Eastern Kern Air Pollution Control District

Rule 410.8
AEROSPACE ASSEMBLY AND COATING OPERATIONS

STAFF REPORT

Draft April 29, 2022

Prepared by

Samuel Johnson
Air Quality Engineer I

Reviewed by

Glen Stephens
Air Pollution Control Officer

Eastern Kern Air Pollution Control District
2700 "M" Street, Suite 302
Bakersfield, California 93301
(661) 862-5250 ● www.kernair.org

Table of Contents

I. INTRODUCTION

The Eastern Kern Air Pollution Control District (District) is proposing to adopt amendments to Rule 410.8, Aerospace Assembly and Coating Operations. Rule 410.8 limits volatile organic compound (VOC) emissions from aerospace coatings and adhesives, and from cleaning, stripping, storing, and disposal of organic solvents and waste solvent materials associated with the use of aerospace coatings and adhesives.

Amendments to Rule 410.8 are to implement contingency measures to provide additional emission reductions in the event the District fails to meet reasonable further progress (RFP) milestones or fails to attain the 2008 Ozone national ambient air quality standard (NAAQS) or the 2015 Ozone NAAQS by the respective attainment date. This staff report presents the proposed amendments made to the Rule.

Appendix A: Proposed Revision of proposed Rule 201.1, Rule 410.8 Aerospace Assembly & Coating Operations.

Appendix B: Proposed Revision of proposed Rule 201.1, Rule 410.8 Aerospace Assembly & Coating Operations. Strikeout Underline.

Appendix C: Summary table of coating VOC content requirements currently more stringent than Rule 410.8.

Appendix D: Cost effectiveness analysis of carbon adsorption system

II. BACKGROUND

In light of the District's failure to attain the 2008 Ozone NAAQS by the Serious attainment date, and in accordance with Clean Air Act Sections 172(c)(9) and 182(c)(9), the District is required to implement contingency measures to go into effect if the District is unable to achieve RFP milestones or attain the Ozone NAAQS.

Aerospace surface coating operations are among the largest sources of VOC emission in the District. Permitted aerospace surface coating operations have a potential to emit of approximately 92 tons of VOC per year, with historical VOC emissions closer to 30 tons per year; this accounts for approximately 23% of VOC emitted from permitted facilities within the District; therefore, additional emission reductions from this source category are anticipated to result in a significant contribution towards attainment with the ozone NAAQS.

III. PROPOSED REVISIONS TO RULE 410.8

Staff is proposing to amend Rule 410.8 to include contingency measures for aerospace surface coating operations, to go into effect if the District fails to meet an RFP milestone or fails to attain the 2008 Ozone NAAQS or 2015 Ozone NAAQS by the attainment date. Contingency measures include: a reduction in allowable VOC content of some coating categories; setting a VOC content limit for solvents used to clean coating application equipment outside of an enclosed device; changes to the "low-use coating" exemption under Section IV of the rule, and requiring installation of a VOC emission control device for surface coating operations with VOC emissions above the determined cost effectiveness threshold.

IV. VOC EMISSION REDUCTIONS

Reducing VOC emissions from surface coating operations can be achieved through substitution to lower VOC content coatings and cleaning solvents, or the use of add-on control devices.

Rule 410.8 allows an exemption from the VOC content limits for coatings or refillable aerosols with separate formulations used in volumes of less than 50 gallons per year, provided the total of such formulations applied annually is less than 200 gallons. Other California air Districts have more restrictive volume threshold for this VOC content exemption, the most stringent being from Imperial County APCD, which limits these "non-compliant" coatings to 20 gallons per formulation, totaling 50 gallons per year, and requires a demonstration that compliant coatings are not available.

As a first step in determining the feasibility of lowering coating and solvent VOC content thresholds, a review of coating VOC requirements of other California air district rules was performed. This review found over 20 categories of solvents, primers, coatings, adhesives, sealants, and maskants that other air districts had a lower VOC content requirements than Rule 410.8, with some of these requirements having been in place for over 20 years. A summary of these categories can be found in Appendix B of this staff report.

Rule 410.8 does not currently set a VOC content requirement for organic solvents used for cleaning of coating application equipment, but prohibits the use of organic solvents unless a specified cleaning method is used. Several other California air districts limit the VOC content or composite vapor pressure for coating application equipment cleaning solvents, unless an enclosed cleaning system is used. Establishing a VOC content or composite partial pressure limit for these solvents is anticipated to provide a modest reduction in VOC emissions

Control technologies for reducing VOC emissions for surface coating operations include the following:

A. Carbon Adsorption

Carbon adsorption uses a solid carbon-based filter (activated carbon or polymers) to remove VOC's from low to medium concentration gas streams. Gas molecules passing through the filter are selectively held onto the surface of the solid filter by attractive forces weaker and less specific than chemical bonds. Most VOCs can be removed ("desorbed") from the filter by increasing temperature, decreasing pressure, or introducing a stronger adsorbed material to displaced the captured VOCs. These removed VOCs are typically vented to an afterburner or oxidizer for destruction.

Among types of adsorption equipment, the two most common are fixed-bed regenerable systems and disposable/rechargeable canisters. Fixed-bed units are typically used for continuous VOC containing exhaust streams, and are equipped with systems to desorb the carbon filter while it remains at its operating location. Canister type adsorbers are generally limited to controlling lower-volume and/or intermittent gas streams. They are not intended for desorption at their operating location, and are either returned to the manufacturer or regenerated at a central desorption facility onsite. Once the canister reaches a specified VOC content, the equipment is shut down, the saturated carbon or canister is removed, and fresh carbon or a new canister is installed for the next operating cycle.

When properly designed, operated and maintained, carbon adsorbers can achieve VOC removal efficiencies of 95 to 99 percent at input VOC concentrations of between 500 and 2,000 ppm in air.

B. Oxidizer

Oxidizers control VOC emissions by combusting VOC laden gas; the interaction of organic molecules at high temperatures (1400 ^{o}F or greater) breaks down the organic molecules into primarily waster and carbon dioxide, though emissions of nitrogen oxides, acidic gases, trace metals, and other hazardous air pollutants may also occur. The waste gas stream being treated by the oxidizer must be heated to its ignition temperature; this is typically accomplished through combustion of supplemental fuel (e.g. natural gas) in the oxidizer. The organic gas must remain at or above this desired temperature long enough to fully react with the oxygen (residence time), and there must be sufficient mixing of the organic gas and oxygen (referred to as turbulence) to ensure as much gas as possible is exposed to oxygen at the elevated temperatures.

The main types of thermal oxidizers are direct fire, catalytic, recuperative, and regenerative. Catalytic oxidizers make use of a catalyst to increase the rate of the combustion reaction, which lowers the required temperature of the oxidizer as well as supplemental fuel requirements. Recuperative thermal oxidizers recover waste heat from the combustion through heat exchangers placed in the hot outlet gas streams; this recovered heat can be used to preheat the VOC gas stream, heat & boil water for steam, or provide process heat for another operation at the facility. Regenerative thermal oxidizers utilize heat exchangers, constructed of ceramic materials able to withstand the high temperatures the oxidizer must reach for ignition of the gas stream, between the emission source & combustion chamber and the combustion chamber & exhaust stack. The inlet gas first passes through the first hot ceramic bed thereby heating the stream (and cooling the bed) to its ignition temperature. If the desired temperature is not attainable, a small amount of auxiliary fuel is added in the combustion chamber. The hot gases then react (releasing energy) in the combustion chamber and while passing through the second ceramic bed, thereby heating it to the combustion chamber outlet temperature. When the temperature of the outlet ceramic bed reaches a set temperature, the process flows are reversed (using valves in the ducting/piping) so that the inlet gas is now fed into the hot second ceramic bed and exits through the first ceramic bed.

When properly designed, operated and maintained, oxidizers can achieve VOC destruction efficiencies of 95 to 99.99 percent.

V. COST EFFECTIVENESS

When assessing the cost effectiveness of a control technology, the total annual cost per ton (TACPT) of emission reductions is calculated and then compared to a cost-effectiveness “cutoff” threshold. The TACPT is calculated by dividing the total annual cost of the emission control system (sum of estimated capital recovery cost and annual operating cost) by the amount of emission reductions expected from use of the emission control system.

The last revision to Eastern Kern APCD’s cost-effectiveness “cutoff” threshold was in the year 2000, set at $5,000 per ton. However, since these contingency measures would In 2021, the San Joaquin Valley Air Pollution Control District established a best available control technology BACT Policy cost-effectiveness threshold of $22,600 per to of VOC reductions. Since the soonest a contingency requirement would be triggered is for nonattainment with the 2008 ozone NAAQS (putting eastern Kern APCD at extreme nonattainment, the same as San Joaquin Valley), the District selected the San Joaquin Valley APCD threshold for determining whether add-on controls were cost-effective.

In determining the cost effectiveness of the VOC control equipment, EPA's *Air Pollution Cost Control Manual* was consulted for each type of VOC control equipment previously described to determine the cost of installation and use of the equipment. Additionally, cost-effectiveness determinations by other California air districts for add-on control devices at aerospace surface coating operations were reviewed.

The Bay Area Air Quality Management District has had a Best Available Control Technology (BACT) determination for aerospace surface coatings operations in place since 1991 that listed carbon adsorption or thermal oxidation as generally cost-effective for operations that emit more than 25 pounds per day of VOC (~4.56 ton/yr). The Sacramento Metropolitan Air Quality Management District performed a BACT analysis in 2018 that determined a VOC control system was cost effective for aerospace coating operations that emitted more than 4,785 lb/yr (2.40 ton/yr) of VOC was "technologically feasible", .

A cost effectiveness analysis for carbon adsorption can be found in Appendix C of this staff report; carbon adsorption was found to be cost-effective for operations that emit 3.50 tons or more of uncontrolled VOC per year. A review of cost effectiveness analyses performed by other agencies indicated that an oxidizer would require more than double these uncontrolled emissions to be cost effective to install, so a cost-effectiveness analysis was not performed by the District for an oxidizer.

VI. ECONOMIC IMPACT

Pursuant to California Health & Safety Code (CH&SC) §40920.6(a), the District is required to analyze the cost effectiveness of new rules or rule amendments that implement Best Available Retrofit Control Technology (BARCT) or "all feasible measures" to control VOC. Among contingency measures added to Rule 410.8, proposed additional controls would constitute BARCT, and are therefore subject to the cost effectiveness analysis mandate.

Potential economic impacts from the proposed contingency measures include the cost of obtaining coatings and solvents with lower VOC formulations, as well as the cost to install and operate VOC emission control devices.

VII. ENVIRONMENTAL IMPACTS

Environmental impacts of these contingency measures are a decrease in VOC emissions and associated decrease in tropospheric ozone.

The use of add-on control devices could result in generation of solid and liquid waste requiring further treatment (adsorber or condenser); this waste would likely be handled by existing waste treatment

Use of an oxidizer would result in an increase in emissions of nitrogen oxides, oxides of sulfur, and could increase particulate matter and toxic air contaminant emissions.

Pursuant to the Section 15061, Subsections (2) & (3) of the California Environmental Quality Act (CEQA) Guidelines, staff will prepare a Notice of Exemption for this project.

VIII. RULE CONSISTENCY ANALYSIS

Pursuant to CH&SC §40727.2, prior to adopting, amending, or repealing a rule or regulation, the District is required to perform a written analysis that identifies and compares the air pollution control elements of the rule with the corresponding elements of existing or proposed District and EPA rules, regulations, and guidelines that apply to the same source category. Rule elements that were analyzed are emission limits or control efficiency, operating parameters and work practices, monitoring and testing, and recordkeeping and reporting requirements.

Results of Consistency Analysis

District Rules

Facilities subject to Rule 410.8 could also be subject to the following rules:

- Rule 410, Organic Solvents
- Rule 410.2, Disposal and Evaporation of Solvents
- Rule 410.3, Organic Solvent Degreasing Operations
- Rule 410.4, Metal, Plastic, and Pleasure Craft Parts and Products Coating Operations
- Rule 410.4A, Motor Vehicle and Mobile Equipment Refinishing Operations
- Rule 410.7, Graphic Arts
- Rule 411, Storage of Organic Liquids
- Rule 422, New and Modified Stationary Source Review Rule
- Rule 423, National Emissions Standards for Hazardous Air Pollutants
- Rule 432, Polyester Resin Operations
- Rules 410, 410.2, and 410.4 include a provision that will exempt any source operation that is subject to, or specifically exempted by, Rule 410.8.

Rules 410.3, 410.4A, 410.7, 411, 422, and 423 are not in conflict with, nor are they inconsistent with the requirements of Rule 410.8.

EPA Rules and Regulations

A. EPA-Control Technique Guidelines (CTG)

1. CTG EPA-453/R-97-004 1997/12 applies to *Surface Coating Operations at Aerospace Manufacturing and Rework Operations* located in marginal, moderate, serious or severe ozone nonattainment areas that has the potential to emit greater than or equal to 25 tons/year of VOC, and equal to greater than 10 tons/year of VOC for extreme ozone nonattainment areas. Rule 410.8 requirements are currently more stringent than the CTG limits for 34 categories, and as stringent as the CTG in the 19 remaining categories; contingency requirements would further increase the stringency of Rule 410.8. As such, District staff concludes that District Rule 410.8 is more stringent than the CTG.

2. CTG EPA-450/2-77-022 1977/11 applies to *VOC Emissions from Solvent Metal Cleaning* operations located in marginal, moderate, serious or severe ozone nonattainment areas that have the potential to emit greater than or equal to 25 tons/year of VOC, and equal to greater than 10 tons/year of VOC for extreme ozone nonattainment areas.

   This CTG applies to the use of the following degreasing equipment: cold cleaners, open top vapor degreasers, and conveyorized degreasers. The CTG identifies design and work practice standards for cold cleaners, open top vapor degreasers, and conveyorized degreasers, for example: cover the solvent tank, have a facility for waste solvent and draining cleaned parts, permanent labels on operating parts, close degreaser when not in use, drain parts until dripping ceases, no excessive splashing if solvent is sprayed. The CTG also identifies add-on controls such as refrigeration chillers and carbon control.

