

89-118B.3

PREPARATION OF ALTERNATIVE EMISSION CONTROL PLANS FOR  
SURFACE COATING OPERATIONS

RANDALL GUENSLER  
CALIFORNIA AIR RESOURCES BOARD  
SACRAMENTO, CALIFORNIA



AIR & WASTE MANAGEMENT  
A S S O C I A T I O N

•  
SINCE 1907

For Presentation at the  
82nd Annual Meeting & Exhibition  
Anaheim, California  
June 25-30, 1989

## INTRODUCTION

Many local air pollution control district (APCD) regulations in California currently allow sources to demonstrate compliance with emission limits through alternative emission control plans (AECPs), commonly known as source bubbles. Under AECF provisions, sources can comply with specific emission limits of a regulation through alternative means, provided that emissions from the source are equal to, or less than, the emissions that would result if all coating operations at the facility complied with the specific emission limits. AECFs allow sources to satisfy volatile organic compound (VOC) requirements for coatings that would normally be in violation of the rule by reducing emissions in other steps of the coating process. Theoretically, an AECF allows a facility to control VOC emissions in a flexible, cost-effective manner. More than twenty surface coating regulations in California currently contain AECF provisions.<sup>1</sup> Designing a plan that ensures equivalent emission reductions are achieved is a complex task undertaken by air quality engineers.

A number of policy guidelines that ultimately affect alternative emission control plans have been published in the Federal Register by the Environmental Protection Agency over the past ten years. On December 4, 1986, the EPA published the emission trading policy in the Federal Register which outlined the requirements for sources desiring to create, bank, and use emission reduction credits.<sup>2</sup> The emission trading policy applies to AECFs, because AECFs allow credits for reducing emissions at one operation that are used to offset excess emissions from similar operations.

In 1988, the EPA Office of Air Quality Planning and Standards listed a number of deficiencies in State Implementation Plans that must be corrected by state and local agencies to conform with EPA policy.<sup>3</sup> As these policies apply to all general VOC regulations, the policies also apply to the preparation of alternative emission control plans.

In February 1989, EPA staff from the Office of Air Quality Planning and Standards and EPA Region IX met in San Francisco with California air pollution control agency staff to further clarify the intent and requirements of EPA policy. The EPA outlined criteria that must be met by local districts for AECFs to be granted. Foremost on EPA's agenda was stating that all AECFs that provide for cross line averaging or allow compliance determinations based upon a weighted average must meet the EPA emission trading policy requirements.

To properly prepare and enforce AECFs, local APCD engineers and inspectors need to understand AECF theory and the applicable federal policy that affects the practical application of AECFs. This paper summarizes the theory behind AECFs as well as the policy issues outlined by the EPA and is designed to serve as a reference document in the preparation of AECFs for coating operations.

## COATING PROCESS AND CONTROL OF RESULTANT EMISSIONS

Emissions from coating operations originate from the release of solvents, or VOCs, as the coating dries to form a solid film. VOCs are the primary ingredient in the formation of

photochemical smog (ozone). Conventional coatings generally contain about 70% solvent, which evaporates as the coating dries. Fifty to 90% of the VOC emissions from the coating operations emanate from the paint spray booth and immediate flash off areas.<sup>4</sup>

Coatings are generally spray applied to the substrate with a hand held applicator and a liquid pump system, which aspirates the liquid stream to achieve proper coverage. In some cases, the facility may use other application techniques such as dip coating, flow coating, roller coating or electro-deposition.

The basic VOC control strategies for coating applications consist of: 1) requiring the use of low VOC coatings, 2) requiring the use of add-on controls, when feasible, and 3) requiring high transfer efficiencies. Typical control strategies implemented by air pollution control agencies in California require sources to limit the amount of VOCs contained in the coatings applied.

Coating regulations, designed to control VOC emissions to reasonably available control technology (RACT) levels, are established in California on a grams of VOC per liter of coating basis. Theoretically, the control technologies required by these rules are representative of coating formulation technology readily available to industry.

The most popular control strategy for VOC emissions from coating operations is to limit the amount of solvents that are allowed in the coating formulation. Throughout California, the emission limits vary from application to application and can range from 250 g/l to 720 g/l. All of the regulations stipulate VOC emission limits for each liter of coating in grams of VOC per liter of coating "as applied"; hence, the VOC content is determined at the time the coating is applied to a substrate. As will be discussed later in the paper, the calculations used to determine compliance eliminate the contribution of water and exempt solvents from the VOC content and volume applied determinations. The addition of solvents in the form of thinners and reducers serves to increase the VOC content and is included in the "as applied" determination.

