

POWC MACT- Overview

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First, Some Terms

- Paper and Other Web Coating
- Maximum Achievable Control Technology
- National Emission Standards for Hazardous Air Pollutants

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MACT vs. NESHAP

- NESHAP is the rule
- MACT is the level required by most NESHAPs
- “MACT Standard”

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GOALS

- Introduce requirements of the POWC MACT
- Review applicability case studies
- Review possible compliance approaches
- Discuss implementation cases

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Overview of Rule

- Codified in 40 CFR Part 63, Subpart JJJJ
- Applies to **ONLY** major sources.
- Requires use of add-on control and/or low-HAP coatings

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Overview of Rule

- Applies to all coating lines not covered by other MACTs
- Includes aqueous lines
- Monitoring, reporting, and recordkeeping requirements

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What is included?

- Regulates “organic HAP”
- Must include all HAP that are greater than:
 - 0.1 % for carcinogens
 - 1.0 % for non-carcinogens

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Typical HAP in the Coating Industry

- | | |
|--------------------------|---------------------------|
| ● Toluene | ● Vinyl acetate |
| ● Xylene | ● Acetaldehyde |
| ● Hexane | ● Methyl methacrylate |
| ● Methyl Ethyl Ketone* | ● Benzene |
| ● Methyl Isobutyl ketone | ● Certain Glycol Ethers** |
| ● Methanol | |

* proposed for delisting
** treated as one HAP

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Existing Affected Source

- All coating lines = one affected source
- Additional line at existing facility is part of existing affected source- generally

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New Affected Source

- New line(s) installed at new facilities
- Lines at facilities with no prior P&OWC operation.

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Operations covered by other MACTs are excluded

- Printing and Publishing (Subpart KK)
- Magnetic Tape (Subpart EE)
- Metal Coil Coating (Subpart SSSS)
- Fabric Coating (Subpart OOOO)

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More Exclusions

- Specific process exclusions:
 - Lithography
 - Screenprinting
 - Letterpress
 - Narrow web flexographic printing
- Research and development lines

§63.3300

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Key Date:
September 13, 2000

- Rule proposed (65 FR 55331)
- “Affected sources” built after this date are considered “new affected sources”

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Key Date:
December 4, 2002

- Rule promulgated
- Compliance date for new affected sources

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More Key Dates

- December 5, 2004
 - Initial Notifications due
- December 5, 2005
 - Compliance date for existing affected sources

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Affiliated Operations

- Definition (preamble):
 - Coating formulation and mixing
 - Storage and wastewater operations
- Affiliated equipment have no P&OWC requirements
- Defers to the “MONs”

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The MON

- Miscellaneous Organic NESHAPs
- Miscellaneous Organic Chemical Manufacturing MACT
- Miscellaneous Coating Manufacturing MACT

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Affiliated Operations and the “MONs”

- P&OWC affiliated equipment specifically is exempted from other MACTs (i.e., MCM and MOCM)

§ 63.7985(d)(2)
§ 63.2435(c)(3)

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Existing Sources

- **Must limit emissions to:**
 - Reduce emissions by **95** percent, **OR**
 - Meet limit of **0.04** kg HAP / kg coating applied, **OR**
 - Meet limit of **0.20** kg HAP / kg solids applied.

§63.3320(b)

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Rule Requirements- New Sources

- **Must limit emissions to:**
 - Reduce emissions by **98** percent, **OR**
 - Meet limit of **0.016** kg HAP / kg coating applied, **OR**
 - Meet limit of **0.08** kg HAP / kg solids applied.

§63.3320(b)

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Options to Meet MACT

- **Use Low-HAP Coatings**
- **Install Capture and Control System**
 - Solvent Recovery System (SRS)
 - Thermal or catalytic destruction
- **Combination of above**

§63.3370

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One More Alternative

- No greater than 20 ppmv at outlet of an oxidizer **and** demonstrate 100 percent capture efficiency