   Rule 410.8 identifies solvent VOC content limits or a control system with efficiencies of at least 90% capture and 95% control, and that would not allow more emissions than if compliant materials were utilized. The general solvent limit is 200 g/L; the coating stripper solvent limit is currently 300 g/L. Since the CTG does not identify control requirements any more stringent than Rule 410.8, District staff considers Rule 410.8 at least as stringent as the CTG.

B. EPA - Alternative Control Technology (ACT)

Currently no EPA ACT guidance document for aerospace coating operations.

C. Standards of Performance for New Stationary Sources (NSPS)

Currently no NSPS guidance document for aerospace coating operations.

D. National Emission Standards for Hazardous Air Pollutants (NESHAPs) and Maximum Achievable Control Technologies (MACTs)

NESHAPs and MACTs are requirements contained in 40 Code of Federal Regulations (CFR) Part 61 and 40 CFR Part 63. Since EPA has delegated the authority to implement most NESHAP requirements to the District, NESHAPs and MACTs promulgated by EPA are largely incorporated by reference into District Rule 423 (National Emission Standards for Hazardous Air Pollutants). It is important to mention that the District implements NESHAPs and MACTs by incorporating the emission standards as conditions of the Permits to Operate issued to affected sources.

40 CFR 63 Subpart GG (National Emission Standards for HAPs: Aerospace Manufacturing and Rework Facilities)
VOC content requirements described in the "Table of Standards" of Rule 410.8 are of equal or greater stringency as the requirements of 40 CFR §63.745(c) and §63.747(c). VOC control system requirements listed in Section V.F of Rule 410.8 are more stringent than the requirements of §63.745(d) and §63.747(d). Coating application equipment requirements of Section V.E of Rule 410.8 are equivalent to 40 CFR §63.745(f). Sections V.B and V.D of Rule 410.8 are approximately equivalent to 40 CFR §63.744(a), (b), & (d), as well as 40 CFR §63.748. 40 CFR §63.746 is not directly comparable to Section V.C of Rule 410.8, as it specifically applies to organic HAP in chemical strippers, and not all VOC.

IX. SOCIOECONOMIC IMPACTS

CH&SC §40728.5 exempts districts with a population of less than 500,000 persons from the requirement to assess the socioeconomic impacts of proposed rules. Eastern Kern County population is below 500,000 persons.

X. RULE APPROVAL PROCESS

The District will be accepting written comments and concerns from persons interested in proposed Amended Rule 410.8 for a period of 30 days following the workshop. The District anticipates that Amended Rule 410.8 will be considered for adoption by the Governing Board at the September 1, 2022, Board Hearing.

REFERENCES

Antelope Valley Air Quality Management District Rule 1124 *"Aerospace Assembly and Component Manufacturing Operations"* (Amended 08/20/2013)

Antelope Valley Air Quality Management District Rule 1171 *"Solvent Cleaning Operations"* (Amended 08/21/2018)

Bay Area Air Quality Management District *Best Available Control Technology (BACT) Guideline Document #161.1.1* (09/06/1991)

Bay Area Air Quality Management District *Best Available Control Technology (BACT) Guideline Document #161.1.2* (09/06/1991)

Bay Area Air Quality Management District Regulation 8 Rue 29 *"Aerospace Assembly and Component Coating Operations"* (Amended 12/20/1995)

EPA *Air Pollution Cost Control Manual Section 3.1 – VOC Recapture Controls Chapter 1 – Carbon Adsorbers* (October 2018)

EPA *Air Pollution Cost Control Manual Section 3.2 – VOC Destruction Controls Chapter 2 – Incinerators and Oxidizers*

Imperial County Air Pollution Control District Rule 425 *"Aerospace Coating Operations"* (Amended 02/23/2010)

Mojave Desert Air Quality Management District Rule 1118 *"Aerospace Assembly, Rework, and Component Manufacturing Operations"* (Amended 06/08/2020)

Sacramento Metropolitan Air Quality Management District *Minor Source BACT Determination No.'s 182 & 183* (09/18/2018)

Sacramento Metropolitan Air Quality Management District Rule 456 *"Aerospace Assembly and Component Coating Operations"* (Amended 10/23/2008)

San Diego County Air Pollution Control District Rule 67.9 *"Aerospace Coating Operations"* (Amended 04/30/1997)

San Joaquin Valley Unified Air Pollution Control District *Best Available Control Technology (BACT) Policy* (revised 07/01/2021)

San Joaquin Valley Unified Air Pollution Control District Rule 4605 *"Aerospace Assembly and Component Coating Operations"* (Amended 06/16/2011)

Santa Barbara County Air Pollution Control District Rule 337 *"Surface Coating of Aerospace Vehicles and Components"* (Amended 06/21/2012)

South Coast Air Quality Management District Rule 1124 *"Aerospace Assembly and Component Manufacturing Operations"* (Amended 09/21/2001)

South Coast Air Quality Management District Rule 1171 *"Solvent Cleaning Operations"* (Amended 05/01/2009)

Ventura County Air Pollution Control District Rule 74.13 *"Aerospace Assembly and Component Manufacturing Operations"* (Amended 09/11/2012)

Remainder of Page Intentionally Left Blank

APPENDIX A:

PROPOSED REVISION RULE 410.8

AEROSPACE ASSEMBLY AND COATING OPERATIONS

RULE 410.8 Aerospace Assembly and Coating Operations - Adopted 3/13/2014 (Amended XX/XX/2022)

I. Purpose

The purpose of this rule is to limit volatile organic compound (VOC) emissions from aerospace coatings and adhesives, and from cleaning, stripping, storing, and disposal of organic solvents and waste solvent materials associated with the use of aerospace coatings and adhesives. This rule also provides administrative requirements for recording and measuring VOC emissions.

II. Applicability

Except as provided in Section IV, the provisions of this rule are applicable to the manufacturing, assembling, coating, masking, bonding, paint stripping, surface cleaning, service, and maintenance of aerospace components, and the cleanup of equipment, storage, and disposal of solvents and waste solvent materials associated with these operations.

III. Definitions

A. Ablative Coating: A coating that chars when exposed to open flame or extreme temperatures, as would occur during the failure of an engine casing or during aerodynamic heating. The ablative char surface serves as an insulative barrier, protecting adjacent components from heat or open flame.

B. Adhesion Promoter: A coating applied to a substrate in a monomolecular thickness to promote wetting and form a chemical bond with the subsequently applied material.

C. Adhesive: A substance that is used to bond one surface to another.

D. Adhesive Bonding Primer: A coating applied in a very thin film to aerospace adhesive bond detail components for corrosion inhibition and adhesion.

E. Aerosol Coating: A mixture of pigments, resins, and liquid and gaseous solvents and propellants packaged in a disposable container for hand-held application.

F. Aerospace Component: Any raw material, partial or completed fabricated part, assembly of parts, or completed unit of any aircraft, helicopter, missile, or space vehicle, including integral equipment such as models, mock-ups, prototypes, molds, jigs, tooling, hardware jackets, and test coupons.

G. Aerospace Material: Any coating, primer, adhesive, sealant, maskant, lubricant, stripper or hand-wipe cleaning or clean-up solvent used during the manufacturing, assembly, refinishing, maintenance or service of an aerospace component. Preservative oils and compounds, form release agents not containing solids, greases, and waxes are not aerospace materials for the purpose of this rule.

H. Antichafe Coating: A coating applied to areas of moving aerospace components which may rub during normal operation.

I. Antique Aerospace Vehicle or Component: An aircraft or component thereof that was built at least 30 years ago. An antique aerospace vehicle would not routinely be in commercial or military service in the capacity for which it was designed.

J. Anti-Wicking Wire Coating: The outer coating of a wire which prevents fluid wicking into the insulation of the wire.

K. Air Pollution Control Officer (APCO): Eastern Kern Air Pollution Control District Air Pollution Control Officer, or his designee.

L. ARB: California Air Resources Board.

M. ASTM: American Society for Testing and Materials.

N. Barrier Coating: A coating applied in a thin film to fasteners to inhibit dissimilar metal corrosion and to prevent galling.

O. Bearing Coating: A coating applied to an antifriction bearing, a bearing housing, or the area adjacent to such a bearing in order to facilitate bearing function or to protect the base material from excessive wear. A material shall not be classified as a bearing coating if it can also be classified as a dry lubricative material or a solid film lubricant.

P. Brush Coating: Manual application of coatings using brushes and rollers.

Q. Caulking and Smoothing Compounds: Semi-solid materials which are applied by hand application methods and are used to aerodynamically smooth exterior vehicle surfaces or fill cavities such as bolt hole accesses. A material shall not be classified as a caulking and smoothing compound if it can also be classified as a sealant.

R. Chemical Agent-Resistant Coating (CARC): An exterior topcoat designed to withstand exposure to chemical warfare agents or the decontaminants used on these agents.

S. Chemical Milling: The removal of metal by chemical action of acids or alkalis.

T. Clear Topcoat: A clear or semi-transparent coating applied over a primer for purposes such as appearance, identification, or protection.

U. Coating: A material applied onto or impregnated into a substrate for protective, decorative, or functional purposes. Such materials include, but are not limited to, paints, varnishes, sealers, and stains excluding preservative oils and compounds, form release agents not containing solids, greases, and waxes.

V. Commercial Exterior Aerodynamic Structure Primer: A primer utilized for the purpose of extended corrosion protection, which is only used on the exterior of passenger and cargo doors, supporting door structures, aerodynamic components, and structures of commercial aircraft which protrude from the fuselage, such as wings and attached components, control surfaces, horizontal stabilizer, vertical fins, wing-to-body fairings, antennae, landing gear and landing gear doors.

W. Composite Partial Pressure: The sum of the partial pressures of the VOC compounds in a solvent. The VOC composite partial pressure is calculated as follows:

$$PP_c = \frac{\sum_{i=1}^{n} \frac{(W_i)(VP_i)}{MW_i}}{\frac{W_w}{MW_w} + \sum_{e=1}^{k} \frac{W_e}{MW_e} + \sum_{i=1}^{n} \frac{W_i}{MW_i}}$$

Where:

W_i	=	Weight of the "i"th VOC compound, in grams
W_w	=	Weight of water, in grams
W_e	=	Weight of exempt compound, in grams
MW_i	=	Molecular weight of the "i"th VOC compound, in grams per gram-mole
MW_w	=	Molecular weight of water, in grams per gram-mole
MW_e	=	Molecular weight of the "e"th exempt compound, in grams per gram-mole
PP_c	=	VOC composite partial pressure at 20°C (68°F), in mm Hg
VP_i	=	Vapor pressure of the "i"th VOC compound at 20°C (68°F), in mm Hg

X. Conformal Coating: A coating applied to electrical conductors and circuit boards to protect them against electrical discharge damage and/or corrosion.

Y. Decorative Laminate Primer: An adhesive bonding primer which is applied to a substrate to enhance adhesion between the decorative laminate and the subsequently applied substrate, and is cured at a maximum temperature of 250°F.

Z. Dip Coating: The process in which a substrate is immersed in a solution (or dispersion) containing the coating and then withdrawn.

AA. Dry Lubricative Coating: A coating consisting of lauric acid, cetyl alcohol, waxes, or other non-cross linked or resin-bound materials which act as a dry lubricant or protective coat.

BB. Electric-Effect Coating: An electrically-conductive coating.

CC. Electrodeposition: A dip coating application method where the paint solids are given an electrical charge which is then attracted to a substrate.

DD. Electromagnetic Interference (EMI) Coating: A coating applied to space vehicles, missiles, aircraft radomes, and helicopter blades to disperse static energy or reduce electromagnetic interference.

EE. Electronic Wire Coating: The outer electrical insulation coating applied to tape insulation of a wire specifically formulated to smooth and fill edges.

FF. Electrostatic Application: A sufficient charging or atomized paint droplets to cause deposition principally by electrostatic attraction. This application shall be operated at a minimum 60 KV power.

GG. EPA: United States Environmental Protection Agency.

HH. Epoxy Based Fuel Tank Coating: A coating which contains epoxy resin that is applied to integral fuel tank components of aircraft to protect the fuel tank from corrosion and the by-products of bacterial growth.

II. Epoxy Polyamide: A tough chemically resistant polyamide-cured epoxy coating that provides long-term protection for alloys exposed to hot corrosive environments.

JJ. Fastener Sealant: A sealant applied to a device used to join two or more parts together.

KK. Fire Resistant Coating - Civilian (interior): A cabin interior coating that passes Federal Aviation Administration standards using the Ohio State University Heat Release, Fire and Burn Tests.

LL. Flight Test Coating: A coating applied to an aircraft prior to flight testing to protect the aircraft from corrosion and to provide required marking during flight test evaluation.

MM. Flow Coating: A coating application system with no air supplied to the nozzle and where paint flows over the part and the excess coating drains back into a collection system.

NN. Fuel Tank Adhesive: An adhesive used to bond components continuously exposed to fuel and which must be compatible with and used with fuel tank coatings.

OO. Fuel Tank Coating: A coating applied to the interior of a fuel tank or areas of an aircraft that are continuously wetted by fuel to protect it from corrosion and/or bacterial growth.

PP. Grams of VOC per Liter of Coating, Less Water and Exempt Compounds: The weight of VOC content per combined volume of VOC and coating solids and can be calculated by the following equation:

$$\text{Grams of VOC per liter of coating, less water and exempt compounds} = \frac{Ws - Ww - Wec}{Vm - Vw - Vec}$$

Where:

Ws	=	weight of volatile compounds (grams)
Ww	=	weight of water (grams)
Wec	=	weight of exempt compounds (grams)
Vm	=	volume of material (liters)
Vw	=	volume of water (liters)
Vec	=	volume of exempt compounds (liters)

QQ. Grams of VOC per Liter of Material: The weight of VOC per volume of material and can be calculated by the following equation:

$$\text{Grams of VOC per liter of material} = \frac{Ws - Ww - Wec}{Vm}$$

Where:

Ws	=	weight of volatile compounds (grams)
Ww	=	weight of water (grams)
Wec	=	weight of exempt compounds (grams)
Vm	=	volume of material (liters)

RR. Hand Application Methods: The application of coatings, sealants, or adhesives by non-mechanical hand-held equipment including but not limited to paint brushes, hand rollers, caulking guns, trowels, spatulas, syringe daubers, non-refillable aerosol cans, rags, and sponges.