The intent of the VOC content limit is to minimize the emissions of VOC per unit of production; however, because of the volumetric VOC content limits in California, an applied solids basis was necessarily enacted by the EPA to better relate VOC content to industrial output.

The surface area of a painted part is coated to a specific mil thickness in depth; thus, coating solids are applied as a volume (area x thickness). An emissions limit that is fairly representative of unit production (i.e. grams of VOC per unit of product manufacture) is based upon the grams of VOC emissions per volume of solids applied to a surface. Different coating formulations, however, contain varied amounts of solids. High solids (low VOC) coating may contain 60% solids while conventional coatings may contain only 30% solids. Emissions from coating operations, if they are to accurately reflect emissions per unit of industry production, must be based upon the grams of VOC per liter of coating solids applied, rather than the grams of VOC per liter of coating applied. In 1980, the EPA required that alternative emission averaging for the can and coil coating industry be based upon a solids basis, or pounds of VOC per pound of coating solids applied.<sup>5</sup> At the recent EPA workshop held in San Francisco, EPA staff indicated that local agencies have the flexibility to determine solids basis on either a weight of VOC per volume of solids, or a weight of VOC

per weight of solids basis, depending upon the units established in the existing local district regulation.

#### CALCULATING EQUIVALENT EMISSIONS

By examining the results from each of the individual steps from the EPA Method 24 VOC content analysis<sup>4</sup>, we can calculate the VOC content of coatings on a solids basis.

The Method 24 analysis yields the grams of VOC per liter of coating, less water and exempt solvents. To determine the Method 24 VOC content, the laboratory first determines the weight percent of water, exempt solvent, and solids contained in the coating. By multiplying the weight percent of each component by the coating density, the weighted contribution of each component can be found and the weight of VOC per weight of solids can be calculated.

To determine the weight of VOC per volume of solids, an additional laboratory analysis must be performed. When the solvent is distilled from the coating sample, the solvent density must be determined; however, this procedure is complex as the result must yield the density of the non-exempt solvent only. The solvent density is used to calculate the volume percentage of solids, less water and exempt solvent. Given the weight percent of each component, and after determining the density of each component, the weight of VOC per volume of solids can be determined.

It is important to note that all components of the VOC calculations (VOC content, solids content, and volume applied) must be in consistent units (less water and exempt solvents).

#### Coating Formulation and VOC Content

As previously mentioned, in California the emissions limits for coatings are established on a grams of VOC per liter of coating basis. The emission limits, however, do not necessarily constitute fair treatment for all coating applications. For example, if one liter of material is capable of coating 100 widgets and a second liter of material is capable of coating 200 widgets, a fair emission limit for coatings would be based upon the number of widgets processed by the source rather than the number of liter of coating consumed.

The inherent problem with California regulations stems from the fact that coatings may be manufactured with a variety of solvents and a variety of solvent densities; thus, actual VOC emissions in grams of VOC per liter of solids applied can vary from coating to coating. Table 1, as follows, illustrates the effective VOC limits, on a solids basis, for certain coatings that employ different solvents for application:

Table 1. Solids basis VOC content for various solvent based coatings that comply with a 340 g/l VOC limit.

SOLVENT BASE	VOC CONTENT METHOD 24 (g VOC/l COATING)	SOLVENT DENSITY (g VOC/l VOC)	SOLIDS CONTENT BY VOLUME	VOC CONTENT (g VOC/l SOLIDS)
n - Hexanes	340	660	.48	708
MEK	340	800	.58	586
Xylene	340	860	.60	567
Toluene	340	870	.61	557
Methyl Acetate	340	930	.63	540
Ethyl Acetate	340	1370	.75	453
Cellusolve Acetate	340	1400	.76	447

The effective solids-based VOC limits for a set of coatings that comply with the California 340 g/l of coating limit range from 700 g/l solids to 450 g/l solids depending upon the solvent blend used for manufacture. This finding also indicates that determining compliance on a daily averaging basis for a variety of coatings is not a simple matter.