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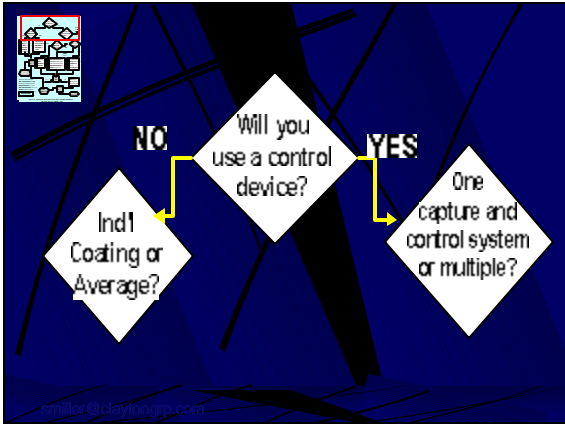
Alternatives Presentation

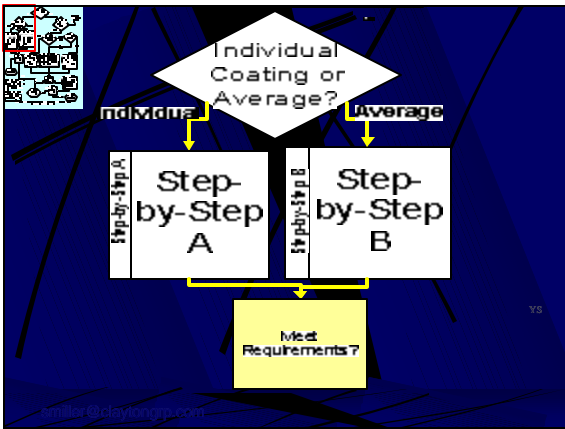
- Does not follow rule flow
- Follows likely thought flow of person assessing compliance
 - You do not (necessarily) know which option you will use
 - You do (generally) know if you have - or intend to use - "add-on controls."

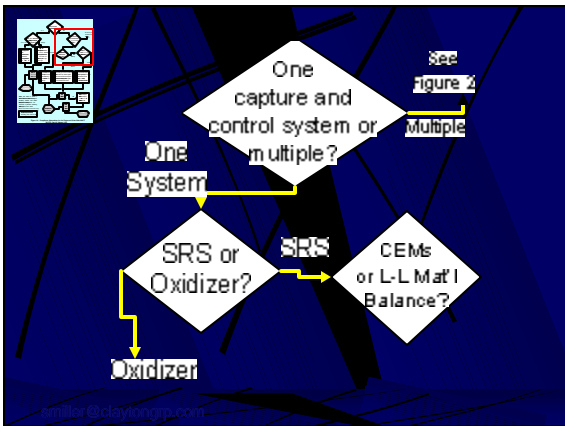
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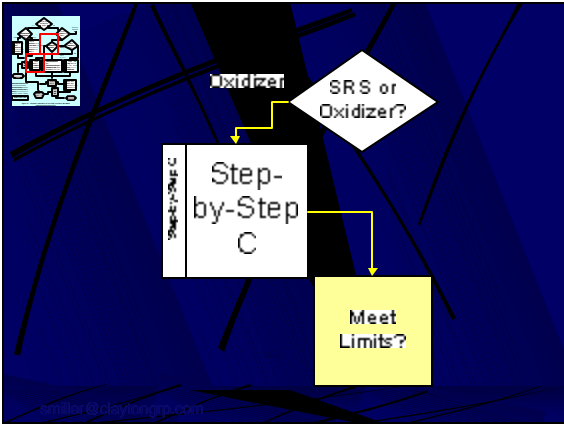
Copy of this flow diagram available online

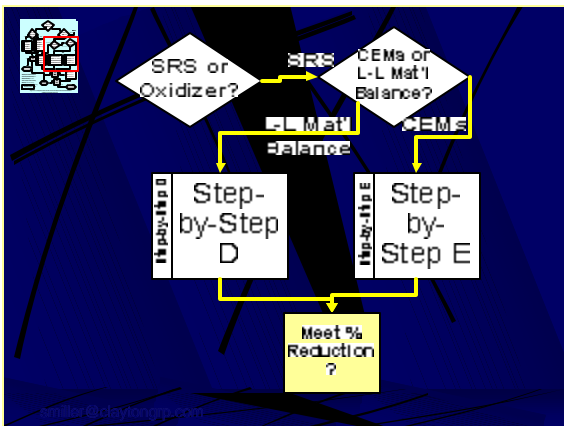
FIGURE 1-10. A SAMPLE FLOWCHART, AS REQUIRED BY 40 CFR 63.110(b)(2)(ii).