SS. High Temperature Coating: A coating that is certified to withstand temperatures of more than 350°F.

TT. High-Volume, Low-Pressure (HVLP) Spray Equipment: Spray equipment permanently labeled as such and which is designed and operated between 0.1 and 10 pounds per square inch, gauge, (psig) air atomizing pressure measured dynamically at the center of the air cap and at the air horns and with liquid supply pressure less than 50 psig.

UU. Impact Resistant Coating: A flexible coating that protects aerospace components, such as aircraft landing gear, landing gear compartments, and other surfaces subject to abrasive impacts from runway debris.

VV. Intermediate Release Coating: A thin coating applied beneath topcoats to assist in removing the topcoat in depainting operations and generally to allow the use of less hazardous depainting methods.

WW. Lacquer: A clear or pigmented coating formulated with a nitrocellulose or synthetic resin to dry by evaporation without a chemical reaction. Lacquers are resoluble in their original solvent.

XX. Liquid Leak: A visible solvent leak from a container at a rate of more than three drops per minute or a visible liquid mist.

YY. Long Term Adhesive Bonding Primer (Metal to Structural Core Bonding): An adhesive bonding primer that has met the aircraft manufacturers' required performance characteristics following 6000 hours testing. Used for metal to structural core bonding and with an adhesive that is specified to be cured at 350°F ± 10°F.

ZZ. Maskant for Chemical Milling: A coating applied directly to an aerospace component to protect surface areas when chemical milling such component.

AAA. Metalizing Epoxy Coating: A coating that contains relatively large quantities of metallic pigmentation for appearance and/or added protection.

BBB. Mold Release: A coating applied to a mold surface to prevent the molded piece from sticking to the mold as it is removed.

CCC. Non-Absorbent Container: A container made of non-porous material that does not allow the migration of solvents through it.

DDD. Non-Leaking Container: A container without liquid leak.

EEE. Non-Structural Adhesive: An adhesive that bonds non-load carrying aircraft component in non-critical applications.

FFF. Normal Business Hours: Monday through Friday, 8:00 am to 5:00 pm.

GGG. Optical Anti-Reflective Coating: A coating with a low reflectance in the infrared and visible wavelength range and is used for anti-reflection on or near optical and laser hardware.

HHH. Organic Solvent: The same as "Solvent."

III. Organic Solvent Cleaning: As defined in Rule 410.3, Organic Solvent Degreasing Operations.

JJJ. Part Marking Coating: Coatings or inks used to make identifying markings on materials, components, or assemblies. These markings may be permanent or temporary.

KKK. Phosphate Ester Resistant Wire Ink Coating: A coating that is used for surface identification, mark on aerospace wire or cable, and inhibits the corrosion caused by contact with phosphate ester type hydraulic fluids.

LLL. Pretreatment Coating: A coating which contains no more than 12 percent solids by weight and at least one-half (0.5) percent acid by weight and is applied directly to metal surfaces to provide surface etching, corrosion resistance, adhesion, and ease of stripping.

MMM. Primer: A coating applied directly to an aerospace component for purposes of corrosion prevention, protection from the environment, functional fluid resistance, and adhesion of subsequent coatings, adhesives, or sealants.

NNN. Radiation-Effect Coating: A coating which helps in the prevention of radar detection.

OOO. Rain Erosion Resistant Coating: A coating that protects leading edges, flaps, stabilizers, and engine inlet lips against erosion caused by rain during flight.

PPP. Remanufactured Aircraft Part: An aerospace component that is built as a spare part or replacement part subject to an existing commercial aircraft specification.

QQQ. Rocket Motor Nozzle Coating: A catalyzed epoxy coating system used in elevated temperature applications on rocket motor nozzles.

RRR. Roll Coating: Application of coatings from a paint trough to a flat surface by mechanical series of rollers.

SSS. Scale Inhibitor: A coating that is applied to the surface of a part prior to thermal processing to inhibit the formation of tenacious scale.

TTT. SCAQMD: South Coast Air Quality Management District.

UUU. Screen Print Ink: An ink used in screen printing processes during fabrication of decorative laminates and decals.

VVV. Sealant: A viscous semisolid material that is applied with a syringe, caulking gun, or spatula to fill voids in order to seal out water, fuel, other liquids and solids, and in some cases air movement.

WWW. Silicone Insulation Material: An insulating material applied to exterior metal surfaces for protection from high temperatures caused by atmospheric friction or engine exhaust. These materials differ from ablative coatings in that they are not “sacrificial”.

XXX. Short Term Adhesive Bonding Primer: An adhesive bonding primer that has met the manufacturers’ required performance characteristics following 1000 hours testing. Used for metal to metal and metal to structural core bonding with an adhesive which is specified to be cured at a temperature of 350°F ± 10°F.

YYY. Solid Film Lubricant: A very thin coating consisting of a binder system containing as its chief pigment material one (1) or more of the following: molybdenum disulfide, graphite, polytetrafluoroethylene (PTFE) or other solids that act as a dry lubricant between closely-fitting surfaces.

ZZZ. Solvent: As defined in Rule 410.3, Organic Solvent Degreasing Operations.

AAAA. Sonic and Acoustic Applications: The use of aerospace materials on aerospace components that are subject to mechanical vibration or sound wave cavitation.

BBBB. Space Vehicle Coating: A coating applied to a vehicle designed to travel and operate beyond earth's atmosphere.

CCCC. Specialty Coating: A coating that, even though it meets the definition of a primer, topcoat, or self-priming topcoat, has additional performance criteria beyond those of primers, topcoats, and self-priming topcoats for specific applications. These performance criteria may include, but are not limited to, temperature or fire resistance, substrate compatibility, antireflection, temporary protection or marking, sealing, adhesively joining substrates, or enhanced corrosion protection.

DDDD. Specialized Function Coating: A coating that fulfills specific engineering requirements that are limited in application and characterized by low volume usage. This category excludes coatings covered in other Specialty Coating categories.

EEEE. Stripper: A volatile liquid applied to remove a maskant for chemical processing, cured or dried paint, cured or dried paint residue, or temporary protective coating.

FFFF. Structural Adhesive - Autoclavable: An adhesive used to bond load-carrying aircraft components and is cured by heat and pressure in an autoclave.

GGGG. Structural Adhesive - Nonautoclavable: An adhesive cured under ambient conditions and is used to bond load-carrying aircraft components or other critical functions, such as nonstructural bonding near engines.

HHHH. Surface Cleaning: Any method of cleaning outside of a degreaser, including, but not limited to, wipe cleaning and equipment flushing.

IIII. Temporary Protective Coating: A coating applied to an aerospace component to protect it from mechanical and environmental damage during manufacturing or shipping.

JJJJ. Thermal Control Coating: A coating formulated with specific thermal conductive or radiative properties to permit temperature control of the substrate.

KKKK. Topcoat: A coating applied over a primer for purposes such as appearance, identification, or protection.

LLLL. Touch-Up Operation: The application of Aerospace Materials to repair minor surface damage and imperfections after the main coating process.

MMMM. Transfer Efficiency: The ratio of the weight or volume of coating solids adhering to the part being coated to the weight or volume of coating solids used in the application process expressed as a percentage.

NNNN. Unicoat: A coating that is applied directly to an aerospace component for purposes of corrosion protection, environmental protection, and functional fluid resistance that is not subsequently topcoated. A unicoat is used in lieu of the application of a primer and a topcoat.

OOOO. Volatile Organic Compounds (VOCs): The definition contained in 40 CFR 51.100 shall apply, and is hereby incorporated by reference. In the event of any discrepancy between a definition contained in 40 CFR 51.100 and any definition specified above, the definition specified above shall control.

QQQQ. Waste Solvent Material: Any solvent which may contain dirt, oil, metal particles, sludge, or waste products; or wiping material containing VOCs including, but not limited to, paper, cloth, sponge, rag, or cotton swab used in organic solvent cleaning.

RRRR. Wet Fastener Installation Coating: A primer or sealant applied by dipping, brushing, or daubing to fasteners that are installed before the coating is cured.

SSSS. Wing Coating: A coating that is corrosion resistant and is resilient enough to withstand the flexing of wings.

IV. Exemptions

A. Jet engine or rocket engine flushing operations using any solvent other than trichloroethylene are exempt from this rule.

B. Coatings applied using non-refillable aerosol spray containers.

C. Except for the provisions of Section VI, VOC limits for solvents and strippers listed in Section V shall not apply to space vehicle manufacturing.

D. Except for the recordkeeping provisions of Sections VI.A.1 and VI.A.4, the requirements of Section V shall not apply to aerospace assembly and component coating facilities using not more than four (4) gallons of products containing VOCs per day. Solvent-containing materials used in operations subject to Rule 410.3, Organic Solvent Degreasing Operations shall not be included in this determination.

E. Except for the provisions of Section VI, Section V shall not apply to laboratories which apply coatings, solvents, and adhesives to test specimens for purpose of research, development, quality control, and testing for production-related operations. Any person claiming this exemption shall provide operational records, data, and calculations as determined by the APCO to be necessary to substantiate this claim.

F. Coatings that have been designated as "classified" by the Department of Defense or used on space vehicles are exempt from the VOC content limits of the following categories as listed in the Table of Standards:

1. Ablative Coating, Bearing Coating, Caulking and Smoothing Compounds, Chemical Agent-Resistant Coating, Electromagnetic Interference Coating, Intermediate Release Coating, Lacquer, Metalized Epoxy Coating, Mold Release, Part Marking Coating, Rocket Motor Nozzle Coating, Silicone Insulation Material, Specialized Function Coating, Thermal Control Coating, Epoxy Polyamide, and Wet Fastener Installation Coating;

2. The Fastener Sealant category is exempt from the 600 g/l VOC limit but must still comply with the 675 g/l VOC limit;

3. The Sealant (Extrudable/Rollable/Brushable) category is exempt from the 280 g/l VOC limit but must still comply with the 600 g/l VOC limit.

G. Provisions of Section V.A. shall not apply to:

1. Coatings or refillable aerosols with separate formulations that are used in volumes of less than fifty (50) gallons in any calendar year provided that the total of such formulations applied annually by a facility is less than 200 gallons;

2. Adhesives with separate formulations that are used in volumes of less than one half (0.5) gallon on any day or less than ten (10) gallons in any calendar year;

3. Touch-up coatings and stencil coatings; or

4. Rework operations performed on antique aerospace vehicles or associated components.

Any operator seeking to claim the exemption in Section IV.F shall notify the APCO in writing that substitute compliant coatings are not available.

H. The provisions of Section V.E. shall not apply to the application of coatings that contain less than 20 grams of VOC per liter of coating less water and exempt compounds.

V. Requirements

A. Aerospace Coatings and Adhesives: An operator shall not apply to any aerospace component, any coating, aerosol, or adhesive with a VOC content, less water and exempt compounds, as applied, in excess of the limits listed in the Table of Standards for Aerospace Component Products Containing VOCs.

TABLE OF STANDARDS
VOC CONTENT LIMITS FOR AEROSPACE COMPONENT COATING PRODUCTS
Content expressed in Grams per Liter
Less Water and Exempt Compounds

VOC Content Category	VOC Limit
I. PRIMERS	
1. General	350
2. Adhesive Bonding Primers	
a. Commercial Aircraft	250
b. Military Aircraft	805
3. Commercial Exterior Aerodynamic Structure Primer	650
4. Compatible Substrate Primer	780
5. Cryogenic Flexible Primer	645
6. Elevated-Temperature Skydrol-Resistant Commercial Primer	740
7. Flexible Primer	640
8. Low-Solids Corrosion Resistant Primer	350
9. Primer Compatible with Rain Erosion-Resistant Coating	850
II. COATINGS	
1. Ablative Coating	600
2. Adhesion Promoter Coating	850
3. Antichafe Coating	600

TABLE OF STANDARDS Continued

VOC Content Category	VOC Limit
4. Bearing Coating	620[1]
5. Chemical Agent-Resistant Coating	550[1]
6. Conformal Coating	750
7. Cryoprotective Coating	600
8. Electromagnetic/Radiation Effect Coating	800
9. Electromagnetic Interference (EMI) Coating	800[1]
10. Fire-Resistant (Interior) Coating	
a. Civilian	650
b. Military	800
c. Space	800
11. Flight-Test Coating	
a. Used on Missiles or Single Use Aircraft	420
b. All Other	840
12. Fuel-Tank Coating	
a. General	420
b. Rapid Cure	720
13. High-Temperature Coating	850
14. Impact-Resistant Coating	420
15. Intermediate Release Coating	750[1]
16. Lacquer Coating	830
17. Metallized Epoxy Coating	740[1]
18. Mold Release Coatings	780[1]
19. Optical Anti-Reflection Coating	700
20. Part Marking Coating	850[1]
21. Pretreatment Coating	780
22. Rain Erosion-Resistant Coating	800
23. Rocket Motor Nozzle Coating	660[1]
24. Scale Inhibitor Coating	880
25. Space-Vehicle Coatings, Other: does not include Electric Discharge and EMI Protection Coating or Fire-Resistant (Interior) Coating	1000
26. Specialized Function Coating	890[1]
27. Temporary Protective Coating	250
28. Thermal Control Coating	800[1]
29. Topcoat	
a. Clear	520
b. Epoxy Polyamide	660[1]
c. Other	420

30. Unicoat Coating (Self Priming Topcoats)	420

TABLE OF STANDARDS Continued

VOC Content Category	VOC Limit
31. Wet Fastener Installation Coating	675[1]
32. Wing Coating	750
33. Wire Coatings	
a. Electronic	420
b. Anti-Wicking	420
c. Pre-Bonding Etchant	420
d. Phosphate Ester Resistant Ink	925
III. ADHESIVES	
1. Commercial Interior Adhesive	760
2. Cyanoacrylate Adhesive	1020
3. Fuel-Tank Adhesive	620
4. Non-Structural Adhesive	250
5. Rocket Motor Bonding Adhesive	890
6. Rubber-Based Adhesive	850
7. Space Vehicle Adhesive	800
8. Structural Adhesive	
a. Autoclavable	50
b. High Temperature - Autoclavable	650
c. Non-Autoclavable	850
IV. SEALANTS	
1. Rollable, Brushable or Extrudable Sealant	280[2]
2. Fastener Sealant	675
3. Other	600
V. MASKANTS	
1. Bonding Maskant	1230
2. Critical Use and Line Sealer Maskant	750
3. Chemical Milling Maskant	
a. For use with Type I Etchant	250
b. For use with Type II Etchant	160
c. For Chemical Processing *Less water, Exempt Compounds and (PERC)	250*
4. Photolithographic Maskant	850
5. Seal Coat Maskant	1230

TABLE OF STANDARDS Continued

VOC Content Category	VOC Limit
VI. LUBRICANTS --	
1. Fastener Installation Lubricant (applied at time of Aircraft/component assembly)	
a. Solid-Film Lubricant	880
b. Dry Lubricative Material	675
2. Fastener Lubricative Coating (applied at time of Fastener Manufacture)	
a. Solid-Film Lubricant	250
b. Dry Lubricative Material	120
c. Barrier Coating	420
3. Non-Fastener Lubricative Coatings (applied at time of non-Fastener Manufacture)	
a. Solid-Film Lubricant	880
b. Dry Lubricative Materials	675
VII. OTHER	
1. Caulking and Smoothing Compound	850
2. Corrosion Prevention Compound System	710
3. Insulation Covering	740
4. Screen Print Ink	840
5. Silicone Insulation Material	850

1 Coatings that have been designated as "classified" by the Department of Defense or coatings that are used on space vehicles are exempt from these coating limits.