Because the solids-based allowable limits in California vary with the density of the coating solvent, the engineer preparing an AECF includes the solvent density as a variable in the analysis. EPA policy does provide for the use of an assumed solvent density at 880 g/l (7.36 lb/gal) when the actual solvent density cannot be determined.<sup>7</sup> Because a solvent density analysis for water-based and exempt-solvent-based coatings is extremely difficult to perform, the use of an assumed solvent density for these coatings is appropriate when calculating the coating specifications less water and exempt solvent. However, care must be taken to ensure that the calculated values for solids content and VOC content are less water and exempt solvent. The variable solids based standard in California is currently being reviewed by regulatory agency staff. Future regulatory strategies may bring either solids based prohibitory rule limits or a fixed solids content requirement for use in AECFs.

If the VOC content of a coating exceeds a rule limit, two parameters contribute to excess emissions: 1) there is a difference between the VOC limit and the VOC content applied, and 2) the excess solvent in the coating is displacing a certain volume of solids that would normally reside in a complying coating; thus, an increased volume of coating must be applied to cover the same surface area. To account for these two parameters in calculating equivalent emissions, a spreadsheet comparing the actual and allowable emissions on a solids basis must be prepared. Actual emissions are determined by multiplying the volume of solids applied by the VOC content per volume of solids. Allowable emissions are determined by dividing the volume of solids applied by the theoretical solids content of a complying coating (less water and exempt solvent) and then multiplying by the volume based VOC limit (grams of VOC per liter of coating, less water and exempt solvent) of the regulation. The facility is in compliance with the equivalence provision when the actual emissions are less than or equal to the allowable emissions.

### Water and Exempt Solvent

In most rules, sources are allowed to use a limited number of solvents that the APCD shall consider to be exempt from the rule requirements; however, the district does not allow the source to count the exempt VOC in the volume of coating applied. Thus, sources are not allowed to simply dilute coating with exempt VOC in order to meet the VOC limit per liter of coating. For example, if a source takes one liter of coating that has a VOC content of 500 grams per liter and dilutes the coating with one liter of exempt 1,1,1 trichloroethane (0 grams of VOC per liter), the result is two liters of diluted coating with 250 grams of VOC per liter of coating. This is an artificial reduction in VOC content because the solids were also diluted and now two liters of coating must be applied to cover the same surface area (resulting in the same amount of total emissions). To account for the increased coating consumption, the APCD subtracts the volume of exempt solvent from the total amount of coating; therefore, the VOC content remains at 500 grams per liter.

In calculating the VOC content of coatings, the following compounds are usually not considered to contribute to the VOC content of the coating nor to the total volume of the coating:

COMPOUND	DENSITY g/ml
Water	1.00
Methylene Chloride	1.33
1,1,1 Trichloroethane	1.32
1,1,2 Trichlorotrifluoroethane	1.58
Trichlorofluoromethane	1.49
Dichlorodifluoromethane	1.48

The volume of water and exempt solvent must be tracked very carefully when determining that emissions from coating operations are equivalent to or less than the emissions that would normally be allowed under the prohibitory rule. Because the volume of solids applied is used to determine the emissions from the coating, consistent units must be used at all times. Any calculations used to determine the volume of solids applied must employ solids content and coating volume data that are less water and exempt solvent.

### Transfer Efficiency

Transfer efficiency is the ratio of the amount of solids adhering to the surface to the amount of solids applied; thus, transfer efficiency quantifies the unnecessary application of coating and determines the amount of coating wasted. If a greater transfer efficiency is achieved, a lesser volume of coating will be required to cover the same surface area.

Transfer efficiency is dependent upon numerous physical parameters related to the coating application method. The type of spray equipment used, part size and geometry, air temperature and humidity, spray booth air velocity and the presence of cross drafts, coating formulation and viscosity, and even the length of time elapsed between the mixing of the coating and the time of

application will all affect the transfer efficiency. In addition, a major component of the transfer efficiency achieved is the human factor; the experience, ability, and mental state of the coating applicator will affect the transfer efficiency achieved.

The EPA has established a test method to determine the transfer efficiency of coating operations in the automobile manufacturing industry,<sup>8</sup> which includes provisions for strictly controlled environmental conditions and the use of robotic spray equipment. However, there is presently no EPA approved test method for determining the actual transfer efficiency achieved in the field by typical coating applications. It is highly unlikely that the actual transfer efficiency achieved in the field could be quantified, unless a controlled physical environment is established and the human factor is eliminated.

In 1982, the EPA had established table values for transfer efficiency (by application method) in the Federal Register, for use in the large appliance industrial surface coating category.<sup>9</sup> However, these table values have since been determined to be invalid in preparing credits for use in AECPs. Because the transfer efficiency related emissions cannot be reasonably quantified by a field test method, the emissions do not meet the criteria of "quantifiable" in the emission trading policy.<sup>10</sup> Therefore, AECPs may not contain credits for methods that claim to improve transfer efficiency, unless an EPA approved test method is used.

