U.S. EPA - LARGE APPLIANCES MACT DEVELOPMENT FOURTH ROUNDTABLE MEETING

EPA Environmental Research Center Building
Research Triangle Park, North Carolina
Classroom 3

July 14, 1999

U.S EPA - LARGE APPLIANCES MACT DEVELOPMENT FOURTH ROUNDTABLE MEETING

Agenda

10:00 - 10:15	-Purpose and Introductions -Welcome/Program Overview	U.S. EPA
10:15 - 10:30	-Background and Current Status	U.S. EPA
10:30 -12:00	-MACT Floors -Update of Data Gathering/Data Analysis -Recommended MACT Floor Approach -Preliminary MACT Floor	U.S. EPA
12:00	-Lunch	
1:00	-Continue MACT Floor Discussion	All Participants
2:00- 3:00	-Potential Issues -Adhesives Operations -Unit Operations Not Included in MACT Floor -Cure HAPs -Subcategorization -Additional Data Needed	U.S. EPA
3:00	-Adjourn	

LARGE APPLIANCES MACT DEVELOPMENT

Current Schedule

Third Roundtable Meeting	April 1998
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ACCOMPLISHMENTS

- Refinement of PIC
- Questionnaires Returned and Responses Entered Into Access Database
- Development of Preliminary MACT Floor

OBJECTIVES

- To Present the Results of Our Data Gathering Activities and Preliminary Data Analysis
- To Present Our Recommended MACT Floor Approach
- To Present the Preliminary MACT Floor Value
- Hear Comments from Stakeholders

LARGE APPLIANCES SOURCE CATEGORY

The Large Appliances Source Category Includes Facilities Primarily Engaged in Manufacturing The Following Types of Products:

- **Household Cooking Equipment (Sic Code 3631)**

  -Grills
  -Convection Ovens
  -Microwave Ovens
  -Electric And Gas Ranges

- **Household Refrigerators, Iceboxes, Home And Farm Freezers (Sic Code 3632)**

- **Household Laundry Equipment (Sic Code 3633)**

  -Washing Machines
  -Dryers
  -Drycleaning and Laundry Machines

- **Other Household Appliances (Sic Code 3639)**

  -Dishwashers
  -Floor Waxers/Polishers
  -Garbage Disposal Units
  -Sewing Machines
  -Trash Compactors
  -Water Heaters

- **Heating/ Air Conditioning And Refrigeration Equipment (Sic Code 3585)**

  -Warm Air Furnaces
  -Air Conditioning Units
  -Refrigerated Display Cases
  -Beverage Dispensing Equipment
  -Drinking Fountains
  -Ice Making Machinery

- **Sel**

  -Cafeteria Food Warmers
  -Car Washing Equipment
  -Corn Popping Machines
  -Floor Sanding Machines
  -Water Conditioners
  -Water Filters and Purification Equipment

LARGE APPLIANCES MACT FLOOR DATABASE

BACKGROUND

- 400 questionnaires were mailed to facilities that were believed to be large appliance manufacturers, in an attempt to survey the entire industry
- 221 facilities returned completed questionnaires; this number is believed to include most (80 - 90 %) of the existing large appliance manufacturers
- Of the 221 facilities for which we have some data, 54 facilities are currently considered to be major or synthetic minor sources, and have provided responses complete enough to be included in our MACT floor database
- 33 additional facilities have been identified as probable major sources that can be added to the MACT floor database after we follow-up with the facilities to clarify questionnaire responses or to obtain missing data from incomplete responses
- About 45 of the 221 facilities in the database are estimated to be small businesses based on reported number of corporate employees (less than 500); this would indicate that about 20 - 25 % of the facilities in the industry may be small businesses

LARGE APPLIANCES PRELIMINARY DATA ANALYSIS

- Typical Unit Operations at a large appliance manufacturing facility that may result in HAP emissions include:

  - metal cutting and forming steps using cutting oils and lubricants
  - metal surface cleaning and pretreating steps
  - bonding of some component parts with adhesives
  - application of one or more layers of coatings
  - cleaning of coating application areas, conveyers, and coated parts
  - storage of coatings, solvents, and cleaning materials
  - mixing of coatings and thinners in mix areas
  - collection and disposal of waste materials

- The coating application unit operation is by far the largest source of HAP emissions, accounting for an estimated 80 percent of emissions from all of the listed activities

- The volume of nonvolatiles (solids) in a coating, which is related to the level of productions, is the most suitable parameter for normalizing facility wide emissions in this industry. An estimated 15 million liters (4.0 million gallons) of coating solids are applied per year in the industry.

LARGE APPLIANCES PRELIMINARY DATA ANALYSIS

- The types of coatings used by large appliance manufacturing facilities and their relative percentage of use (by solids applied) are as follows:

- solvent-based coatings	42 percent
- powder coatings	40 percent
- water-based coatings	18 percent

- The major HAPs emitted from large appliance manufacturing facilities, and an estimate of the percentage of total industry emissions represented by each, are as follows:

- xylene	27%
- glycol ethers	21%
- toluene	13%
- methylene diphenyl diisocyanate	12%
- methyl ethyl ketone	09%
Total	82%

- Very little emissions data from material storage or waste collection and disposal activities were provided in the questionnaire responses; these activities are not expected to be significant sources of emissions in this industry and they were not included in the MACT floor database

LARGE APPLIANCES PRELIMINARY DATA ANALYSIS

- The extent of the use of cutting oils and lubricants, and the HAP content of these materials, was not addressed in the questionnaire responses in enough detail to include them in the MACT floor database; these materials are being investigated and, if justified, they will be added later

