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DATE 6/3/87

TO Arch MacQueen
EPA/MDAD
MD-14

SUBJECT Polymeric Coating of Supporting Substrates AP-42 Section

I have enclosed the newly published background information document (BID) for the proposed NSPS ~~for~~ this source category. It is listed as reference #1 in the AP-42 section submitted to you for review last October.

When can we expect to receive your comments on the section? We (MRI) have a mailbox at MD-13 on the 7th floor of the Mutual Building.

SIGNED Stephen W. Edgerton

INTEROFFICE COMMUNICATION

FILE COPY

MIDWEST RESEARCH INSTITUTE

June 22, 1984

To: Magnetic Tape Project File, MRI Project 7701-L, ESED Project 83/18

From: Cecily M Beall

Subject: Distribution of Emissions Between Coating Mix Preparation Area and the Coating Line

The contribution of VOC emissions from coating mix preparation to total VOC emissions from magnetic tape coating was estimated from actual emission data provided by two magnetic tape manufacturers.[1,2] Analysis of the information indicated that VOC emissions from coating mix preparation contribute approximately 10 percent of the emissions from the coating line. The calculation procedures and calculations are attached. Written estimates based on experience and engineering judgement were also obtained from five magnetic tape manufacturers.[3,7] (A summary of these data is attached.) These estimates of the relative proportion of VOC emissions from the mix room range from 1 to 8 percent. Because the estimates provided by the Section 114 information respondents were based on educated guesses[8,9], and not actual data, the estimate calculated from measured VOC emission levels was used to represent the contribution of VOC emission from coating mix preparation to total emissions from the model plants.

References

1. Memorandum from Meyer, J., MRI, to Johnson, W., EPA. March 10, 1983. Trip report: Columbia Magnetic Products in Carrollton, Georgia.

2. Memorandum from Buzenberg, R., DPRA, to Johnson, W., EPA:CPB and Short, R., EPA. November 11, 1981. Trip Report: IBM Corp., facility in Boulder, Colorado. Attachments.

3. Letter and attachments from Lusk, L., IBM, to Farmer, J., EPA. June 28, 1983. Magnetic tape manufacturing facility Section 114 information request response.

4. Letter and attachments from Henning, T., Syncom, to Farmer, J., EPA. May 12, 1983. Magnetic tape manufacturing facility Section 114 information request response.

5. Letter and attachments from Harper, S., Verbatim Corp., to Farmer, J., EPA. August 17, 1983. Magnetic tape manufacturing facility Section 114 information request response.

6. Letter and attachment from Lee, J., 3M Co., to Farmer, J., EPA. October 24, 1983. Magnetic tape manufacturing facility Section 114 information request response.

7. Letter from Weiler, H., American Video Tape, to Farmer, J., EPA. February 13, 1984. Magnetic tape manufacturing facility Section 114 information request response.

8. Telecon. Meyer, J., MRI, with Lusk, L., IBM Corp. July 29, 1983. Clarification of responses to Section 114 information request.

9. Telecon. Beall, C., MRI, with Henning, T., Syncom. July 22, 1983. Clarification of responses to Section 114 information request.

Attachment

Attachment

Calculations

A. Estimate Based on Information Obtained From CBS, Carrollton, Georgia

1. Data

- The ventilation system at CBS captured VOC emissions from the coating application/flashoff area, drying oven, mixers, mills, holding tanks, wash sinks, and all other sources of fugitive VOC emissions. During the plant visit, the following information was obtained:
- Flow rate to carbon adsorber = 12,000 acfm (constant by design)
- Inlet temperature = 100°F
- Inlet concentration during coating operations = 10-15 percent of the lower explosive limit (LEL)
- Inlet concentration during standby period = ~190 ppm observed
- Activity during standby period = mix preparation, mix storage, no equipment cleaning observed
- Solvent formulation was 60 percent (volume) tetrahydrofuran (THF) and 40 percent (volume) toluene.

2. Calculations

- Molecular weight (MW) of solvent mixture:

Compound	MW	Reference
THF	72.12	1
Toluene	92.15	2

$$\text{Average MW} = 0.6\ (MW_{THF}) + 0.4\ (MW_{Toluene})$$
$$= 0.6\ (72.12) + 0.4\ (92.15)$$
$$= 80.1\ \text{g/mole}$$

- Average LEL:

Compound	Percent by volume	Reference
THF	2.0	3
Toluene	1.3	3

$$\text{Average LEL} = 0.6\ (2.0) + 0.4\ (1.3)$$
$$= 1.72\ \text{percent by volume}$$

· Inlet concentration during coating operations:

Conc. = (0.1)1.72% by volume
= $(0.172 \times 10^{-2})(10^6$ ppm/100%)
= 1.72×10^3 ppm
= 1,700 ppm