#### EMISSION TRADING POLICY GUIDELINES FOR AECPs

The general requirements of the emission trading policy which must be met by AECPs include the following:

1. Facilities operating under an AACP must demonstrate that they comply daily with the limits of the regulation through alternative means on a coating solids (production) basis.
2. Emission averaging periods in non-attainment areas may not exceed 24 hours.
3. On a daily basis, the operations included in the emission trade must provide a 20% emission reduction from a daily weighted baseline calculated from the previous two operating years.
4. Emission reduction credits must be quantifiable by approved test methods (this prohibits credits for improved transfer efficiency in all categories except automobile manufacturing topcoat applications).
5. Emission reduction credits must be enforceable (this prohibits credits for the substitution of exempt solvents).
6. Detailed daily usage records must be maintained for all operations and must demonstrate compliance on a daily basis.
7. All AECPs must be submitted to the EPA as a source-specific revision to the State

Implementation Plan (SIP).

8. A State Assurances document must accompany the SIP revision certifying that the AECF has been administered properly, is technically sound, and serves the intent of the SIP.

#### Applicability

Not all alternative methods for determining compliance with stationary source prohibitory rules are subject to the EPA emission trading policy. The exceptions are instantaneous compliance with emission limits (through the use of add-on control equipment) and daily averaging of identical processes on a single piece of equipment.

**Control Equipment.** Control equipment used to achieve instantaneous compliance with an emission limit is not subject to the emission trading policy. For example, a source may use a 95% efficient thermal incinerator in conjunction with an 800 g/l coating to demonstrate compliance with a 420 g/l limit. When the 95% control efficiency is applied to the non-complying coating, the final VOC content is calculated by:

$$(1-.95)(800 \text{ g/l}) = 40 \text{ g/l}$$

Using the control equipment, the source has demonstrated compliance with the 420 g/l regulatory limit. This type of alternative compliance method is not subject to the emission trading policy provided that the difference between the final 40 g/l calculated VOC content and the 420 g/l regulatory limit is not used to offset emissions from any other coatings or operations in the facility.

**Identical Processes.** The EPA has determined that emissions between two identical processes, carried out on a single piece of equipment, may be averaged on a daily solids basis. For example, if a single piece of coating application equipment is used to apply coatings that are subject to the same regulatory limit, i.e. two topcoats both subject to a 420 g/l limit, the process may comply by averaging without being subject to the emission trading policy.<sup>11</sup> The EPA cites an example of a two-tone tool box, coated with two different color topcoats (one exceeding the limit and the other over-complying with the limit), and coated in or by a single piece of application equipment, as being able to comply on a daily basis without being subject to the emission trading policy.

#### Emissions Qualifying for Use in an AECF

Only real emissions can qualify for use in an AECF. Reductions from artificial baselines, such as paper reductions of allowable emissions or permit condition limits, do not constitute a real emission reduction. The emission reductions resulting from AECFs are intended to contribute to achieving attainment of the national ambient air quality standards (NAAQS) established by the Clean Air Act. Therefore, reductions in the emissions from non-reactive hydrocarbons may not be used to compensate for emissions of reactive hydrocarbons. For these purposes, emission reductions



resulting from the control of exempt solvents and nominally reactive compounds, such as perchloroethylene,<sup>12</sup> may not be used in AECPs.

Only emissions from operations subject to a single prohibitory rule are allowed to be included in an AACP. According to the emission trading policy, emission reductions used in an AACP must be surplus, permanent, quantifiable, and enforceable. In considering whether emissions qualify for a trade, the EPA has indicated that the following definitions may apply:<sup>13</sup>

1. **Surplus:** At a minimum, only emission reductions not required by current regulations in the SIP, not already relied upon for SIP planning purposes, and not used by the source to meet any other regulatory requirement, shall be considered surplus. Surplus emission reductions shall be determined by using an appropriate baseline for reference.
- 2) **Permanent:** Permanence of each emission reduction must be ensured by requiring that each AACP be submitted as a source specific SIP revision. Permit conditions shall ensure that an emission reduction from the baseline is achieved for each and every future operating day.
- 3) **Quantifiable:** The emission reduction can be qualified and quantified by consistent methodologies that are repeatable.
- 4) **Enforceable:** The conditions of the AACP shall be reflected in a permit to operate reviewed annually by the local district. Each AACP must be approved by the district and federally enforceable by submitting the AACP as a source specific SIP revision. AECPs require detailed source recordkeeping to ensure ongoing compliance.