2 Coatings that have been designated as "classified" by the Department of Defense or coatings that are used on space vehicles are exempt from the 280 g/l limit, but must comply with a 600 g/l limit.

B. Evaporative Loss Minimization

1. Surface Cleaning: No operator shall use a solvent for surface cleaning, clean-up, or jet engine or rocket engine gas path cleaning or flushing not exempt under Section IV of this rule (excluding stripping coatings or cleaning coating application equipment) unless:

   a. The solvent contains less than 200 grams of VOC per liter (1.67 lb/gal) of material, as applied; or

   b. The VOC composite vapor pressure of the solvent is less than or equal to 45 mm Hg (0.87 psia) at a temperature of 68°F.

2. Coating Application Equipment Cleaning

   An operator shall not use VOC-containing materials to clean spray equipment used for the application of coatings, adhesives, or ink, unless one of the following methods is used:

   a. An enclosed system or equipment proven to be equally effective at controlling emissions is used for cleaning. The enclosed system must totally enclose spray guns, cups, nozzles, bowls, and other parts during washing, rinsing and draining procedures; be used according to the manufacturer's recommendations; and remain closed when not in use;

   b. Unatomized discharge of cleaning solvent into a waste container that is kept closed when not in use;

   c. Disassembled spray gun that is cleaned in a vat and kept closed when not in use; or

   d. Atomized spray into a waste container that is fitted with a device designed to capture atomized cleaning solvent emissions.

3. In lieu of compliance with Sections V.B.1. or V.B.2. an operator may control VOC emissions from surface cleaning operations or from cleaning coating application equipment with a VOC emission control system that meets the requirements of Section V.F.

C. Coating Strippers

1. No operator shall use or specify for use within the District a coating stripper unless it contains less than 300 grams of VOC per liter (2.5 lb/gal), as applied, or has a VOC composite vapor pressure of 9.5 mm Hg (0.18 psia) or less at 68°F.

2. In lieu of compliance with Section V.C.1, an operator may control emissions from coating stripper operations with a VOC emission control system that meets the requirements of Section V.F.

D. Storage and Disposal of VOC Containing Materials: An operator shall store or dispose of fresh or spent solvents, waste solvent cleaning materials such as cloth, paper, etc., coatings, adhesives, catalysts, and thinners in closed nonabsorbent and non-leaking containers. Storage containers shall remain closed at all times except when depositing or removing the contents or when empty.

E. Application Equipment Requirements: No operator shall apply any coating subject to the provisions of this rule unless one (1) of the following application methods is used:

1. Brush, dip, flow, or roll coating conducted in accordance with manufacturer's recommendations;

2. Electrostatic or Electrodeposition application conducted in accordance with manufacturer's recommendations;

3. HVLP spray equipment operated in accordance with manufacturer's recommendations:

   a. HVLP spray equipment manufactured prior to January 1, 1996, the end user shall demonstrate that the gun meets HVLP spray equipment standards. Satisfactory proof will be either in the form of manufacturer's published technical material or by a demonstration using a certified air pressure tip gauge, measuring the air atomizing pressure dynamically at the center of the air cap and at the air horns.

   b. A person shall not sell or offer for sale for use within the District any HVLP spray equipment without a permanent marking denoting the maximum inlet air pressure in psig at which the gun will operate within the parameters specified in Section III.TT.

4. Spray gun: If a spray gun is used, the end user must demonstrate that the gun meets the HVLP definition in Section III.TT. in design and use. A satisfactory demonstration must be based on the manufacturer's published technical material on the design of the gun and by a demonstration of the operation of the gun using an air pressure tip gauge from the manufacturer of the gun.

5. Any alternative coating application method which has been demonstrated to achieve at least 65 percent transfer efficiency or the equivalent efficiency of HVLP spray equipment and approved, in writing, by APCO.

8. In lieu of compliance with Sections V.E.1. through V.E.5., an operator may control VOC emissions from application equipment with a VOC emission control system that meets the requirements of Section V.F.

F. <u>VOC Emission Control System</u>

As an alternative to meeting the requirements of Sections V.A., V.B., V.C., or V.E., an operator may install a VOC emission control system provided that the VOC emission control system meets all of the following requirements:

1. The VOC emission control system shall be approved by the APCO.

2. The VOC emission control system shall comply with the requirements of Sections V.F.3. through V.F.5. during periods of emission-producing activities.

3. The VOC emission control system collection device shall have a control efficiency of at least 95 percent, by weight.

4. The VOC emission control system can demonstrate a capture efficiency of at least 90 percent by weight.

5. In no case shall compliance through the use of a VOC emission control system result in VOC emissions in excess of the VOC emissions which would result from compliance with applicable provisions of Sections V.A., V.B., V.C., or V.E.

6. The minimum required overall capture and control efficiency of an emission control system at which an equivalent or greater level of VOC reduction will be achieved shall be calculated by using the following equation:

$$CE = \left[1 - \left(\frac{VOC_{LWc}}{VOC_{LWn,Max}} x \frac{1-(VOC_{LWn,Max} / D_{n,Max})}{1-(VOC_{LWc} / D_c)} \right) \right] x\ 100$$

Where:

CE = Minimum Required Overall Capture and Control Efficiency, percent

VOC_{LWc} = VOC Limit, less water and exempt compounds

$VOC_{LWn,Max}$ = Maximum VOC content of noncompliant coating used in conjunction with a control device, less water and exempt compounds

$D_{n,Max}$ = Density of solvent, reducer, or thinner contained in the noncompliant coating, containing the maximum VOC content of the multi-component coating

D_c = Density of corresponding solvent, reducer, or thinner used in the compliant coating system.

G. Prohibition of Solicitation: No person shall solicit, specify, or require an operator to use any coating, solvent, spray equipment, or VOC emission control system that does not meet the limits or requirements of this rule.

H. Sell-Through/Existing Stock of Coatings: A coating manufactured prior to amendment date of this rule, that complied with the VOC Content limit(s) in effect at that time, may be sold, supplied, or offered for sale for 12 months after rule adoption date. Such a coating may be applied at any time, both before and after adoption date, provided manufacture Date-Code and VOC Content is clearly printed on coating container.

I. Specialized Military Coating Operations VOC Requirements: APCO may approve alternative VOC or vapor pressure limits for coatings, adhesives or solvents that are specified in specialized military Technical Orders, for which no viable substitutions are available. The owner/operator must submit a written request to the APCO, and present documentation and sufficient justification regarding the operation and materials.

VI. Administrative Requirements

A. Recordkeeping

1. An operator subject to the requirements of this rule shall have coating manufacturer's specifications, either listed on the coating container, product data sheet, or on Safety Data Sheet (SDS), available for review and shall maintain daily records which show the following information as applicable:

    a. Manufacturer name and type for each coating, solvent, thinner, reducer or stripper used;

    b. Mix ratio by volume of components added to the original material prior to application;

    c. Grams of VOC per liter of each coating, solvent, thinner, reducer, or stripper less water and exempt compounds, as applied;

    d. Volume and method of application of each coating, solvent, thinner, reducer, or stripper applied; and

    e. Vapor pressure of solvents used.

2. An operator shall maintain records to support that the following coatings have been specified for their intended application:

    a. Adhesion promoter;
    b. Antichafe coating;
    c. Electric/radiation effect;
    d. Fuel tank adhesive;
    e. High temperature coating;
    f. Impact resistant coating;
    g. Optical anti-reflective coating;
    h. Rain erosion resistant wing coating.

3. An operator using a VOC emission control system pursuant to Section V.F. as a means of complying with this Rule, shall maintain daily records of key system operating parameters and maintenance procedures, which will demonstrate continuous operation and compliance of the VOC emission control system during periods of emission-producing activities. Key system operating parameters are those necessary to ensure compliance with VOC limits. The parameters may include, but are not limited to, temperatures, pressures, and flow rates.

4. Records required by this Rule shall be retained for a minimum of five (5) years and made available on site during normal business hours to the APCO, ARB, or EPA upon request.

B. Test Methods

1. Coating and solvent VOC content shall be determined using EPA Method 24 or its constituent methods. The VOC content of coatings containing exempt halogenated VOCs shall be determined by using ARB Method 432, "Determination of Dichloromethane and 1,1,1- Trichloroethane in Paints and Coatings" (September 12, 1998). or SCAQMD Method 303 (Determination of Exempt Compounds).

2. The solid content of pretreatment coatings shall be determined using EPA Method 24. The acid content of pretreatment coatings shall be determined using ASTM Method D1613 06 (Standard Test for Acidity of Volatile Solvents and Chemical Intermediates used in Paint, Varnish, Lacquer and Related Products).

3. The test method for determining the fire resistance of an interior coating shall be Federal Aviation Administration-required Ohio State University Heat Release, Fire and Burn Tests.

4. The VOC composite vapor pressure of a blended solvent shall be determined by quantifying the amount of each organic compound in the blend using gas chromatographic analysis SCAQMD Test Method 308-91 "Quantitation of Compounds by Gas Chromatography" (February 1993) and by calculating the VOC composite vapor pressure of the solvent by summing the product of the vapor pressure of each pure component and its molar fraction. For the purpose of this calculation, the blend shall be assumed to be an ideal solution where Raoult's Law applies. The vapor pressure of each pure component shall be obtained from published reference manuals or handbooks.

5. VOC emissions from enclosed systems used to clean coating application equipment shall be determined by the manufacturer using the SCAQMD General Test Method for Determining Solvent Losses from Spray Gun Cleaning Systems.

6. The control efficiency of a VOC emission control system's control device(s) shall be determined using EPA Methods 2, 2A, 2C, or 2D for measuring flow rates and EPA Methods 25, 25A, or 25B for measuring the total gaseous organic concentrations at the inlet and outlet of the control device. EPA Method 18 or ARB Method 422, "Determination of Volatile Organic Compounds in Emissions from Stationary Sources" (September 12, 1990) shall be used to determine the emissions of exempt compounds.

7. The capture efficiency of a VOC emission control system's collection device(s) shall be determined according to EPA's "Guidelines for Determining Capture Efficiency," January 9, 1995 and 40 CFR 51, Appendix M, Methods 204-204F, as applicable, or any other method approved by EPA, ARB, or APCO.

8. When more than one test method or set of test methods are specified for any emissions testing, a violation of any test established in Section VI.B. shall constitute a violation of the Rule.

VII. Ozone Nonattainment Contingency Measures

On and after 60 days following the effective date of the EPA's final determination that one or both of the conditions described in Clean Air Act Sections 172(c)(9) or 182(c)(9) have occurred in eastern Kern County regarding the 2008 or 2015 8-hour Ozone National Ambient Air Quality Standard, the following contingency measures will become effective:

A. Section IV.G.1 of this Rule shall be revised as follows:

1. Coatings or refillable aerosols with separate formulations that are used in volumes of less than twenty (20) gallons in any calendar year provided that the total of such formulations applied annually by a facility is less than 50 gallons, and it can be demonstrated that complying coatings are not available. Coatings exempted under Sections IV.F.1 or IV.G.3 shall not be included in calculating the volume of coatings used under this exemption.

B. The VOC content limits from the Table of Standards for the specified coating categories will change as follows:

Coating Type	VOC Limit	
	Effective Before Contingency Trigger Date	Effective On and After Contingency Trigger Date
Commercial Exterior Aerodynamic Structure Primer	650	350
Compatible Substrate Primer	780	350
Cryogenic Flexible Primer	645	350
Elevated Temperature Skydrol Resistant Commercial Primer	740	350
Flexible Primer	640	350
Adhesion Promoter	850	250
Antichafe Coating	600	420
Chemical Agent Resistant Coating	550	500
Clear Topcoat	520	420
Conformal Coating	750	600
Electric/Radiation Effect Coating	800	600
Electrostatic Discharge & Electromagnetic Interference (EMI) Coating	800	612
Flight Test Coatings, All Other	840	600
High Temperature Coatings	850	720
Metallized Epoxy Coating	740	700
Mold Release Coating	780	762
Rain Erosion Resistant Coating	800	600
Wet Fastener Installation Coating	675	620
Wing Coatings	750	420
Adhesives, Structural Non-Autoclavable	850	250
Fastener Sealant	675	600
Bonding Maskant	1,230	600
Line Sealer Maskant	750	650

C. Section V.B.2 of this Rule shall be revised as follows:

An operator shall not use VOC-containing materials to clean spray equipment used for the application of coatings, adhesives, or ink, unless one of the following methods is used:

a. An enclosed system or equipment proven to be equally effective at controlling emissions is used for cleaning. The enclosed system must totally enclose spray guns, cups, nozzles, bowls, and other parts during washing, rinsing and draining procedures; be used according to the manufacturer's recommendations; and remain closed when not in use;

b. Unatomized discharge of cleaning solvent containing not more than 25 grams of VOC per liter (g/L) of solvent or having a VOC composite partial pressure less than or equal to 5 mm Hg @ 68 ^{o}F into a waste container that is kept closed when not in use;

c. Disassembled spray gun that is cleaned in a vat with solvent containing not more than 25 g/L of solvent or having a VOC composite partial pressure less than or equal to 5 mm Hg @ 68 ^{o}F and kept closed when not in use; or

d. Atomized spray of solvent containing not more than containing not more than 25 g/L of solvent or having a VOC composite partial pressure less than or equal to 5 mm Hg @ 68 ^{o}F into a waste container that is fitted with a device designed to capture atomized cleaning solvent emissions.

