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VOC Emissions Control Strategies for Surface Coating Operation

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RAP Energy solutions for a changing world

表面涂层操作的挥发性有机物（VOC）排放控制策略

挥发性有机物排放控制大会
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Sector Description (1)
行业描述（1）

- Diverse and dispersed throughout the United States
- Includes broad spectrum of industries and production levels
- Company size ranges from small, family-owned businesses to multi-national corporations
- Production facilities can be located almost anywhere, from a small town to a major city

- 在美国种类多、分布广
- 涵盖了各行各业和各类产品
- 公司规模从小型、家族企业到跨国公司
- 生产地点遍布各地，从小城镇到大都市

Sector Description (2)
行业描述（2）

- Smaller businesses trend towards: unique, niche products (fashion, high design) or are subcontractors to larger companies
  - Clothing designers
  - High grade paper
- Larger companies feature many products and have factories in several states and countries
  - Airplane and automotive manufacturers
  - Appliance manufacturers

- 小型企业的趋势：独特、自己独有的产品（时尚高端的设计），或为大公司代加工
  - 服装设计
  - 高级纸制品
- 大型企业的特点是产品种类繁多，在多个州和国家设有工厂
  - 飞机和汽车制造
  - 器械装置制造

Product Types
产品类型

- Airplane and automotive painting
- Architectural coating of buildings
- Appliance manufacturers
- Silkscreening (t-shirts)
- Packaging materials
- Paper coating

- 飞机和汽车喷漆
- 建筑物的建筑涂料
- 机械制造
- 丝网漏印技术（T恤衫）
- 包装材料
- 纸张涂料

Diversity of Products Receiving Surface Coating Treatment
经过表面涂层处理的各种产品

Factors that Influence Technologies to Control Emissions
影响排放控制技术的要素

- Literally thousands of different facilities of all types
- Chemicals and their quantity of usage
  - Customer influence on product design changes materials specified
- Functionality of final product
  - Performance longevity
  - Customer acceptance and feedback

- 有成千上万的各种类型的不同生产厂家
- 化学品及其使用量
  - 消费者对产品设计的影响改变了所使用的材料
- 最终产品的功能性要求
  - 使用寿命
  - 消费者的接受程度和反馈

Regulatory Process
监管程序

- Prioritize what to regulate first, and how
  - What does inventory data tell you?
  - Focus on the biggest sources first and those which emit more pollution
- Sort companies by common machinery, chemicals used or product being coated
- Conduct outreach to industry
  - What are best practices?
  - Employee training

- 优先找出哪些先予以规范，以及如何规范
  - 清单数据说明了什么？
  - 首先关注那些污染严重的最大排放源
- 将公司分类：如一般机械制造、使用化学品或需要涂层的产品
- 工业的延伸活动
  - 有哪些最佳实践
  - 员工培训

Design Criteria for Regulatory Standards
监管标准的设计标准

- 1. Can the process be changed or modified to improve emissions?
- 2. Can coatings with lower VOC content, or VOC with lower photochemical reactivity be used?
- If 1 and 2 are not possible, then use highly efficient VOC incinerators

- 1. 工艺是否可改变或可改造，以改善排放状况?
- 2. 能否使用VOC含量低的涂料，或使用光化反应性低的VOC?
- 如果1和2都不可行，那么使用高效的VOC焚化炉

1. Process Design or Modification
1. 工艺设计或改造

- Process changes: concepts referred to as “design for the environment”, life-cycle assessment of materials use, pollution prevention. Steps include:
  - Use fewer materials or materials that require little or no surface treatment
  - Use low or no-VOC paint
  - Increase the efficiency by which coatings are transferred
  - Reduce the quantity and toxicity of the compounds used
  - Reduce waste from cleaning equipment