Emission reductions resulting from the addition of control equipment and the use of coatings that overcomply with regulatory limits (on a solids basis) may be used to generate credits in an AACP. Emission reductions that cannot be quantified, such as those generated from improved transfer efficiency or the substitution of exempt solvents, may not be used to generate credits for use in an AACP.

#### Emission Averaging Periods

The emission trading policy requires that the short term ozone standard be protected in implementing any emission trade. Because an hourly standard for ozone has been established, and because the standard may be considered "exceeded" only once per day in determining the attainment status of an area, it is imperative that the short term standard be protected on a daily basis.<sup>14</sup> The current emission trading policy requires that sources demonstrate equivalent compliance with prohibitory limits on a 24 hour basis. The EPA will allow each local agency the flexibility to determine the 24 hour basis, be it midnight to midnight, noon to noon, or any other acceptable 24 hour period for a source subject to an emission trade.

The EPA has allowed some sources to demonstrate compliance over averaging periods that exceed 24 hours. In a memorandum dated January 20, 1984, from John R. O'Connor, Acting

Director of EPA's Office of Air Quality Planning and Standards, the EPA outlined the criteria that must be met by any facility, located in an area with an approved attainment demonstration plan, before being considered for an extended averaging period.<sup>14</sup> The memorandum indicates that emission averaging periods in excess of 24 hours are possible in the surface coating industry only for sources located in areas with approved attainment demonstrations and only if daily emission caps that limit the daily emissions from the source to less than historical levels are adopted. Those areas that have not achieved the NAAQS for ozone in 1987 may not implement emission trades that fail to demonstrate compliance on a 24 hour average.

#### Establishing a Facility Baseline

The intent of the emission trading policy is to ensure that a real emission reduction (surplus, permanent, quantifiable, and enforceable) occurs, whenever an emission trade is implemented. To ensure that the emissions meet the emission trading criteria, an emission baseline must be calculated for the source. The emission trading policy requires the preparation of a two year emission baseline to ensure that the emission reductions involved in an emission trade are permanent and representative of actual operations.<sup>14</sup>

An average daily baseline must be calculated for the operations subject to the emission trade. Because coating industries do not lend well to emission calculations on a production basis, the EPA will allow the emission baseline to be calculated by two methodologies: 1) the daily emission baseline can be the actual emissions resulting from the operations subject to the emission trade; or 2) the daily emission baseline can be the actual emission rate, in weight of VOC per weight or volume of solids applied, for the operations subject to the emission trade.

One noteworthy aspect of the emission trading policy that must be carefully examined in preparing an AECP is that the emission reductions resulting from production curtailments prior to the application for credits may not be used by a facility for emission trades. Thus, if a facility operates under contract with an outside agent, and the production contract expires (thereby curtailing production) before the air pollution control district receives the facility's application for an AECP, the emissions from the curtailed operation may not be included in any baseline emission calculations.

#### 20% Offset Requirement

The emission trading policy requires that all emission trades subject to the policy achieve a 20% emission reduction from the facility baseline.<sup>17</sup> The calculated emission reduction must be consistent with the calculated baseline; i.e., if the baseline is actual emissions, the reduction must be actual emissions, and if the baseline is an emission rate, the reduction must be an emission rate.

The EPA has interpreted the 20% emission reduction language in the emission trading policy as follows:

An emission rate requirement can be established for the operations subject to the AECP,

based upon the two year emission baseline. To ensure that a 20% emission reduction occurs on a production basis, the AECPP emission rate, in terms of weight of VOC per weight or volume of solids, is capped at 80% of the baseline daily emission rate. The facility would be required, as a condition of its operating permit, to demonstrate equivalent compliance with the regulation and to demonstrate that the daily emission rate from the operations involved in the emission trade, on a solids basis, is less than 80% of the historical emission rate.

For example, if a facility were operating three coating lines subject to a single regulation, and the lines emitted a daily average of 10 pounds of VOC per gallon of coating solids applied over the past two years, the source could operate under an AECPP provided that emissions equivalent to compliance with the regulation occurred and the total emissions from the three lines did not exceed 8 pounds of VOC per gallon of solids applied.