D. Owner/operator of an existing aerospace surface coating operation subject to this Rule and is not served by a VOC emission control device shall be subject to the following compliance schedule:

1. Submission of an Emission Control Plan to the District, including the following information:

   a. List of each coating operation, Permit to Operate VOC emission limit for each operation, and highest annual VOC emissions from each operation from the preceding three calendar years

   b. Description of measures to be taken to reduce VOC emissions from operations with permitted or actual emissions greater than or equal to 3.50 tons per year (i.e. voluntary reduction of permit VOC emission limit. installation of VOC emission controls, etc.)

2. Within 180 days of submitting Emission Control Plan, owner/operator of an aerospace coating operation with permitted or actual emissions greater than or equal to 3.50 tons per year shall satisfy one of the following:

   a. Submit a complete application to modify the Permit to Operate to reduce uncontrolled VOC emissions from each coating operation to less than 3.50 tons per year, or

   b. Submit a complete application for an Authority to Construct VOC emission control equipment meeting the criteria specified in Section V.F.

E. Owner/operator of a new aerospace surface coating operation with a potential to emit greater than or equal to 3.50 tons per year of uncontrolled VOC shall include a proposal for VOC control equipment meeting the criteria specified in Section V.F with their complete Authority to Construct application.

Remainder of Page Intentionally Left Blank

APPENDIX B:

PROPOSED REVISION RULE 410.8

AEROSPACE ASSEMBLY AND COATING OPERATIONS

STRIKEOUT UNDERLINE

RULE 410.8 Aerospace Assembly and Coating Operations - Adopted 3/13/2014 (Amended XX/XX/2022)

I. Purpose

The purpose of this rule is to limit volatile organic compound (VOC) emissions from aerospace coatings and adhesives, and from cleaning, stripping, storing, and disposal of organic solvents and waste solvent materials associated with the use of aerospace coatings and adhesives. This rule also provides administrative requirements for recording and measuring VOC emissions.

II. Applicability

Except as provided in Section IV, the provisions of this rule are applicable to the manufacturing, assembling, coating, masking, bonding, paint stripping, surface cleaning, service, and maintenance of aerospace components, and the cleanup of equipment, storage, and disposal of solvents and waste solvent materials associated with these operations.

III. Definitions

A. Ablative Coating: A coating that chars when exposed to open flame or extreme temperatures, as would occur during the failure of an engine casing or during aerodynamic heating. The ablative char surface serves as an insulative barrier, protecting adjacent components from heat or open flame.

B. Adhesion Promoter: A coating applied to a substrate in a monomolecular thickness to promote wetting and form a chemical bond with the subsequently applied material.

C. Adhesive: A substance that is used to bond one surface to another.

D. Adhesive Bonding Primer: A coating applied in a very thin film to aerospace adhesive bond detail components for corrosion inhibition and adhesion.

E. Aerosol Coating: A mixture of pigments, resins, and liquid and gaseous solvents and propellants packaged in a disposable container for hand-held application.

F. Aerospace Component: Any raw material, partial or completed fabricated part, assembly of parts, or completed unit of any aircraft, helicopter, missile, or space vehicle, including integral equipment such as models, mock-ups, prototypes, molds, jigs, tooling, hardware jackets, and test coupons.

G. Aerospace Material: Any coating, primer, adhesive, sealant, maskant, lubricant, stripper or hand-wipe cleaning or clean-up solvent used during the manufacturing, assembly, refinishing, maintenance or service of an aerospace component. Preservative oils and compounds, form release agents not containing solids, greases, and waxes are not aerospace materials for the purpose of this rule.

H. Antichafe Coating: A coating applied to areas of moving aerospace components which may rub during normal operation.

I. Antique Aerospace Vehicle or Component: An aircraft or component thereof that was built at least 30 years ago. An antique aerospace vehicle would not routinely be in commercial or military service in the capacity for which it was designed.

J. Anti-Wicking Wire Coating: The outer coating of a wire which prevents fluid wicking into the insulation of the wire.

K. Air Pollution Control Officer (APCO): Eastern Kern Air Pollution Control District Air Pollution Control Officer, or his designee.

L. ARB: California Air Resources Board.

M. ASTM: American Society for Testing and Materials.

N. Barrier Coating: A coating applied in a thin film to fasteners to inhibit dissimilar metal corrosion and to prevent galling.

O. Bearing Coating: A coating applied to an antifriction bearing, a bearing housing, or the area adjacent to such a bearing in order to facilitate bearing function or to protect the base material from excessive wear. A material shall not be classified as a bearing coating if it can also be classified as a dry lubricative material or a solid film lubricant.

P. Brush Coating: Manual application of coatings using brushes and rollers.

Q. Caulking and Smoothing Compounds: Semi-solid materials which are applied by hand application methods and are used to aerodynamically smooth exterior vehicle surfaces or fill cavities such as bolt hole accesses. A material shall not be classified as a caulking and smoothing compound if it can also be classified as a sealant.

R. Chemical Agent-Resistant Coating (CARC): An exterior topcoat designed to withstand exposure to chemical warfare agents or the decontaminants used on these agents.

S. Chemical Milling: The removal of metal by chemical action of acids or alkalis.

T. Clear Topcoat: A clear or semi-transparent coating applied over a primer for purposes such as appearance, identification, or protection.

U. Coating: A material applied onto or impregnated into a substrate for protective, decorative, or functional purposes. Such materials include, but are not limited to, paints, varnishes, sealers, and stains excluding preservative oils and compounds, form release agents not containing solids, greases, and waxes.

V. Commercial Exterior Aerodynamic Structure Primer: A primer utilized for the purpose of extended corrosion protection, which is only used on the exterior of passenger and cargo doors, supporting door structures, aerodynamic components, and structures of commercial aircraft which protrude from the fuselage, such as wings and attached components, control surfaces, horizontal stabilizer, vertical fins, wing-to-body fairings, antennae, landing gear and landing gear doors.

W. Composite Partial Pressure: The sum of the partial pressures of the VOC compounds in a solvent. The VOC composite partial pressure is calculated as follows:

$$PP_c = \frac{\sum_{i=1}^{n} \frac{(W_i)(VP_i)}{MW_i}}{\frac{W_w}{MW_w} + \sum_{e=1}^{k} \frac{W_e}{MW_e} + \sum_{i=1}^{n} \frac{W_i}{MW_i}}$$

Where:

W_i = Weight of the "i"th VOC compound, in grams
W_w = Weight of water, in grams
W_e = Weight of exempt compound, in grams
MW_i = Molecular weight of the "i"th VOC compound, in grams per gram-mole
MW_w = Molecular weight of water, in grams per gram-mole
MW_e = Molecular weight of the "e"th exempt compound, in grams per gram-mole
PP_c = VOC composite partial pressure at 20°C (68°F), in mm Hg
VP_i = Vapor pressure of the "i"th VOC compound at 20°C (68°F), in mm Hg

X. Conformal Coating: A coating applied to electrical conductors and circuit boards to protect them against electrical discharge damage and/or corrosion.

Y. Decorative Laminate Primer: An adhesive bonding primer which is applied to a substrate to enhance adhesion between the decorative laminate and the subsequently applied substrate, and is cured at a maximum temperature of 250°F.

Z. Dip Coating: The process in which a substrate is immersed in a solution (or dispersion) containing the coating and then withdrawn.

AA. Dry Lubricative Coating: A coating consisting of lauric acid, cetyl alcohol, waxes, or other non-cross linked or resin-bound materials which act as a dry lubricant or protective coat.

BB. Electric-Effect Coating: An electrically-conductive coating.

CC. Electrodeposition: A dip coating application method where the paint solids are given an electrical charge which is then attracted to a substrate.

DD. Electromagnetic Interference (EMI) Coating: A coating applied to space vehicles, missiles, aircraft radomes, and helicopter blades to disperse static energy or reduce electromagnetic interference.

EE. Electronic Wire Coating: The outer electrical insulation coating applied to tape insulation of a wire specifically formulated to smooth and fill edges.

FF. Electrostatic Application: A sufficient charging or atomized paint droplets to cause deposition principally by electrostatic attraction. This application shall be operated at a minimum 60 KV power.

GG. EPA: United States Environmental Protection Agency.

HH. Epoxy Based Fuel Tank Coating: A coating which contains epoxy resin that is applied to integral fuel tank components of aircraft to protect the fuel tank from corrosion and the by-products of bacterial growth.

II. Epoxy Polyamide: A tough chemically resistant polyamide-cured epoxy coating that provides long-term protection for alloys exposed to hot corrosive environments.

JJ. Fastener Sealant: A sealant applied to a device used to join two or more parts together.

KK. Fire Resistant Coating - Civilian (interior): A cabin interior coating that passes Federal Aviation Administration standards using the Ohio State University Heat Release, Fire and Burn Tests.

LL. Flight Test Coating: A coating applied to an aircraft prior to flight testing to protect the aircraft from corrosion and to provide required marking during flight test evaluation.

MM. Flow Coating: A coating application system with no air supplied to the nozzle and where paint flows over the part and the excess coating drains back into a collection system.

NN. Fuel Tank Adhesive: An adhesive used to bond components continuously exposed to fuel and which must be compatible with and used with fuel tank coatings.

OO. Fuel Tank Coating: A coating applied to the interior of a fuel tank or areas of an aircraft that are continuously wetted by fuel to protect it from corrosion and/or bacterial growth.

PP. Grams of VOC per Liter of Coating, Less Water and Exempt Compounds: The weight of VOC content per combined volume of VOC and coating solids and can be calculated by the following equation:

$$\text{Grams of VOC per liter of coating, less water and exempt compounds} = \frac{Ws - Ww - Wec}{Vm - Vw - Vec}$$

Where:

Ws	=	weight of volatile compounds (grams)
Ww	=	weight of water (grams)
Wec	=	weight of exempt compounds (grams)
Vm	=	volume of material (liters)
Vw	=	volume of water (liters)
Vec	=	volume of exempt compounds (liters)

QQ. Grams of VOC per Liter of Material: The weight of VOC per volume of material and can be calculated by the following equation:

$$\text{Grams of VOC per liter of material} = \frac{Ws - Ww - Wec}{Vm}$$

Where:
Ws = weight of volatile compounds (grams)
Ww = weight of water (grams)
Wec = weight of exempt compounds (grams)
Vm = volume of material (liters)

RR. Hand Application Methods: The application of coatings, sealants, or adhesives by non-mechanical hand-held equipment including but not limited to paint brushes, hand rollers, caulking guns, trowels, spatulas, syringe daubers, non-refillable aerosol cans, rags, and sponges.

SS. High Temperature Coating: A coating that is certified to withstand temperatures of more than 350°F.

TT. High-Volume, Low-Pressure (HVLP) Spray Equipment: Spray equipment permanently labeled as such and which is designed and operated between 0.1 and 10 pounds per square inch, gauge, (psig) air atomizing pressure measured dynamically at the center of the air cap and at the air horns and with liquid supply pressure less than 50 psig.

UU. Impact Resistant Coating: A flexible coating that protects aerospace components, such as aircraft landing gear, landing gear compartments, and other surfaces subject to abrasive impacts from runway debris.

VV. Intermediate Release Coating: A thin coating applied beneath topcoats to assist in removing the topcoat in depainting operations and generally to allow the use of less hazardous depainting methods.

WW. Lacquer: A clear or pigmented coating formulated with a nitrocellulose or synthetic resin to dry by evaporation without a chemical reaction. Lacquers are resoluble in their original solvent.

XX. Liquid Leak: A visible solvent leak from a container at a rate of more than three drops per minute or a visible liquid mist.

YY. Long Term Adhesive Bonding Primer (Metal to Structural Core Bonding): An adhesive bonding primer that has met the aircraft manufacturers' required performance characteristics following 6000 hours testing. Used for metal to structural core bonding and with an adhesive that is specified to be cured at 350°F ± 10°F.

ZZ. Maskant for Chemical Milling: A coating applied directly to an aerospace component to protect surface areas when chemical milling such component.

AAA. Metalizing Epoxy Coating: A coating that contains relatively large quantities of metallic pigmentation for appearance and/or added protection.

BBB. Mold Release: A coating applied to a mold surface to prevent the molded piece from sticking to the mold as it is removed.

CCC. Non-Absorbent Container: A container made of non-porous material that does not allow the migration of solvents through it.

DDD. Non-Leaking Container: A container without liquid leak.

EEE. Non-Structural Adhesive: An adhesive that bonds non-load carrying aircraft component in non-critical applications.

FFF. Normal Business Hours: Monday through Friday, 8:00 am to 5:00 pm.

GGG. Optical Anti-Reflective Coating: A coating with a low reflectance in the infrared and visible wavelength range and is used for anti-reflection on or near optical and laser hardware.

HHH. Organic Solvent: The same as "Solvent."

III. Organic Solvent Cleaning: As defined in Rule 410.3, Organic Solvent Degreasing Operations.

JJJ. Part Marking Coating: Coatings or inks used to make identifying markings on materials, components, or assemblies. These markings may be permanent or temporary.