Conc. = $(0.15)(1.72 \times 10^{-2}) \times 10^6$ ppm
= 2,580 ppm

· Emission rate from fugitive source:

(χ = 190 ppm)

Assumed inlet conc. = 190 ppm ≅200 ppm

-- Volume flow rate of VOC at 100°F:
(200 ppm)[(10^{-6} ft^3 VOC/ft^3 air)/ppm] = 2×10^{-4} ft^3 VOC/ft^3 air

(2×10^{-4} ft^3 VOC/ft^3 air)(12,000 ft^3 air/min)
= 2.4 ft^3 VOC/min at 100°F

-- Volume flow rate of VOC's at 70°F:

(2.4 ft^3/min)(460 + 70/460 + 100) = (2.4 ft^3/min)((530/560)
= 2.27 ft^3/min of VOC
= (2.27 ft^3/min)(28.32ℓ/ft^3)
= 64.33 ℓ/min

-- Moles of VOC per hour:

(64.33ℓ VOC/min)(mole/24.14ℓ)$_{21°C}$ = 2.665 mole/min x 60 min/h
= 160 mole/h

-- Mass of VOC per hour:

(160 moles VOC/h)(80.1 g/mole) = (12,816 g/h)(lb/453.6 g)
= 28.25 lb/h

· Emission rate during coating of tape:

Inlet conc. = 1,700 ppm
2,600 ppm

-- Volume flow rate of VOC's at 100°F:

Volume = (χ)(10^{-6} ft^3 VOC/ft^3 air)(12,000 ft^3/min)
= ft^3/min at 100°F

χ	$\times 10^{-3}$ ft^3/ft^3	ft^3/min
1,700	1.7	20.4
2,600	2.6	31.2

-- Volume flow rate of VOC's at 70°F:

Volume = $(ft^3/min)(460+70/460+100)$
= $ft^3/min\ (530/560) \times 28.32 \ell/ft^3$

X	ft^3/min at 100°F	ft^3/min at 70°F	ℓ/min
1,700	20.4	19.3	546.6
2,600	31.2	29.5	835.4

-- Moles of VOC per hour:

$moles/h = (\ell/min)(mole/24.14\ell)_{21°C}(60\ min/h)$

X	ℓ/min	mole/h
1,700	546.6	1.359×10^3
2,600	835.4	2.076×10^3

-- Mass of VOC per hour:

mass/h = (mole/h)(80.1 g/mole)
= (g/h)(lb/453.6 g)
= lb/h

X	mole/h	g/h	lb/h
1,700	1.359×10^3	1.089×10^5	240
2,600	2.076×10^3	1.663×10^5	367

· Comparison of fugitive emissions with process emissions:

X process	Fugitive emissions[a]/process emissions
1,700	0.118
2,600	0.077

[a]Estimated to be 28.2 lb/h

Average ratio = [(0.118)+(0.077)]/2 = 0.097

B. Estimate Based on Information Obtained From Confidential Reference --

1. Measurement Data*

Mix-room emissions = 203 tons/yr
Coater emissions = 1,650 tons/yr
Total emission = 1,853 tons/yr

*These are not the reported values, which are confidential. Calculations with actual values gave similar results.

2. Calculations

· Comparison of fugitive emissions to total emissions from line:

Mix room = (203 tons/yr)/(1,853 tons/yr) = 11%
Coaters = (1,650 tons/yr)/1,853 tons/yr) = 89%

The precision of the data used in these calculations is unknown because the analytical method is unknown.

C. Average Relative Contribution of Mix Room Emissions to Total Plant Emissions

· Summary of individual estimates:

CBS = 7.7 to 11.8%
Confidential reference = 11.0%

· Calculation procedure for range of values:

$$\text{Average percent} = [CBS_{\text{min, mid, or max}} + 11.0]/2$$

· Results:

	Calculation values	Mix room/total, %
Mininum	(7.7+11.0)/2	9.4
Midpoint	(9.75+11.0)/2	10.4
Maximum	(11.8+11.0)/2	11.4

The precision of the estimate is probably not good to 1 percent. Therefore, it is estimated that, on the average, mix-room emissions contribute an additional 10 percent to the coating line emissions.

D. Relative VOC Emissions Based on Written Estimates

Coating operation emissions, % of total	Mix room emissions, % of total
98	2
95	5
99	1
93	7
92	8
Average: 95.4	4.6

E. References

1. Handbook of Chemistry and Physics. 60th edition. The Chemical Rubber Company. 1967. p. C-312.

2. Reference 1, p. C-518.

3. NIOSH/OSHA. Pocket Guide to Chemical Hazards. DHEW Publication No. 78-210. pp. 176, 180.