Because major increases in production and emissions are difficult to observe when emission rate baselines are used, local regulatory agencies are encouraged to establish an actual emission baseline. A 20% reduction from an actual emission baseline is accepted by EPA as it is more stringent than the emission rate interpretation:

An emission cap can be established for the operations subject to the AECPP, based upon the two year emission baseline. To ensure that a 20% emission reduction occurs, the AECPP emissions are capped at 80% of the historical daily baseline emissions. The facility would be required, as a condition of its operating permit, to demonstrate equivalent compliance with the regulation and to demonstrate that the daily emissions from the operations involved in the emission trade are less than 80% of the historical emissions.

For example, if a facility were operating three coating lines subject to a single regulation, and the lines emitted a daily average of 100 pounds per day over the past two years, the source could operate under an AECPP provided that emissions equivalent to compliance with the regulation occurred and the total emissions from the three lines did not exceed 80 pounds per day.

According to the strict interpretation of the emission trading policy, any sources that cannot adequately quantify a two year operating baseline are not eligible to receive an AECPP. Because the emission trading policy requires that the baseline be established over the previous two years of operation, or over a representative two years of operation, any source that has not been in operation for more than two years is not eligible to receive an AECPP.

#### Required Laboratory Analysis

To determine compliance with AECPP provisions, laboratory analysis of the coatings involved is critical. Coating specifications in the AECPP must be verified by laboratory analysis prior to plan approval. The VOC content, solids content, water and exempt solvent percentages, and solvent density should all be verified and documented before a plan is implemented. Sources should be required to maintain a comprehensive list of coatings applied at the facility. In addition, coating

specification sheets should be available at the facility outlining all pertinent coating data, including:

1. VOC content as applied, in grams of VOC per liter of coating less water and exempt solvents,
2. Weight percent water, as applied,
3. Weight percent exempt solvent, as applied,
4. Volume percent water and exempt solvents, as applied,
5. Solids content (volume percent solids) as applied, less water and exempt solvents,
6. Density of the non-exempt solvent in the coating, and
7. Mix ratio required by specification. (If the coating is mixed to a viscosity specification, or if the mix ratio varies as a function of another parameter, the coating specification sheet should list the pertinent coating data for all mix ratios).

#### Permit Conditions

In preparing an engineering analysis during the permit approval process, whenever an assumption is made by the engineer, a corresponding permit condition should be added to the permit to operate. Permit conditions serve to protect the integrity of the engineering analysis and are of paramount importance in ensuring plan enforceability and ongoing compliance. If the engineer assumes that a piece of control equipment must operate at 1400F and at 95% efficiency to obtain the required emission reduction, the permit should include two conditions: one, that the unit operate at a temperature of 1400F; and two, that the equipment operate at 95% efficiency. A permit condition should also require an annual source test to demonstrate compliance with assumed destruction efficiency requirements. Permit conditions can be modified at a later date if, for example, a source test determines that the unit can operate at 1300F and still meet the 95% efficiency requirement; however, until such time, the integrity of the engineering analysis must be protected by imposing the permit conditions.

In preparing alternative emission control plans, the following permit conditions should be added to the permit to operate:

1. The permit may comply with the regulation through an AECF approved in writing by the district and submitted as a revision to the State Implementation Plan.
2. The emissions from the equipment included in the AECF shall be equal to or less than the emissions that would result if all of the equipment included in the plan complied with all provisions of regulation \_\_\_\_\_.
3. The source shall maintain a comprehensive list of coatings applied under the AECF. For

each coating, the list shall stipulate all pertinent coating data as required by the District.

4. The source shall retain copies of laboratory analysis and coating specification sheets provided by the manufacturer that document all information contained in the comprehensive list of coatings.
5. The facility shall maintain daily operating records for each operation included in the AECP. Separate records shall be maintained for each permit unit. The volume applied of each coating, less water and exempt solvent, and all applicable data from the comprehensive list of coatings shall be recorded. The daily operating records shall be maintained on the standard form supplied by the local agency in accordance with agency policy. The records shall demonstrate on a daily solids basis that an equivalent emission reduction has been achieved as would have been achieved had all operations complied with regulation \_\_\_\_\_.
6. The emissions from the following permitted units (list permits under the AECP) shall not exceed \_\_\_\_\_ pounds per day. [The emission rate from the following permitted units (list permits included in the AECP) shall not exceed \_\_\_\_\_ pounds of VOC per gallon of coating solids.]
7. [Applicable control equipment conditions should be specified]
8. An exceedance of any permitted limits specified in the AECP shall be reported to the local district within 96 hours. An exceedance of the equivalence condition for this AECP shall be reported to the local district within 96 hours.