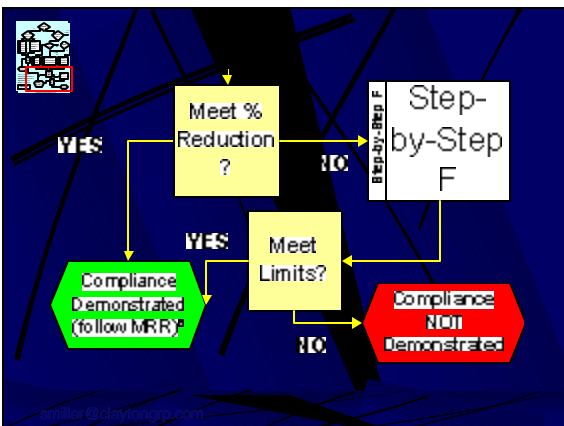












Step-by-Step Guidance

[Based on draft documents]

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Step-by-Steps

- A- Each coating, as purchased and applied (no averaging)
- B- Monthly average or each or all coatings
- C- Oxidation and capture system
- D- Single SRS with Liquid-Liquid balance
- E- SRS using CEMs and capture system
- F- Averaging using reductions in C, D, or E and coating content in B.
- G- Multiple solvent recovery systems and L-L balance
- H- Multiple solvent collection systems/SRSs and CEMs
- I- Multiple collection systems and one or more incinerators

Step-by-Step A
Compliance Demonstration:
Individually Compliant Coating Materials

Overview: This approach can be used if every material purchased meets one of the MACT limits and no averaging is needed to demonstrate compliance.

In this approach, a facility needs to:

1. Identify all coatings and additives used in process.
2. Gather "NESHAP quality" data for each coating.
3. Calculate the as-applied organic HAP content mass fractions.
4. Demonstrate that each coating meets one of the applicable MACT limits.
5. Maintain monitoring and other compliance records.


MACT limits

Existing Sources

$C_{\text{ah}} \leq 0.04$ kg HAP/kg coating
or
 $H_{\text{sl}} \leq 0.20$ kg HAP/kg solids


New Sources

$C_{\text{ah}} \leq 0.016$ kg HAP/kg coating
or
 $H_{\text{sl}} \leq 0.08$ kg HAP/kg solids




Step-by-Step A

<p>STEP 1- Identify all coatings and additives used in process.</p>	
<p>STEP 2- Gather "NESHAP quality" data for each coating and additive used.</p> <p><u>Method 311</u></p> <ul style="list-style-type: none"> • Organic HAPs, OSHA defined carcinogens, $\geq 0.1\%$ percent by weight. • Organic HAPs $\geq 1.0\%$ by weight. • Four places after the decimal point. • Sum individual mass fractions 	<p>§63.3360(c)(1) and App. A of Part 63.</p>




Step-by-Step A

<p>STEP 2-Continued</p> <p>Gather "NESHAP quality" data for each coating and additive used</p> <p><u>Method 24</u></p> <ul style="list-style-type: none"> • Use VOC to represent HAP • Use for solids content, if needed. <p><u>Formulation data</u></p> <ul style="list-style-type: none"> • From manufacturer • Method 311 data takes precedence • Meet $\geq 0.1\%$ / $\geq 1.0\%$ requirements 	
<p><u>Method 24</u></p> <ul style="list-style-type: none"> • Use VOC to represent HAP • Use for solids content, if needed. 	<p>§63.3360(c)(2) and App. A of Part 60.</p>
<p><u>Formulation data</u></p> <ul style="list-style-type: none"> • From manufacturer • Method 311 data takes precedence • Meet $\geq 0.1\%$ / $\geq 1.0\%$ requirements 	<p>§63.3360(c)(3)</p>



Step-by-Step A

<p>STEP 3- Calculate the as-applied organic HAP content mass fractions (C_{ahi} and H_{si}).</p> <ul style="list-style-type: none"> • If any coating material is added to the original coating before application, determine the weighted average organic HAP content of the final coating, using Equation 1a: 	
<p>• If any coating material is added to the original coating before application, determine the weighted average organic HAP content of the final coating, using Equation 1a:</p>	<p>§63.3370(c)(1)</p>




Step-by-Step A

Equation 1a:

$$C_{ahi} = [(C_{hi}M_i + \sum C_{hij}M_{ij}) / (M_i + \sum M_{ij})]$$

Note: Equation 1b is the same as 1a except that VOC content is used instead of HAP content. Must then equate VOC to HAP.



