater than 15 pounds VOC per day from flat wood paneling surface coating operations and will possibly be affected by the CTG.

II. Cost Analysis

The 24 flat wood paneling facilities are found in thirteen states. Nine of the states have state regulations that currently affect VOC emissions from interior panels, but not tileboard or exterior siding. These nine state regulations recommend the same compliance options as are recommended in the CTG. By contrast, the CTG provides recommendations for interior paneling, tileboard, and exterior siding. In the remaining four states, there are currently no state regulations that affect flat wood paneling product facilities.

To determine the overall expected costs, the facilities were researched to determine the product types at each of the 24 facilities. Fifteen facilities were roughly identified as interior product producers (interior panels, tileboard) and nine facilities were roughly identified as exterior product producers (exterior siding). These product types were compared to the current flat wood paneling state regulations (if any) to determine whether or not the facility could be financially affected by the CTG. If the product type at the facility is covered by a state regulation, the facility is assumed to be in compliance with the limits in the CTG and have no costs.

Costs could be associated with 12 facilities from Illinois, New Hampshire, Michigan, and Pennsylvania. If these states adopt the recommendations from the CTG, costs could be incurred to make changes to their coatings in order to meet the recommendations of the CTG. The facilities in these four states include two interior panel facilities, one tileboard facility, and nine exterior siding facilities.

The costs of compliance for the 12 identified facilities were based on the cost effectiveness calculations in the CTG, which are $2,600 per ton of VOC reduced from exterior siding facilities and $1,900 per ton of VOC reduced from interior paneling and tileboard facilities. To estimate the cost for implementing the recommendations of the CTG for exterior siding, we used the cost effectiveness estimate from South Coast AQMD ($2,600 per ton of VOC), as opposed to the higher number associated with the NESHAP (i.e., $4,400 per ton). We believe the South Coast AQMD estimate is more realistic because it is based on actual VOC reduction and conversion costs from a specific facility, whereas the NESHAP estimates were based on average coating usages and average coating costs.

The amount of VOC reduced was based on the VOC emissions in the 2002 NEI database attributed to flat wood product surface coating (according to the SCC). To calculate the emission reductions, an overall percent reduction was used for each of the twelve facilities. For interior paneling products and tileboard in the NESHAP, VOC emissions were reduced by an average of 60 percent for all facilities. For exterior siding products in the NESHAP, VOC emissions were reduced by an average of 91 percent for all facilities. Emission reduction estimates for exterior siding products were also performed as part of the cost effectiveness analysis conducted in South Coast AQMD. The analysis showed a reduction of VOC emissions by an average of 87 percent. To maintain the most realistic estimate of exterior siding costs, we used the real facility reduction associated with South Coast AQMD (87 percent), as opposed to the higher percent reduction estimate from the NESHAP (91 percent). The cost effectiveness of controls for exterior siding operations could vary substantially for facilities already complying with the 2003 NESHAP. When developing their requirements for the exterior siding operations, States should consider the impacts of such measures on facilities already subject to the NESHAP. The respective percent reductions for the two product types were assumed to be true for the 12 identified facilities in nonattainment areas possibly affected by the CTG.

The overall cost anticipated for the twelve facilities is $1.2 million, with an average cost per facility of $101,000 and an average VOC reduction of 77 percent. The data are shown in Table C-1.

Table C-1. Cost Summary for Flat Wood Product Surface Coating Facilities

	Interior panels/tileboard facilities	Exterior siding facilities
Number of facilities in ozone nonattainment areas	15	9
Number of facilities that could incur costs to comply with CTG	3	9
VOC emissions from 2002 NEI (tons)	297 tons	368 tons
Percent reduction expected	60%	91%
Amount of VOC emissions reduced (tons)	178 tons	335 tons
Cost of CTG implementation ($/ton VOC reduced)	$1,900	$2,600
Total costs	≈ $339,000	≈ $871,000

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