#### Recordkeeping Requirements and Format

To demonstrate compliance with the equivalent emission provisions of an AECP, detailed records of the coatings applied must be maintained on a daily basis.<sup>18</sup> The actual VOC content of the coating applied must be included in the plan. The VOC content of each coating as applied is dependent upon the amount of base, catalyst, and added thinner; therefore, multi-component coating mix ratios must be tracked very carefully. Detailed usage records must include the volume of each coating component applied for multi-component coatings as well as the resulting VOC content applied. If coatings contain water or exempt solvents, it is critical that the volume applied be recorded on a consistent basis with VOC content. Because laboratory analysis results stipulate the VOC content, less water and exempt solvent, the volume of each component applied and the solids content must exclude water and exempt solvent.

In determining the emissions resulting from processes subject to the AECP, inspectors should ensure that all of the emissions associated with an operation appear in the final compliance calculation. Thus, the volume of all coatings applied to substrates and the volume of all coatings wasted at a facility must be included in the plan. Many multi-component coatings are designed to catalyze, driving the VOCs from the liquid film. After the components are mixed, emissions from catalyzed coatings can occur from use at the spray booth and also from the waste storage drum;

thus, it is very difficult to quantify the emissions that occur at the facility prior to disposal. Unless the AECPP contains enforceable permit conditions and test methods to determine the actual volume and VOC content of coating disposed of to licensed waste haulers, the volumes should not be excluded from the AECPP equivalency calculation.

#### Annual Approval

It is important that regulatory agencies keep abreast of the changes in operations that occur at facilities that operate under the provisions of an AECPP. Should any of the source's operating parameters change, compliance with the AECPP must be reevaluated by engineering and enforcement staff. By requiring facilities to have their AECPP reapproved on an annual basis, engineers will also have the opportunity to reevaluate the plan and require any changes that may be necessary. The California Clean Air Act, effective 1/1/89, amended Section 42301 of the California Health and Safety Code. Local air pollution control districts now have the authority, at annual permit renewal, to revise permit conditions if changes will ensure continuous compliance with regulations.<sup>19</sup>

#### Preparing the Engineering Analysis

1. Establish the baseline daily emissions, or baseline daily emission rate, and determine the overriding permit conditions limiting the total emissions or emission rate to 80% of the baseline.
2. Verify all data submitted by the source and then input the data into the standardized recordkeeping form and determine if the proposed project will be able to demonstrate equivalent emissions to comply with the regulation.
3. Verify that the proposed project can comply with the 80% of baseline emission limit as calculated by district staff.

#### Preparing an AECPP Summary Document

Because the theory behind AECPPs is not simple, it is very important that a comprehensive document be prepared for each AECPP by engineering staff and provided to enforcement staff and the facility representatives. The summary should be written in terms that can be understood by the general public, and should contain:

1. A general explanation of the methodology and theory behind the plan.
2. A listing of all applicable rules and regulations along with any emission limits of the rules.
3. A clear and concise description of the project proposal, including a project schematic diagram. The description should list all permitted and unpermitted coating application

units that are included in the AECF.

4. A list of operating parameters that were taken into account in the preparation of the plan and that may not be changed without affecting compliance.
5. A design check of all air pollution control equipment.
6. Calculations of expected emissions.
7. Applicable permit conditions that ensure compliance with the plan and an "evergreen" condition requiring compliance with all conditions for the life of the project. Also, an annual source test or a continuous emission monitoring system should be required.
8. A list of findings, conclusions, and recommendations.
9. A detailed set of instructions to the source and enforcement staff that outlines the method that can be used to easily determine compliance on a daily basis.

#### Submittal of AECFs as SIP Revisions

The EPA emission trading policy requires that all AECFs subject to the emission trading policy be submitted to EPA as a source specific SIP revision.<sup>20</sup> The AECF becomes federally enforceable at the time the SIP revision is approved by EPA. The EPA has recently implemented a SIP streamlining process, known as the State Implementation Plan Completeness Review.<sup>21</sup> The revised EPA procedure for review of SIP submittals should reduce the time necessary to process AECFs as a source specific SIP revision. To further speed the processing of source specific SIP revisions, the EPA has stated that parallel processing of AECFs may be available at the regional level. Parallel processing would allow the local APCD and EPA to review the AECF concurrently. This process should allow the regional EPA office to review and approve AECFs in a timely manner, provided that the SIP submittal meets the EPA completeness criteria outlined in the Federal Register.