- 工艺改变：这个概念是指“为环境而设计”，对材料使用的生命周期进行评估，防止污染。步骤包括：
  - 使用更少材料，或使用较少或无需经过表面处理的材料
  - 使用低VOC或不含VOC的涂料
  - 提高效率，以使涂料转移
  - 减少所使用的化合物的数量和毒性
  - 减少清洗设备所产生的废物

2. VOC Content of Coating
涂料的VOC含量

- Many coating processes were using highly reactive chemicals such as toluene, xylene, benzene.
  - Are these chemicals necessary for the functionality of the product?
- Per 1 above, evaluate process from start to finish to assess materials used. Consider products made by subcontractors.
  - Can a product be shifted to another facility that uses materials with lower VOC or which already has best available technology to incinerate VOC?

- 许多涂料加工工艺使用多种反应性化学品，如甲苯、二甲苯、苯。
  - 这些化学品对于产品的功能是否都必要？
- 对于上述1（工艺设计或改造），应从头至尾评估一项工艺，以判断所使用的材料。同时还要考虑分包商所生产的产品。
  - 产品是否可以转移到使用低VOC材料或具备焚化VOC技术的其它厂家进行生产？

3. Incineration
3. 焚化

- Incineration includes equipment with and without catalysts.
- Equipment should be capable of destroying at least 95% of the inlet VOC (99% is possible).
- Aim to achieve a VOC concentration of gases in the combustion chamber that is rich enough to sustain combustion without requiring additional fuel.

- 焚化包括含有催化剂和不含有催化剂的设备
- 设备应当能够焚毁至少95%的进口VOC（99%是可以达到的）
- 目标是在燃烧室里达到一定的VOC气体浓度，足以维持燃烧而无需额外燃料。

Control Measure Examples
控制措施举例

- Require process modifications to restrict quantity of VOC used
- Limit quantity of VOC used per unit of production or coating used
  - i.e. 2.9 pounds of VOC per gallon of coating for paper processes
- Require incinerator with minimum percentage capture and destruction efficiency
  - i.e. 95% capture and destruction efficiency at minimum temperature of 1400 F

- 需要工艺改造，限制所使用VOC的量
- 限制单位产品或单位使用涂料的VOC量
  - 纸制品加工每加仑涂料2.9磅VOC
- 需要使用焚化器，并规定最低采集比例和焚毁效能
  - 即在最低温度为1400F时95%的采集比例和焚毁效能

Control Measure Examples (2)
控制措施举例（2）

- Automotive Coating
  - Prime application 0.23 kg/l
  - Topcoat 0.34 kg/l
  - Final repair 0.58 kg/l
- Architectural, industrial and maintenance coatings:
  - 340 gr/l
- Traffic marking coatings
  - 150 gr/l

- 汽车涂料
  - 第一层：0.23公斤/升
  - 外层： 0.34公斤/升
  - 最后修补： 0.58公斤/升
- 建筑、工业和维修涂料
  - 340克/升
- 交通标记涂料
  - 150克/升

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Emissions Controls Are Only One Part of Good Air Quality Planning
排放控制只是良好空气质量规划的一部分

- Require appropriate record keeping, reporting, monitoring to verify emissions (per remarks by Richard Ayres)
- 需要适当的记录、报告和监测系统来核实排放量（Richard Ayres）

About RAP

The Regulatory Assistance Project (RAP) is a global, non-profit team of experts that focuses on the long-term economic and environmental sustainability of the power and natural gas sectors. RAP has deep expertise in regulatory and market policies that:

- Promote economic efficiency
- Protect the environment
- Ensure system reliability
- Allocate system benefits fairly among all consumers

Learn more about RAP at www.raponline.org

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监管援助项目（RAP）是一个全球性的非营利的专家团队，致力于在电力和天然气领域保持长期的经济和环境的可持续性。RAP在监管和市场政策方面具有深厚的专业特长，以：

- 提高经济效率
- 保护环境
- 保证制度的可靠性
- 在所有消费者中间公平分配制度的收益

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