- The use of adhesives occurs at a relatively small number of facilities (about 20% of those that submitted responses), but was included in the MACT floor database because of the potential for significant emissions at some facilities

- Reformulation of coatings and cleaning materials to reduce the HAP content and conversion to non-HAP emitting powder coatings are expected to be the methods of complying with the NESHAP

RECOMMENDED MACT FLOOR APPROACH

The project team's recommended approach for calculating the MACT floor is to determine a facility-wide average HAP value based on the volume of coating solids applied by a facility, as follows:

- total HAP emissions from surface coating-related operations (coating application operations, adhesive application operations, and cleaning operations) were determined for each facility in the MACT floor database

- the total volume of coating solids (nonvolatiles) from all types of coatings (except adhesives) was determined for each facility in the MACT floor database

- total HAP emissions from the affected unit operations were divided by the total nonvolatiles (solids) in the coatings to normalize emissions for each facility

  (i.e., kg HAP/L solids)

RECOMMENDED MACT FLOOR APPROACH

- facilities were ranked in order of their normalized emissions, lowest to highest
- the top 12% of the facilities were determined based on the number of facilities in the MACT floor database (54 x 0.12 = 6.48 => 7)
- the floor was calculated as the arithmetic average of the normalized emissions of the top 12% of the facilities

Hence, the MACT floor is equal to

0.15 kg HAP/L solids (1.2 lb/gal)

Estimated HAP emission reduction resulting from implementing the MACT floor level of control at existing major sources would be 71 % . The emissions would be reduced from 2,046 Mg to 588 Mg (2,250 tons to 646 tons).

ASSUMPTIONS AND POTENTIAL ISSUES

- Potential major sources were determined by selecting those facilities that;

  1) listed "major source" or "synthetic minor source" as their Title V status on their questionnaire response

  2) reported their HAP emissions under "maximum design capacity" as greater than 9.1 Mg

  3) listed "area source" or "unknown" as their Title V status, reported actual HAP emissions of greater than 3 Mg, and did not report a "maximum design capacity" were assumed to have the potential to increase their emissions to 9.1 Mg.

ASSUMPTIONS AND POTENTIAL ISSUES

- Unit operations for which we gathered some data include cutting oils and lubricants operations, storage tanks, and waste storage operations. At this point, we do not have enough good data to justify the development of numerical emission limits.

- Emissions from adhesives operations are currently incorporated into our MACT database for determining the floor and calculating the emissions reduction. We may decide later to establish a separate HAP content limit for adhesives. If we remove emissions from adhesive operations from the database, it would not change the MACT floor, but would lower the estimated emissions reduction to about 65%.

- We have not found at this point a need to subcategorize.

DEFINITIONS

- Cleaning operation - A unit operation in which a substrate is cleaned. This term focuses on what is being cleaned (e.g., spray booth cleaning operation or parts cleaning operation). Cleaning may be performed to prepare a surface for coating or for other purposes.

- Coating - A material applied onto or impregnated into a substrate for decorative, protective, or functional purposes. Such materials include, but are not limited to, paints, varnishes, sealants, inks, adhesives, maskants, and temporary coatings. Decorative, protective, or functional materials that consist only of solvents, protective oils, acids, bases, or any combination of these substances are not considered coatings for the purposes of this subpart.

- Cure Volatiles - Reaction products which are emitted during the chemical reaction which takes place in some coating films at the cure temperature. These emissions are other than those from the solvents in the coating and may, in some cases, comprise a significant portion of total VOC and/or volatile HAP emissions.

- Depainting/stripping - Removal of a coating from a substrate such as metal hangers by mechanical, chemical, or thermal means. Cleaning of a substrate with solvent or other surface preparation that occurs prior to the coating application operation is not covered by this term.

DEFINITIONS

- Nonvolatiles or solids - The nonvolatile portion of the coating that after drying makes up the dry film.

- Process (process line) - The aggregate of unit operations necessary for producing a product. The emissions from a process includes all sources of air emissions (e.g., storage, transfer, handling, mixing, painting, and packaging).

- Unit operation - An industrial operation, classified or grouped according to its function in an operating environment (i.e., a paint mixing vessel, a spray booth, etc.).

- Unit operation system (UOS) - The ensemble of equipment around which a material balance is performed. The "boundary" of a UOS may include one or more unit operations (e.g., a coating line or a coating line plus mixing tanks). What constitutes a UOS for presenting emissions/waste data needs to be defined on an industry by industry basis. However, common UOSs may be found across industries.

- Work Practice - Specific activities that lead to a reduction in emissions (or waste) or have the potential to do so. The activities include operator training, management directives, work procedures or techniques for conducting emission (or waste) generating operations or for reducing or eliminating the need for such operations.

EXAMPLE MACT FLOOR CALCULATION

- The MACT floor is the arithmetic average of the emission limits achieved by the best performing 12 percent of the facilities in the MACT floor database

- With 54 facilities in the current MACT floor database, the best performing 12% of these facilities would include: 54 x 0.12 = 6.48 facilities; because this is greater than 6 facilities, we used 7 facilities

- These 7 MACT floor facilities (shaded on Table 1) have reported emission limits as follows:

FACILITY	EMISSION LIMIT (kg HAP/L solids)
A	0.0432
B	0.0808
C	0.1429
D	0.1572
E	0.1918
F	0.2008
G	0.2150
	1.0317

- The MACT floor is the arithmetic average of the emission limits of these 7 facilities

- The arithmetic average of these 7 facilities' emission limits is calculated by dividing the sum of the limits (1.03) by the number of facilities (7): 1.03/7= 0.15

- The MACT floor is: **0.15 kilograms of HAP per liter of solids (nonvolatiles) in the coatings applied**

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