#### State Assurances

The EPA's State Implementation Plan Completeness Review policy requires that source specific SIP revisions be accompanied by a letter from the Governor or Governor's designee requesting that the EPA approve the SIP revision.<sup>22</sup> In addition to the formal notification from the State, the source specific SIP revision must be accompanied by specific administrative information and technical supporting documentation. The complete package sent to EPA is known as the State Assurance Document and must contain specific administrative and technical supporting documentation outlined in CFR, Part 51 [amended], Appendix V.<sup>23</sup>

## REFERENCES

1. T. Rarick; U.S. Environmental Protection Agency, Region IX; Memorandum to James J. Morgenter, California Air Resources Board, Chief, Compliance Division; August 27, 1987.
2. U.S. Environmental Protection Agency; Emission Trading Policy Statement...; Federal Register, Volume 51, No. 233; December 4, 1986; pp 43814-43860.
3. U.S. Environmental Protection Agency; Office of Air Quality planning and Standards; Issues Relating to VOC Regulation Cutpoints, Deficiencies, and Deviations; Washington, DC; May 25, 1988.
4. California Air Resources Board; Consideration of a Proposed Model Rule for the Control of VOC Emissions...; No. 78-17-2; Sacramento, CA; September 27, 1978; pp 31-41.
5. U.S. Environmental Protection Agency; Compliance with VOC Emission Limitations for Cab Coating Operations; Federal Register, Volume 45, No. 237; December 8, 1980; pp 80824-80825.
6. Code of Federal Regulations; CFR Title 40, Chapter 1, Part 60, Appendix A, Method 24; Office of Federal Register, National Archives and Record Service, General Services Administration; Washington DC; published annually.
7. U.S. Environmental Protection Agency; Compliance with VOC Emission Limitations for Cab Coating Operations; Federal Register, Volume 45, No. 237; December 8, 1980; pp 80824-80825.
8. U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards; Protocol for Determining the Daily VOC Emissions Rate of Automobile and Light Duty Truck Topcoat Operations; EPA-450/3-88-018; Research Triangle Park, NC; December 1988.
9. U.S. Environmental Protection Agency; Standards of Performance for Industrial Surface Coating: Large Appliances; 40 CFR, Chapter 1, Part 60, subpart SS; (Source: Federal Register, Volume 47, October 27, 1982, p 47785).
10. C. McKaughan; Chief, State Implementation Plan Section, U.S. Environmental Protection Agency, Region IX; Memorandum to R. Baldwin, APCO, Ventura County Air Pollution Control District; October 13, 1988.
11. G.T. Helms; Chief, Ozone/Carbon Monoxide Programs Branch, Office of Air Quality planning and Standards, US Environmental Protection Agency; Memorandum to B. Miller, Chief, Air Programs Branch, US EPA, Region IV; August 31, 1988.
12. U.S. Environmental Protection Agency, Office of Research and Development; Photochemical Reactivity of Perchloroethylene; EPA-600/3-83/001; Research Triangle Park, N.C.; January 1983.
13. U.S. Environmental Protection Agency, Region IX; [Adapted from personal notes taken from the February 1, 1989 AECF EPA Policy Workshop, San Francisco, CA].
14. U.S. Environmental Protection Agency; Emission Trading Policy Statement...; Federal Register, Volume 51, No. 233; December 4, 1986; pp 43814-43860.
15. J.R. O'Connor; Acting Director, Office of Air Quality Planning and Standards; US Environmental Protection Agency; Memorandum to all Air Management Division Directors, US EPA, Regions I-IX; January 20, 1984.
16. U.S. Environmental Protection Agency; Emission Trading Policy Statement...; Federal Register, Volume 51, No. 233; December 4, 1986; pp 43814-43860.
17. Ibid.
18. US Environmental Protection Agency, Stationary Source Compliance Division; Recordkeeping Guidance Document for Surface Coating Operations and the Graphic Arts Industry; Washington, DC; July 12, 1988.
19. Assembly Bill (AB) 2595 (Sher); The California Clean Air Act; September 30, 1988.
20. U.S. Environmental Protection Agency; Emission Trading Policy Statement...; Federal Register, Volume 51, No. 233; December 4, 1986; pp 43814-43860.
21. US Environmental Protection Agency; State Implementation Plan Completeness Review; Federal Register, Volume 54, No. 12; January 19, 1989; pp 2138 - 2141.
22. Ibid.
23. Ibid.

**NOTE TO EDITORS**

**Under the new federal copyright law,  
publication rights to this paper are  
retained by the author(s).**