KKK. Phosphate Ester Resistant Wire Ink Coating: A coating that is used for surface identification, mark on aerospace wire or cable, and inhibits the corrosion caused by contact with phosphate ester type hydraulic fluids.

LLL. Pretreatment Coating: A coating which contains no more than 12 percent solids by weight and at least one-half (0.5) percent acid by weight and is applied directly to metal surfaces to provide surface etching, corrosion resistance, adhesion, and ease of stripping.

MMM. Primer: A coating applied directly to an aerospace component for purposes of corrosion prevention, protection from the environment, functional fluid resistance, and adhesion of subsequent coatings, adhesives, or sealants.

NNN. Radiation-Effect Coating: A coating which helps in the prevention of radar detection.

OOO. Rain Erosion Resistant Coating: A coating that protects leading edges, flaps, stabilizers, and engine inlet lips against erosion caused by rain during flight.

PPP. Remanufactured Aircraft Part: An aerospace component that is built as a spare part or replacement part subject to an existing commercial aircraft specification.

QQQ. Rocket Motor Nozzle Coating: A catalyzed epoxy coating system used in elevated temperature applications on rocket motor nozzles.

RRR. Roll Coating: Application of coatings from a paint trough to a flat surface by mechanical series of rollers.

SSS. Scale Inhibitor: A coating that is applied to the surface of a part prior to thermal processing to inhibit the formation of tenacious scale.

TTT. SCAQMD: South Coast Air Quality Management District.

UUU. Screen Print Ink: An ink used in screen printing processes during fabrication of decorative laminates and decals.

VVV. Sealant: A viscous semisolid material that is applied with a syringe, caulking gun, or spatula to fill voids in order to seal out water, fuel, other liquids and solids, and in some cases air movement.

WWW. Silicone Insulation Material: An insulating material applied to exterior metal surfaces for protection from high temperatures caused by atmospheric friction or engine exhaust. These materials differ from ablative coatings in that they are not "sacrificial".

XXX. Short Term Adhesive Bonding Primer: An adhesive bonding primer that has met the manufacturers' required performance characteristics following 1000 hours testing. Used for metal to metal and metal to structural core bonding with an adhesive which is specified to be cured at a temperature of 350°F ± 10°F.

YYY. Solid Film Lubricant: A very thin coating consisting of a binder system containing as its chief pigment material one (1) or more of the following: molybdenum disulfide, graphite, polytetrafluoroethylene (PTFE) or other solids that act as a dry lubricant between closely-fitting surfaces.

ZZZ. Solvent: As defined in Rule 410.3, Organic Solvent Degreasing Operations.

AAAA. Sonic and Acoustic Applications: The use of aerospace materials on aerospace components that are subject to mechanical vibration or sound wave cavitation.

BBBB. Space Vehicle Coating: A coating applied to a vehicle designed to travel and operate beyond earth's atmosphere.

CCCC. Specialty Coating: A coating that, even though it meets the definition of a primer, topcoat, or self-priming topcoat, has additional performance criteria beyond those of primers, topcoats, and self-priming topcoats for specific applications. These performance criteria may include, but are not limited to, temperature or fire resistance, substrate compatibility, antireflection, temporary protection or marking, sealing, adhesively joining substrates, or enhanced corrosion protection.

DDDD. Specialized Function Coating: A coating that fulfills specific engineering requirements that are limited in application and characterized by low volume usage. This category excludes coatings covered in other Specialty Coating categories.

EEEE. Stripper: A volatile liquid applied to remove a maskant for chemical processing, cured or dried paint, cured or dried paint residue, or temporary protective coating.

FFFF. Structural Adhesive - Autoclavable: An adhesive used to bond load-carrying aircraft components and is cured by heat and pressure in an autoclave.

GGGG. Structural Adhesive - Nonautoclavable: An adhesive cured under ambient conditions and is used to bond load-carrying aircraft components or other critical functions, such as nonstructural bonding near engines.

HHHH. Surface Cleaning: Any method of cleaning outside of a degreaser, including, but not limited to, wipe cleaning and equipment flushing.

IIII. Temporary Protective Coating: A coating applied to an aerospace component to protect it from mechanical and environmental damage during manufacturing or shipping.

JJJJ. Thermal Control Coating: A coating formulated with specific thermal conductive or radiative properties to permit temperature control of the substrate.

KKKK. Topcoat: A coating applied over a primer for purposes such as appearance, identification, or protection.

LLLL. Touch-Up Operation: The application of Aerospace Materials to repair minor surface damage and imperfections after the main coating process.

MMMM. Transfer Efficiency: The ratio of the weight or volume of coating solids adhering to the part being coated to the weight or volume of coating solids used in the application process expressed as a percentage.

NNNN. Unicoat: A coating that is applied directly to an aerospace component for purposes of corrosion protection, environmental protection, and functional fluid resistance that is not subsequently topcoated. A unicoat is used in lieu of the application of a primer and a topcoat.

OOOO. Volatile Organic Compounds (VOCs): ~~As defined in Rule 102, Definitions.~~ The definition contained in 40 CFR 51.100 shall apply, and is hereby incorporated by reference. In the event of any discrepancy between a definition contained in 40 CFR 51.100 and any definition specified above, the definition specified above shall control.

QQQQ. Waste Solvent Material: Any solvent which may contain dirt, oil, metal particles, sludge, or waste products; or wiping material containing VOCs including, but not limited to, paper, cloth, sponge, rag, or cotton swab used in organic solvent cleaning.

RRRR. Wet Fastener Installation Coating: A primer or sealant applied by dipping, brushing, or daubing to fasteners that are installed before the coating is cured.

SSSS. Wing Coating: A coating that is corrosion resistant and is resilient enough to withstand the flexing of wings.

IV. Exemptions

A. Jet engine or rocket engine flushing operations using any solvent other than trichloroethylene are exempt from this rule.

B. Coatings applied using non-refillable aerosol spray containers.

C. Except for the provisions of Section VI, VOC limits for solvents and strippers listed in Section V shall not apply to space vehicle manufacturing.

D. Except for the recordkeeping provisions of Sections VI.A.1 and VI.A.4, the requirements of Section V shall not apply to aerospace assembly and component coating facilities using not more than four (4) gallons of products containing VOCs per day. Solvent-containing materials used in operations subject to Rule 410.3, Organic Solvent Degreasing Operations shall not be included in this determination.

E. Except for the provisions of Section VI, Section V shall not apply to laboratories which apply coatings, solvents, and adhesives to test specimens for purpose of research, development, quality control, and testing for production-related operations. Any person claiming this exemption shall provide operational records, data, and calculations as determined by the APCO to be necessary to substantiate this claim.

F. Coatings that have been designated as "classified" by the Department of Defense or used on space vehicles are exempt from the VOC content limits of the following categories as listed in the Table of Standards:

1. Ablative Coating, Bearing Coating, Caulking and Smoothing Compounds, Chemical Agent-Resistant Coating, Electromagnetic Interference Coating, Intermediate Release Coating, Lacquer, Metalized Epoxy Coating, Mold Release, Part Marking Coating, Rocket Motor Nozzle Coating, Silicone Insulation Material, Specialized Function Coating, Thermal Control Coating, Epoxy Polyamide, and Wet Fastener Installation Coating;

2. The Fastener Sealant category is exempt from the 600 g/l VOC limit but must still comply with the 675 g/l VOC limit;

3. The Sealant (Extrudable/Rollable/Brushable) category is exempt from the 280 g/l VOC limit but must still comply with the 600 g/l VOC limit.

G. Provisions of Section V.A. shall not apply to:

1. Coatings or refillable aerosols with separate formulations that are used in volumes of less than fifty (50) gallons in any calendar year provided that the total of such formulations applied annually by a facility is less than 200 gallons;

2. Adhesives with separate formulations that are used in volumes of less than one half (0.5) gallon on any day or less than ten (10) gallons in any calendar year;

3. Touch-up coatings and stencil coatings; or

4. Rework operations performed on antique aerospace vehicles or associated components.

Any operator seeking to claim the exemption in Section IV.F shall notify the APCO in writing that substitute compliant coatings are not available.

H. The provisions of Section V.E. shall not apply to the application of coatings that contain less than 20 grams of VOC per liter of coating less water and exempt compounds.

V. Requirements

A. Aerospace Coatings and Adhesives: An operator shall not apply to any aerospace component, any coating, aerosol, or adhesive with a VOC content, less water and exempt compounds, as applied, in excess of the limits listed in the Table of Standards for Aerospace Component Products Containing VOCs.

TABLE OF STANDARDS
VOC CONTENT LIMITS FOR AEROSPACE COMPONENT COATING PRODUCTS
Content expressed in Grams per Liter
Less Water and Exempt Compounds

VOC Content Category	VOC Limit
I. PRIMERS	
1. General	350
2. Adhesive Bonding Primers	
a. Commercial Aircraft	250
b. Military Aircraft	805
3. Commercial Exterior Aerodynamic Structure Primer	650
4. Compatible Substrate Primer	780
5. Cryogenic Flexible Primer	645
6. Elevated-Temperature Skydrol-Resistant Commercial Primer	740
7. Flexible Primer	640
8. Low-Solids Corrosion Resistant Primer	350
9. Primer Compatible with Rain Erosion-Resistant Coating	850
II. COATINGS	
1. Ablative Coating	600
2. Adhesion Promoter Coating	850
3. Antichafe Coating	600

TABLE OF STANDARDS Continued

VOC Content Category	VOC Limit
4. Bearing Coating	620[1]
5. Chemical Agent-Resistant Coating	550[1]
6. Conformal Coating	750
7. Cryoprotective Coating	600
8. Electr~~ic~~omagnetic/Radiation Effect Coating	800
9. Electromagnetic Interference (EMI) Coating	800[1]
10. Fire-Resistant (Interior) Coating	
a. Civilian	650
b. Military	800
c. Space	800
11. Flight-Test Coating	
a. Used on Missiles or Single Use Aircraft	420
b. All Other	840
12. Fuel-Tank Coating	
a. General	420
b. Rapid Cure	720
13. High-Temperature Coating	850
14. Impact-Resistant Coating	420
15. Intermediate Release Coating	750[1]
16. Lacquer Coating	830
17. Metallized Epoxy Coating	740[1]
18. Mold Release Coatings	780[1]
19. Optical Anti-Reflection Coating	700
20. Part Marking Coating	850[1]
21. Pretreatment Coating	780
22. Rain Erosion-Resistant Coating	800
23. Rocket Motor Nozzle Coating	660[1]
24. Scale Inhibitor Coating	880
25. Space-Vehicle Coatings, Other: does not include Electric Discharge and EMI Protection Coating or Fire-Resistant (Interior) Coating	1000
26. Specialized Function Coating	890[1]
27. Temporary Protective Coating	250
28. Thermal Control Coating	800[1]
29. Topcoat	
a. Clear	520
b. Epoxy Polyamide	660[1]
c. Other	420

30. Unicoat Coating (Self Priming Topcoats)	420

TABLE OF STANDARDS Continued

VOC Content Category	VOC Limit
31. Wet Fastener Installation Coating	675[1]
32. Wing Coating	750
33. Wire Coatings	
a. Electronic	420
b. Anti-Wicking	420
c. Pre-Bonding Etchant	420
d. Phosphate Ester Resistant Ink	925
III. ADHESIVES	
1. Commercial Interior Adhesive	760
2. Cyanoacrylate Adhesive	1020
3. Fuel-Tank Adhesive	620
4. Non-Structural Adhesive	250
5. Rocket Motor Bonding Adhesive	890
6. Rubber-Based Adhesive	850
7. Space Vehicle Adhesive	800
8. Structural Adhesive	
a. Autoclavable	50
b. High Temperature - Autoclavable	650
c. Non-Autoclavable	850
IV. SEALANTS	
1. Rollable, Brushable or Extrudable Sealant	280[2]
2. Fastener Sealant	675
3. Other	600
V. MASKANTS	
1. Bonding Maskant	1230
2. Critical Use and Line Sealer Maskant	750
3. Chemical Milling Maskant	
a. For use with Type I Etchant	250
b. For use with Type II Etchant	160
c. For Chemical Processing *Less water, Exempt Compounds and (PERC)	250*
4. Photolithographic Maskant	850
5. Seal Coat Maskant	1230

TABLE OF STANDARDS Continued

VOC Content Category	VOC Limit
VI. LUBRICANTS --	
1. Fastener Installation Lubricant (applied at time of Aircraft/component assembly)	
a. Solid-Film Lubricant	880
b. Dry Lubricative Material	675
2. Fastener Lubricative Coating (applied at time of Fastener Manufacture)	
a. Solid-Film Lubricant	250
b. Dry Lubricative Material	120
c. Barrier Coating	420
3. Non-Fastener Lubricative Coatings (applied at time of non-Fastener Manufacture)	
a. Solid-Film Lubricant	880
b. Dry Lubricative Materials	675
VII. OTHER	
1. Caulking and Smoothing Compound	850
2. Corrosion Prevention Compound System	710
3. Insulation Covering	740
4. Screen Print Ink	840
5. Silicone Insulation Material	850

1 Coatings that have been designated as "classified" by the Department of Defense or coatings that are used on space vehicles are exempt from these coating limits.

2 Coatings that have been designated as "classified" by the Department of Defense or coatings that are used on space vehicles are exempt from the 280 g/l limit, but must comply with a 600 g/l limit.

B. Evaporative Loss Minimization

1. Surface Cleaning: No operator shall use a solvent for surface cleaning, clean-up, or jet engine or rocket engine gas path cleaning or flushing. N not exempt under Section IV of this rule, (excluding stripping coatings or cleaning coating application equipment), unless:

   a. The solvent contains less than 200 grams of VOC per liter (1.67 lb/gal) of material, as applied; or

   b. The VOC composite vapor pressure of the solvent is less than or equal to 45 mm Hg (0.87 psia) at a temperature of 68°F.