Step-by-Step A


STEP 3- Continued-

- To show compliance with the organic HAP content as a percent of solids, use Equation 2 and then Equation 3.

Equation 2:

$$C_{asi} = [(C_{si}M_i + \sum C_{sij}M_{ij}) / (M_i + \sum M_{ij})]$$

§63.3370(c)(2)




Step-by-Step A

STEP 3- Continued-

Equation 3:

$$H_{si} = C_{ahi} / C_{asi}$$


§63.3370(c)(2)



Step-by-Step A

<p>STEP 4- Demonstrate that <u>each coating, as-applied</u>, meets one of the applicable MACT limits</p> <ul style="list-style-type: none"> You are in compliance if C_{ohi} or H_{si} meet the applicable MACT limits. C_{ohi} or H_{si} need to be calculated for each coating used in a month 	<p>§63.3370(c) §63.3370(b)</p> <p style="background-color: yellow;">Benefit: no monthly usage records</p>
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Step-by-Step A

<p>STEP 5- Maintain monitoring and other compliance records</p> <ul style="list-style-type: none"> HAP content data. Volatile matter, coating solids, and compliance demonstrations 	<p>§63.3410(a) (1) (iii)</p> <p>§63.3410(a) (1) (vi)</p>
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Step-by-Step D

Compliance Demonstration:
Single Solvent Recovery System, Liquid-Liquid Material Balance, Efficiency Demonstration

<p>Overview: This approach is valid when using a single solvent recovery system to demonstrate compliance with the volatile organic matter collection and recovery efficiency as determined through a liquid-liquid material balance.</p>	<p>MACT Limits</p> <p><u>Existing Sources</u> $R_v \geq 95\%$</p> <p><u>New Sources</u> $R_v \geq 98\%$</p>
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Step-by-Step D

In this approach, a facility needs to:


1. Identify all coatings and additives used in process.
2. Gather "NESHAP quality" data
3. Install a monitoring device in-line with the SRS.
4. Calculate the monthly volatile organic matter collection and recovery efficiencies.
5. Compare the monthly efficiencies with the MACT limits.
6. Maintain monitoring and other compliance records.



Step-by-Step D


STEP 1- Identify all coatings and additives used in process.	§63.3410(a) (1)(iv)
STEP 2- - Gather "NESHAP quality" data for each coating and additive used. <i>(Basically same data as Step-by-Step A)</i>	§63.3360(c) (3)

No HAP data is needed for this calculation since efficiency is based on "volatile matter."



Step-by-Step D


STEP 3- Install a flowmeter inline with the solvent recovery system.	§63.3350(d) (2)
<ul style="list-style-type: none"> ✦ Placement ✦ Accuracy 	§63.3360(g)



Step-by-Step D

STEP 4- Calculate the volatile organic matter collection and recovery efficiencies.	
<ul style="list-style-type: none"> Mass of purchased materials (M_i, M_j). Volatile matter content of materials purchased (C_{vi}, C_{vij}). Determine material retained or otherwise not emitted (M_{ret}). 	<p>§ 63.3370(e)</p> <p>§ 63.3370(i)</p>


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Step-by-Step D

STEP 4- continued	
<ul style="list-style-type: none"> Calculate the VOM collection/recovery efficiency using Equation 7. <p>Equation 7</p> $R_v = (M_{vr} + M_{vret}) / (\sum C_{vi}M_i + \sum C_{vij}M_{ij})$	<p>§ 63.3370(i)(1)</p> <div style="border: 1px solid black; padding: 2px; width: fit-content;"> <p>In many/most cases M_{vret} is assumed to be zero.</p> </div>


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Step-by-Step D

<p>STEP 5- Compare the monthly VOM efficiencies with the compliance standards.</p> <p>STEP 6- Records of all data and calculations</p>	<p>§ 63.3320(i)(1)(x)(A)</p>
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Step-by-Step F.
Compliance Demonstration: Single Control Device and Capture System, Emission Rate Demonstration


<p>Overview: This approach is valid when using a single solvent recovery system, liquid-liquid material balance to demonstrate compliance with MACT limits on a monthly average as-applied basis.</p>	<p style="text-align: center;">MACT limits</p> <p><u>Existing Sources</u> $S \leq 0.04$ kg HAP/kg coating or $L \leq 0.20$ kg HAP/kg sol</p> <p><u>New Sources</u> $L \leq 0.016$ kg HAP/kg coating or $S \leq 0.08$ kg HAP/kg sol</p>
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Step-by-Step F.

