POLYURETHANE FOAM BLOWING

GENERIC SCENARIO

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I. INTRODUCTION

This scenario addresses the use of PMN chemicals in the production of polyurethane foams. These chemicals may include isocyanates, polyols, catalysts, surfactants. These Forams are generally classified as rigid or flexible.

Rigid Foam

1. Laminated boardstock - used as sheathing insulation in homes and buildings.

2. Bunstock - used in applications such as pipe insulation.

3. Pour-In-Place/Injection - used for insulation in refrigerator cabinets

4. Sprayed foam - insulation of large and/or complex surfaces such as architectural surfaces where it would not be economical to use boardstock or bunstock.

Flexible Foam

1. Slabstock - used predominantly in furniture, bedding and carpet underlay.

2. Molded - used primarily as seat component in the automotive industry and for some specialized uses in the furniture industry.

Flow diagrams for each of these processes are provided as attachments.

II. Number of Sites

NSPMN ___PV___ x

where:

NSPMN = Number of sites that manufacture polyurethane (PUR)

foam using the PMN chemical

PV = production volume of PMN chemical (kg/yr)

FOAMPV = production volume of PUR foam (kg/site-yr). Assume 4 million kg/site-yr for rigid foam and 5.8 million kg/site-yr for flexible foam (PEI, 1990)

% CONC = concentration of PMN chemical typical foam product. See supplemental information for concentrations of individual components in both rigid and flexible polyurethane foams.

III. DAYS/SITE-YR

Assume 250 days/site-yr for both rigid and flexible polyurethane foam manufacture (PEI, 1990)

IV. WORKER EXPOSURE

A. Number of Workers

Two to ten workers per site for both rigid and flexible polyurethane foam manufacture (PEI, 1990)

B. Exposure Levels

1. CFCs and CFC substitutes

Type of Foam	8-HR TWA Inhalation Exposure	5 minute peak Exposures (ppm)
Rigid	< 500	< 5000
Flexible	< 55	< 550

Source: USEPA, 1990

Dermal exposures are expected to be minimal based on the high volatility.

2. Other Components

For all other chemicals use CEB's standard models for dermal and inhalation exposure (CEB, 1991).

C. Controls

Engineering Controls are designed to control exposure to most hazardous materials (diisocyanates). Toluene diisocyanate (TDI) has an OSHA Short Term Exposure Limit (STEL) of 0.02 ppm and an OSHA Permissible Exposure Limit (PEL) of 0.005 ppm. Methylene bisphenyl isocyanate (MDI) has a PEL of 0.02 ppm. Recommended practice for spray foam applicators (rigid foam), both indoor and outdoor, is to wear air-supplied respirators to protect against diisocyanate exposure (Lichtenberg, 90).

IV. Environmental Releases

A. CFCs and CFC substitutes

Rigid Foams

Daily releases (to air) = Use rate x % Release

where:

Use rate = Amount of CFC or CFC blowing agent consumed per day (kg/site-day). Assume 2500 kg/site-day (PEI, 90).

% release = 2.5% laminated boardstock
19% Bunstock
11% Poured foam
10.5% Sprayed foam
Source: EPA, 87a

Flexible Foam

Daily releases (to air) = Use rate

where:

Use rate = amount of CFC or CFC blowing agent consumed per day (Kg/site-day). Assume 435 (kg/site-day) for flexible foam (EPA, 87b).

B. Other Components

Air releases are expected to be negligible due to the typically low vapor pressures of these components. Base releases for cleaning losses and residue in shipping containers using standard CEB assumptions and the following use rates.

Rigid Foam

Assume 19,000 Kg/site-day of foam. Use rates for each component are given below

Component	Kg/site-day
Polyol	5500
Flame Retardant	1300
Surfactant	250
Catalysts	210
CFC-11	2500
Isocyanate	10,000

Flexible Foam

Assume 5000 kg/site-day of foam. Use rates for each component are given below.

Component		kg/site-day
Polyol	=	3125
Isocyanate	=	1320
Catalyst	=	25
CFC -11	=	435

REFERENCES

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