2. Coating Application Equipment Cleaning

An operator shall not use VOC-containing materials to clean spray equipment used for the application of coatings, adhesives, or ink, unless one of the following methods is used:

a. An enclosed system or equipment proven to be equally effective at controlling emissions is used for cleaning. The enclosed system must totally enclose spray guns, cups, nozzles, bowls, and other parts during washing, rinsing and draining procedures; be used according to the manufacturer's recommendations; and remain closed when not in use;

b. Unatomized discharge of cleaning solvent into a waste container that is kept closed when not in use;

c. Disassembled spray gun that is cleaned in a vat and kept closed when not in use; or

d. Atomized spray into a waste container that is fitted with a device designed to capture atomized cleaning solvent emissions.

3. In lieu of compliance with Sections V.B.1. or V.B.2. an operator may control VOC emissions from surface cleaning operations or from cleaning coating application equipment with a VOC emission control system that meets the requirements of Section V.F.

C. Coating Strippers

1. No operator shall use or specify for use within the District a coating stripper unless it contains less than 300 grams of VOC per liter (2.5 lb/gal), as applied, or has a VOC composite vapor pressure of 9.5 mm Hg (0.18 psia) or less at 68°F.

2. In lieu of compliance with Section V.C.1, an operator may control emissions from coating stripper operations with a VOC emission control system that meets the requirements of Section V.F.

D. Storage and Disposal of VOC Containing Materials: An operator shall store or dispose of fresh or spent solvents, waste solvent cleaning materials such as cloth, paper, etc., coatings, adhesives, catalysts, and thinners in closed nonabsorbent and non-leaking containers. Storage containers shall remain closed at all times except when depositing or removing the contents or when empty.

E. Application Equipment Requirements: No operator shall apply any coating subject to the provisions of this rule unless one (1) of the following application methods is used:

1. Brush, dip, flow, or roll coating conducted in accordance with manufacturer's recommendations;

2. Electrostatic or Electrodeposition application conducted in accordance with manufacturer's recommendations;

3. HVLP spray equipment operated in accordance with manufacturer's recommendations:

   a. HVLP spray equipment manufactured prior to January 1, 1996, the end user shall demonstrate that the gun meets HVLP spray equipment standards. Satisfactory proof will be either in the form of manufacturer's published technical material or by a demonstration using a certified air pressure tip gauge, measuring the air atomizing pressure dynamically at the center of the air cap and at the air horns.

   b. A person shall not sell or offer for sale for use within the District any HVLP spray equipment without a permanent marking denoting the maximum inlet air pressure in psig at which the gun will operate within the parameters specified in Section III.TT.

4. Spray gun: If a spray gun is used, the end user must demonstrate that the gun meets the HVLP definition in Section III.TT. in design and use. A satisfactory demonstration must be based on the manufacturer's published technical material on the design of the gun and by a demonstration of the operation of the gun using an air pressure tip gauge from the manufacturer of the gun.

5. Any alternative coating application method which has been demonstrated to achieve at least 65 percent transfer efficiency or the equivalent efficiency of HVLP spray equipment and approved, in writing, by APCO.

8. In lieu of compliance with Sections V.E.1. through V.E.5., an operator may control VOC emissions from application equipment with a VOC emission control system that meets the requirements of Section V.F.

F. VOC Emission Control System

As an alternative to meeting the requirements of Sections V.A., V.B., V.C., or V.E., an operator may install a VOC emission control system provided that the VOC emission control system meets all of the following requirements:

1. The VOC emission control system shall be approved by the APCO.

2. The VOC emission control system shall comply with the requirements of Sections V.F.3. through V.F.5. during periods of emission-producing activities.

3. The VOC emission control system collection device shall have a control efficiency of at least 95 percent, by weight.

4. The VOC emission control system can demonstrate a capture efficiency of at least 90 percent by weight.

5. In no case shall compliance through the use of a VOC emission control system result in VOC emissions in excess of the VOC emissions which would result from compliance with applicable provisions of Sections V.A., V.B., V.C., or V.E.

6. The minimum required overall capture and control efficiency of an emission control system at which an equivalent or greater level of VOC reduction will be achieved shall be calculated by using the following equation:

$$CE = \left[1 - \left(\frac{VOC_{LWc}}{VOC_{LWn,Max}} x \frac{1-(VOC_{LWn,Max} / D_{n,Max})}{1-(VOC_{LWc} / D_c)} \right) \right] x\ 100$$

Where:

CE = Minimum Required Overall Capture and Control Efficiency, percent

VOC_{LWc} = VOC Limit, less water and exempt compounds

$VOC_{LWn,Max}$ = Maximum VOC content of noncompliant coating used in conjunction with a control device, less water and exempt compounds

$D_{n,Max}$ = Density of solvent, reducer, or thinner contained in the noncompliant coating, containing the maximum VOC content of the multi-component coating

D_c = Density of corresponding solvent, reducer, or thinner used in the compliant coating system.

G. Prohibition of Solicitation: No person shall solicit, specify, or require an operator to use any coating, solvent, spray equipment, or VOC emission control system that does not meet the limits or requirements of this rule.

H. Sell-Through/Existing Stock of Coatings: A coating manufactured prior to amendment date of this rule, that complied with the VOC Content limit(s) in effect at that time, may be sold, supplied, or offered for sale for 12 months after rule adoption date. Such a coating may be applied at any time, both before and after adoption date, provided manufacture Date-Code and VOC Content is clearly printed on coating container.

I. Specialized Military Coating Operations VOC Requirements: APCO may approve alternative VOC or vapor pressure limits for coatings, adhesives or solvents that are specified in specialized military Technical Orders, for which no viable substitutions are available. The owner/operator must submit a written request to the APCO, and present documentation and sufficient justification regarding the operation and materials.

VI. Administrative Requirements

A. Recordkeeping

1. An operator subject to the requirements of this rule shall have coating manufacturer's specifications, either listed on the coating container, product data sheet, or on Safety Data Sheet (SDS), available for review and shall maintain daily records which show the following information as applicable:

    a. Manufacturer name and type for each coating, solvent, thinner, reducer or stripper used;

    b. Mix ratio by volume of components added to the original material prior to application;

    c. Grams of VOC per liter of each coating, solvent, thinner, reducer, or stripper less water and exempt compounds, as applied;

    d. Volume and method of application of each coating, solvent, thinner, reducer, or stripper applied; and

    e. Vapor pressure of solvents used.

2. An operator shall maintain records to support that the following coatings have been specified for their intended application:

    a. Adhesion promoter;
    b. Antichafe coating;
    c. Electric/radiation effect;
    d. Fuel tank adhesive;
    e. High temperature coating;
    f. Impact resistant coating;
    g. Optical anti-reflective coating;
    h. Rain erosion resistant wing coating.

3. An operator using a VOC emission control system pursuant to Section V.F. as a means of complying with this Rule, shall maintain daily records of key system operating parameters and maintenance procedures, which will demonstrate continuous operation and compliance of the VOC emission control system during periods of emission-producing activities. Key system operating parameters are those necessary to ensure compliance with VOC limits. The parameters may include, but are not limited to, temperatures, pressures, and flow rates.

4. Records required by this Rule shall be retained for a minimum of five (5) years and made available on site during normal business hours to the APCO, ARB, or EPA upon request.

B. Test Methods

1. Coating and solvent VOC content shall be determined using EPA Method 24 or its constituent methods. The VOC content of coatings containing exempt halogenated VOCs shall be determined by using ARB Method 432, "Determination of Dichloromethane and 1,1,1- Trichloroethane in Paints and Coatings" (September 12, 1998). or SCAQMD Method 303 (Determination of Exempt Compounds).

2. The solid content of pretreatment coatings shall be determined using EPA Method 24. The acid content of pretreatment coatings shall be determined using ASTM Method D1613 06 (Standard Test for Acidity of Volatile Solvents and Chemical Intermediates used in Paint, Varnish, Lacquer and Related Products).

3. The test method for determining the fire resistance of an interior coating shall be Federal Aviation Administration-required Ohio State University Heat Release, Fire and Burn Tests.

4. The VOC composite vapor pressure of a blended solvent shall be determined by quantifying the amount of each organic compound in the blend using gas chromatographic analysis SCAQMD Test Method 308-91 "Quantitation of Compounds by Gas Chromatography" (February 1993) and by calculating the VOC composite vapor pressure of the solvent by summing the product of the vapor pressure of each pure component and its molar fraction. For the purpose of this calculation, the blend shall be assumed to be an ideal solution where Raoult's Law applies. The vapor pressure of each pure component shall be obtained from published reference manuals or handbooks.

5. VOC emissions from enclosed systems used to clean coating application equipment shall be determined by the manufacturer using the SCAQMD General Test Method for Determining Solvent Losses from Spray Gun Cleaning Systems.

6. The control efficiency of a VOC emission control system's control device(s) shall be determined using EPA Methods 2, 2A, 2C, or 2D for measuring flow rates and EPA Methods 25, 25A, or 25B for measuring the total gaseous organic concentrations at the inlet and outlet of the control device. EPA Method 18 or ARB Method 422, "Determination of Volatile Organic Compounds in Emissions from Stationary Sources" (September 12, 1990) shall be used to determine the emissions of exempt compounds.

7. The capture efficiency of a VOC emission control system's collection device(s) shall be determined according to EPA's "Guidelines for Determining Capture Efficiency," January 9, 1995 and 40 CFR 51, Appendix M, Methods 204-204F, as applicable, or any other method approved by EPA, ARB, or APCO.

8. When more than one test method or set of test methods are specified for any emissions testing, a violation of any test established in Section VI.B. shall constitute a violation of the Rule.

VII. Ozone Nonattainment Contingency Measures

On and after 60 days following the effective date of the EPA's final determination that one or both of the conditions described in Clean Air Act Sections 172(c)(9) or 182(c)(9) have occurred in eastern Kern County regarding the 2008 or 2015 8-hour Ozone National Ambient Air Quality Standard, the following contingency measures will become effective:

A. Section IV.G.1 of this Rule shall be revised as follows:

1. Coatings or refillable aerosols with separate formulations that are used in volumes of less than twenty (20) gallons in any calendar year provided that the total of such formulations applied annually by a facility is less than 50 gallons, and it can be demonstrated that complying coatings are not available. Coatings exempted under Sections IV.F.1 or IV.G.3 shall not be included in calculating the volume of coatings used under this exemption.

B. The VOC content limits from the Table of Standards for the specified coating categories will change as follows:

Coating Type	VOC Limit	
	Effective Before Contingency Trigger Date	Effective On and After Contingency Trigger Date
Commercial Exterior Aerodynamic Structure Primer	650	350
Compatible Substrate Primer	780	350
Cryogenic Flexible Primer	645	350
Elevated Temperature Skydrol Resistant Commercial Primer	740	350
Flexible Primer	640	350
Adhesion Promoter	850	250
Antichafe Coating	600	420
Chemical Agent Resistant Coating	550	500
Clear Topcoat	520	420
Conformal Coating	750	600
Electric/Radiation Effect Coating	800	600
Electrostatic Discharge & Electromagnetic Interference (EMI) Coating	800	612
Flight Test Coatings, All Other	840	600
High Temperature Coatings	850	720
Metallized Epoxy Coating	740	700
Mold Release Coating	780	762
Rain Erosion Resistant Coating	800	600
Wet Fastener Installation Coating	675	620
Wing Coatings	750	420
Adhesives, Structural Non-Autoclavable	850	250
Fastener Sealant	675	600
Bonding Maskant	1,230	600

Line Sealer Maskant	750	650

C. Section V.B.2 of this Rule shall be revised as follows:

An operator shall not use VOC-containing materials to clean spray equipment used for the application of coatings, adhesives, or ink, unless one of the following methods is used:

a. An enclosed system or equipment proven to be equally effective at controlling emissions is used for cleaning. The enclosed system must totally enclose spray guns, cups, nozzles, bowls, and other parts during washing, rinsing and draining procedures; be used according to the manufacturer's recommendations; and remain closed when not in use;

b. Unatomized discharge of cleaning solvent containing not more than 25 grams of VOC per liter (g/L) of solvent or having a VOC composite partial pressure less than or equal to 5 mm Hg @ 68 ^{o}F into a waste container that is kept closed when not in use;

c. Disassembled spray gun that is cleaned in a vat with solvent containing not more than 25 g/L of solvent or having a VOC composite partial pressure less than or equal to 5 mm Hg @ 68 ^{o}F and kept closed when not in use; or

d. Atomized spray of solvent containing not more than containing not more than 25 g/L of solvent or having a VOC composite partial pressure less than or equal to 5 mm Hg @ 68 ^{o}F into a waste container that is fitted with a device designed to capture atomized cleaning solvent emissions.

D. Owner/operator of an existing aerospace surface coating operation subject to this Rule and is not served by a VOC emission control device shall be subject to the following compliance schedule:

1. Submission of an Emission Control Plan to the District, including the following information:

   a. List of each coating operation, Permit to Operate VOC emission limit for each operation, and highest annual VOC emissions from each operation from the preceding three calendar years

   b. Description of measures to be taken to reduce VOC emissions from operations with permitted or actual emissions greater than or equal to 3.50 tons per year (i.e. voluntary reduction of permit VOC emission limit. installation of VOC emission controls, etc.)

2. Within 180 days of submitting Emission Control Plan, owner/operator of an aerospace coating operation with permitted or actual emissions greater than or equal to 3.50 tons per year shall satisfy one of the following:

   a. Submit a complete application to modify the Permit to Operate to reduce uncontrolled VOC emissions from each coating operation to less than 3.50 tons per year, or

b. Submit a complete application for an Authority to Construct VOC emission control equipment meeting the criteria specified in Section V.F.

E. Owner/operator of a new aerospace surface coating operation with a potential to emit greater than or equal to 3.50 tons per year of uncontrolled VOC shall include a proposal for VOC control equipment meeting the criteria specified in Section V.F with their complete Authority to Construct application.