1. Follow Step-by-Step B in identifying coatings and gathering "NESHAP quality" data.
2. Follow Step-by-Step C, D, or E in installing a monitoring device and calculating the control efficiency.
3. Determine the organic HAP emitted
4. Calculate the monthly avg. organic HAP emission rates as-applied (L or S).
5. Maintain monthly records to demonstrate compliance.



Step-by-Step F.


<p>STEP 1. Follow Step-by-Step B Compliance Demonstration.</p> <ul style="list-style-type: none"> • Identify all coatings and additives used in the process. • Gather "NESHAP quality" data for each coating and additive used in the process. • Determine HAP content data per unit of coating or per unit of solids. 	<p>See Step-by-Step B</p>
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Step-by-Step F.

<p>STEP 2. Follow Step-by-Step C, D, or E Compliance Demonstration .</p> <ul style="list-style-type: none"> • Determine capture efficiency (if required) • Determine overall control efficiency 	<p>See Step-by-Step C, D, or E</p>
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Step-by-Step F.

<p>STEP 3. Determine the organic HAP emitted.</p> <p>Equation 8:</p> $H_e = [1 - R_v / 100] [SC_{hi} M_i + SC_{hij} M_{ij} - M_{vret}]$	<p>§63.3370 (i) (1)</p> <p>Equation may be simplified by not distinguishing between coating products and additive products ($C_{hi} = C_{hij}$ and $M_i = M_{ij}$).</p>
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Step-by-Step F.

<p>STEP 4. Calculate the monthly average organic HAP emission rate as-applied per unit of coating (L) and/or per unit of solids (S).</p> <p>Equation 9:</p> $L = H_e / (SM_i C_{si} + SM_{ij} C_{sij})$ <p>Equation 10:</p> $S = H_e / (SM_i + SM_{ij})$	<p>§63.3370(i)(1)</p> <p>Equation may be simplified by not distinguishing between coating products and additive products ($C_{si} = C_{sij}$ and $M_i = M_{ij}$).</p>
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Step-by-Step F.

STEP 5. Demonstrate that one of the MACT limits is being met	
STEP 6. Record keeping Requirements	§63.3410(a)(1) §63.3410(b)

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Equation 15

$$H_e = \underbrace{(SM_{Cl} C_{ah})}_{\text{HAP content times coating mass}} * \underbrace{\{1 - [(E/100)(CE/100)]\}}_{\text{1 Minus overall control efficiency}} + \underbrace{(SM_{Bl} C_{ah})}_{\text{HAP content times coating mass}} - M_{vret}$$

HAP emitted from controlled work stations HAP emitted from uncontrolled work stations

Then... To compare to the limits, you divide by either total coating or total solids

Solvent retained in the tape or otherwise not emitted

Equation 15 No Control Equipment

~~$$H_e = \underbrace{(SM_{Cl} C_{ah})}_{\text{HAP content times coating mass}} * \underbrace{\{1 - [(E/100)(CE/100)]\}}_{\text{1 Minus overall control efficiency}} + \underbrace{(SM_{Bl} C_{ah})}_{\text{HAP content times coating mass}} - M_{vret}$$

HAP emitted from controlled work stations HAP emitted from uncontrolled work stations

Then... To compare to the limits, you divide by either total coating or total solids

Solvent retained in the tape or otherwise not emitted~~

Equation 15
All Always Controlled Work Stations

$$H_e = \underbrace{\{S_m C_{ah}\}}_{\text{HAP content times coating mass}} * \underbrace{\{1 - [(E/100)(CE/100)]\}}_{\text{1 Minus overall control efficiency}} \underbrace{\{S_m C_{ah}\}}_{\text{HAP content times coating mass}} - M_{vret}$$

HAP emitted from controlled work stations

HAP emitted from controlled work stations

HAP content times coating mass

1 Minus overall control efficiency

HAP content times coating mass

Solvent retained in the tape or otherwise not emitted

Then...To compare to the limits, you divide by either total coating or total solids