APPENDIX C

PROPOSED REVISION RULE 410.8

AEROSPACE ASSEMBLY AND COATING OPERATIONS

SUMMARY TABLE OF COATING VOC CONTENT REQUIREMENTS CURRENTLY MORE STRINGENT THAN RULE 410.8

Summary of VOC Content Limit Differences, Table 1

	Eastern Kern (2014)		Bay Area (1995)		San Joaquin Valley (2011)		South Coast (2001)		San Diego (1997)		Imperial (2010)	
Category	g/L	lb/gal	g/L	lb/gal	g/L	lb/gal	g/L	lb/gal	g/L	lb/gal	g/L	lb/gal
Primers												
Commercial Exterior Aerodynamic Structure Primer	650	5.4	N/D	N/D	350	2.9	N/D	N/D	N/D	N/D	N/D	N/D
Coatings												
Adhesion Promoter	850	7.1	N/D	N/D	850	7.1	250	2.1	N/D	N/D	N/D	N/D
Antichafe Coating	600	5.0	N/D	N/D	600	5.0	420	3.5	600	5.0	N/D	N/D
Flight Test Coating (except missiles or single-use target craft)	840	7.0	N/D	N/D	600	5.0	840	7.0	840	7.0	N/D	N/D
High-Temperature Coating	850	7.1	720	6.0	850	7.1	850	7.1	850	7.1	N/D	N/D
Metallized Epoxy Coating	740	6.2	N/D	N/D	740	6.2	700	5.8	N/D	N/D	N/D	N/D
Rain Erosion Resistant Coating	800	6.7	N/D	N/D	800	6.7	800	6.7	690	5.8	N/D	N/D
Adhesives												
Structural - Nonautoclavable	850	7.1	N/D	N/D	850	7.1	850	7.1	250	2.1	250	2.1
Sealants												
Fastener	675	5.6	N/D	N/D	600	5.0	675	5.6	N/D	N/D	N/D	N/D
Maskants												
Bonding	1,230	10.3	N/D	N/D	N/D	N/D	N/D	N/D	600	5.0	N/D	N/D
Line Sealer	750	6.3	N/D	N/D	N/D	N/D	N/D	N/D	650	5.4	N/D	N/D

Summary of VOC Content Limit Differences, Table 2

	Eastern Kern (2014)		Sac Metro (2008)		Ventura (2012)		Santa Barbara (2012)		Antelope Valley (2013)		Mojave Desert (2020)	
Category	g/L	lb/gal	g/L	lb/gal	g/L	lb/gal	g/L	lb/gal	g/L	lb/gal	g/L	lb/gal
Primers												
Commercial Exterior Aerodynamic Structure Primer	650	5.4	N/D	N/D	N/D	N/D	350	2.9	650	5.4	650	5.4
Compatible Substrate Primer	780	6.5	N/D	N/D	N/D	N/D	350	2.9	780	6.5	780	6.5
Cryogenic Flexible Primer	645	5.4	N/D	N/D	N/D	N/D	350	2.9	645	5.4	645	5.4
Elevated Temperature Skydrol Resistant Commercial Primer	740	6.2	N/D	N/D	N/D	N/D	350	2.9	740	6.2	740	6.2
Flexible Primer	640	5.3	N/D	N/D	N/D	N/D	350	2.9	640	5.3	640	5.3
Coatings												
Adhesion Promoter	850	7.1	N/D	N/D	850	7.1	250	2.1	850	7.1	850	7.1
Antichafe Coating	600	5.0	N/D	N/D	600	5.0	420	3.5	420	3.5	420	3.5
Chemical Agent Resistant Coating	550	4.6	N/D	N/D	N/D	N/D	N/D	N/D	550	4.6	500	4.2
Clear Topcoat	520	4.3	520	4.3	520	4.3	520	4.3	520	4.3	420	3.5
Conformal Coating	750	6.3	600	5.0	750	6.3	N/D	N/D	750	6.3	750	6.3
Electric/Radiation Effect Coating	800	6.7	600	5.0	800	6.7	800	6.7	800	6.7	800	6.7
Electrostatic Discharge/EMI Coating	800	6.7	612	5.1	N/D	N/D	800	6.7	800	6.7	800	6.7

Summary of VOC Content Limit Differences, Table 2 (continued)

	Eastern Kern (2014)		Sac Metro (2008)		Ventura (2012)		Santa Barbara (2012)		Antelope Valley (2013)		Mojave Desert (2020)	
Category	g/L	lb/gal	g/L	lb/gal	g/L	lb/gal	g/L	lb/gal	g/L	lb/gal	g/L	lb/gal
Coatings (cont.)												
Fire Resistant (Interior) Coating, Civilian	650	5.4	600	5.0	650	5.4	600	5.0	650	5.4	650	5.4
Flight Test Coatings (except missiles or single-use target craft)	840	7.0	N/D	N/D	600	5.0	600	5.0	840	7.0	840	7.0
High-Temperature Coating	850	7.1	420	3.5	850	7.1	720	6.0	850	7.1	720	6.0
Metallized Epoxy Coating	740	6.2	N/D	N/D	N/D	N/D	700	5.8	700	5.8	700	5.8
Mold Release Coating	780	6.5	762	6.4	N/D	N/D	780	6.5	780	6.5	780	6.5
Rain Erosion Resistant Coating	800	6.7	600	5.0	420	3.5	600	5.0	800	6.7	600	5.0
Wet Fastener Installation Coating	675	5.6	620	5.2	N/D	N/D	675	5.6	675	5.6	675	5.6
Adhesives												
Structural - Nonautoclavable	850	7.1	N/D	N/D	850	7.1	850	7.1	850	7.1	700	5.8
Sealants												
Fastener	675	5.6	N/D	N/D	675	5.6	600	5.0	675	5.6	675	5.6

Summary of Application Equipment Cleaning Solvent VOC Content Limit Differences, Table 3

	Eastern Kern (2014)		Bay Area (1995)		San Joaquin Valley (2011)		South Coast (2009)		San Diego (1997)		Imperial (2010)	
	g/L	**lb/gal**	**g/L**	**lb/gal**	**g/L**	**lb/gal**	**g/L**	**lb/gal**	**g/L**	**lb/gal**	**g/L**	**lb/gal**
Coating Application Equipment Cleaning Solvents	N/A	N/A	N/A	N/A	N/A*	N/A*	25	0.21	200**	1.67**	N/A*	N/A*

*fully enclosed system or equivalent required

**or vapor pressure ≤ 20 mmHg @ 68 ^{o}F, boiling point ≥ 374 ^{o}F @ 760 mmHg, or enclosed system

Summary of Application Equipment Cleaning Solvent VOC Content Limit Differences (cont.)

	Eastern Kern (2014)		Sac Metro (2008)		Ventura (2012)		Santa Barbara (2012)		Antelope Valley (2018)		Mojave Desert (2020)	
Category	**g/L**	**lb/gal**	**g/L**	**lb/gal**	**g/L**	**lb/gal**	**g/L**	**lb/gal**	**g/L**	**lb/gal**	**g/L**	**lb/gal**
Coating Application Equipment Cleaning Solvents	N/A	N/A	25	0.21	25*	0.21*	25**	0.21**	200***	1.67***	N/A	N/A

* or composite partial pressure < 5mmHg @ 20 ^{o}C (must use an enclosed system for all VOC containing materials)

**or use enclosed cleaning system or equipment proven to be equally effective as an enclosed cleaning system

***or VOC composite partial pressure ≤ 45 mmHg

APPENDIX D

PROPOSED REVISION RULE 410.8

AEROSPACE ASSEMBLY AND COATING OPERATIONS

COST EFFECTIVENESS ANALYSIS

Rule 410.8 – Cost Effectiveness

Step 1: Determining Amount of Carbon Required

$$M_c = M_{cl} \times f$$
$$M_c, M_{cl} = amount\ of\ carbon\ required\ (lb)$$
$$f = extra\ capacity\ factor\ (dimensionless)$$

$$M_{cl} = \frac{m_{voc}}{w_c}\theta_A$$
$$M_{cl} = amount\ of\ carbon\ required\ (lb)$$
$$m_{voc} = maximum\ VOC\ inlet\ loading\ \left(\frac{lb}{hr}\right)$$
$$\theta_A = adsorption\ time$$
$$w_c = working\ capacity$$

$$f = \left(1 + \frac{N_D}{N_A}\right)$$
$$N_D = \#\ of\ desorbing\ carbon\ beds\ during\ coating\ operations$$
$$N_A = \#\ of\ adsorbing\ carbon\ beds\ during\ coating\ operations$$

Maximum estimated VOC emissions: 100 lb/hr (District permits/evaluations)
Maximum daily time spent in adsorption: 16 hours (conservative estimate)
Working capacity of carbon: 0.25 (SMAQMD BACT analysis for aerospace coating)

$$M_{cl} = 100\frac{lb}{hr} \times \frac{1}{0.25} \times 16\ hr = 6{,}400\ lb\ carbon$$

Carbon canisters are desorbed outside of operating hours; N_D=0, f=1

$$M_c = 6{,}400\ lb \times 1 = 6{,}400\ lb$$

Carbon Cost: $3.70 (Comment letter on SMAQMD BACT Determination, CPI adjusted to 2022)

Carbon Life: 5 Years

Remainder of Page Intentionally Left Blank

Step 2: Total Capital Investment

Direct Costs
Carbon Canister options (from EPA Cost Control Manual, Section 3.1, Chapter 1, p. 1-26)

Canister Size (lb carbon)	Maximum Flow Rate (cfm)	Canister Type	2018 Price ($)		2022 CPI Adjusted Price ($)	
			Virgin Carbon	Reactivated Carbon	Virgin Carbon	Reactivated Carbon
1,000	600	Epoxy-Lined Steel	6,600	-	7,486	-
1,000	1,000	Epoxy-Lined Steel	11,500	7,000	13,044	7,940
2,000	2,000	Epoxy-Lined Steel	19,000	10,000	21,551	11,343
2,000	750	Carbon Steel	22,000	13,200	24,954	14,972
3,000	2,000	Epoxy-Lined Steel	13,900	-	15,766	-
4,100	8,000	Polypropylene	45,000	-	51,042	-
5,000	2,500	Carbon Steel	42,600	20,100	48,320	22,799
8,000	4,500	Carbon Steel	66,000	30,000	74,862	34,028
10,000	18,000	Polypropylene	94,500	-	107,188	-

Number of Canisters Needed

Canister Size (lb carbon)	Maximum Flow Rate (cfm)	Canister Type	# to meet carbon requirement	Cost ($)
1,000	600	Epoxy-Lined Steel	7	52,403
1,000	1,000	Epoxy-Lined Steel	7	91,308
2,000	2,000	Epoxy-Lined Steel	4	86,204
2,000	750	Carbon Steel	4	99,815
3,000	2,000	Epoxy-Lined Steel	3	47,299
4,100	8,000	Polypropylene	2	102,084
5,000	2,500	Carbon Steel	2	96,639
8,000	4,500	Carbon Steel	1	74,861
10,000	18,000	Polypropylene	1	107,188

Instrumentation: 10% of equipment cost (EPA cost Control Manual, Section 1, Ch. 2, p. 26)
Freight: 10% of equipment cost (EPA cost Control Manual, Section 1, Ch. 2, p. 26)
Sales Tax: 10.5% (Los Angeles, CA)
Handling & Erection: 14% of equipment cost (EPA cost Control Manual, Section 3.1, Ch. 1, p. 26)
Piping: 2% of equipment cost (EPA cost Control Manual, Section 3.1, Ch. 1, p. 26)
No site prep, buildings, foundation/supports, electrical, insulation, or painting required for canister units
Indirect Costs

Engineering: 10% of equipment cost (EPA cost Control Manual, Section 3.1, Ch. 1, p. 26)
Construction/Field Expenses: 5% of equipment cost (EPA cost Control Manual, Section 3.1, Ch. 1, p. 26)
Start-up: 2% of equipment cost (EPA cost Control Manual, Section 3.1, Ch. 1, p. 26)
Performance Test: 1% of equipment cost (EPA cost Control Manual, Section 3.1, Ch. 1, p. 26)
Contractor Fees: 10% of Direct + Indirect costs
Contingencies: 40% (conservative to account for retrofit)

Purchased Equipment	$47,299
Instrumentation	$4,729
Freight	$4,729
Sales Tax	$4,966
Handling & Erection	$6,621
Piping	$945
Direct Costs	$69,293
Engineering	$4,729
Construction/Field Expenses	$2,364
Start-up	$945
Performance Test	$472
Indirect Costs	$8,513
Contractor Fees	$7,780
Contingencies	$31,122
Total Capital Investment (TCI)	$116,710
Interest Rate	0.04
Equipment Life (Years)	10
Capital Recovery Factor (CRF)	0.1233
Capital Recovery Cost (CRC)	$14,389

Step 3: Annual Costs

Direct Annual Costs
Labor wage- 20.55/hr (Bureau of Labor Statistics Occupation Code: 51-9122)
Operator Labor – 0.5 hr/shift, 1 shift/day, 260 days/yr (130 hr/yr)
Material cost same as labor (SMAQMD BACT Analysis)
Booth fan motor size increase needed: 10-hp
0.746 kW/hp
Fan operating hours/year – 2,080
$/kW – 0.1341

Indirect Annual Costs
Overhead - $3,586 (SMAQMD BACT Analysis, CPI adjusted to 2022)
Administrative Charges: $231 (SMAQMD BACT Analysis, CPI adjusted to 2022)
Property Tax: $115 (SMAQMD BACT Analysis, CPI adjusted to 2022)
Insurance: $115 (SMAQMD BACT Analysis, CPI adjusted to 2022)

Annual Costs	
Labor	$2,671
Material	$2,671
Electrical	$2,080
Total Direct Annual Costs	$7,423
Overhead	$3,586
Administrative Charges	$231
Property Tax	$115
Insurance	$115
Total Indirect Annual Costs	$4,047

Step 4: Total Annual Cost

Capital Recovery Cost (CRC)	$14,389
Direct Annual Costs	$7,423
Indirect Annual Costs	$4,047
Carbon Replaced (lb)	9,000
Carbon Replacement Cost	$33,300
Total Annual Cost	**$66,583**

Step 5: Cost Effectiveness

Cost Effectiveness Threshold (per ton, SJVAPCD)	$22,600
Tons of VOC Reduction to be Cost Effective	2.95
Overall VOC Control Efficiency (Rule 410.8)	85.5%
Uncontrolled Emissions (tons/year)	3.45

Remainder of Page Intentionally Left Blank