

APPENDIX E

Painting and Adhesive Emission Estimates

*Redman Home Builders
Weiser, Idaho*

*T200072
September 2000*

REDMAN HOME BUILDERS

1425 Sunnyvale Road, Weiser, Idaho

EMISSIONS ANALYSIS

PAINT PRODUCTS

PAINT PRODUCT	TAP's	CAS NUMBER	TAP WEIGHT PERCENT	PAINT DENSITY	TAP QUANTITY	MAX. PAINT THROUGHPUT	TAP EMISSIONS	TAP EMISSIONS	SOLIDS VOLUME	SOLIDS QUANTITY
			% by wt	lb/gal	lb/gal	gal/yr	lb/hr	T/yr	%	lb/gal
LOW TEMP35										
	cristobalite	14464-46-1	0.4	9.95	0.04	7797.6	0.04	0.16		
	kaolin	1332-58-7	3	9.95	0.30	7797.6	0.27	1.16	34	3.36
	Zinc oxide	1314-13-2	3	9.95	0.30	7797.6	0.27	1.16		
1999 throughput							6498		2.48	

PAINT PRODUCT	TAP's	CAS NUMBER	TAP WEIGHT PERCENT	PAINT DENSITY	TAP QUANTITY	MAX. PAINT THROUGHPUT	TAP EMISSIONS	TAP EMISSIONS	SOLIDS VOLUME	SOLIDS QUANTITY
			% by wt	lb/gal	lb/gal	gal/yr	lb/hr	T/yr	%	lb/gal
Contractor Satin										
	cristobalite	14464-46-1	0.1	10.45	0.01	5221.2	0.0062	0.03		
	kaolin	1332-58-7	5	10.45	0.52	5221.2	0.3114	1.38	41	4.28
	mica	12001-26-2	2	10.45	0.21	5221.2	0.1246	0.55		
1999 throughput							4351		1.94	

PAINT PRODUCT	TAP's	CAS NUMBER	TAP WEIGHT PERCENT	PAINT DENSITY	TAP QUANTITY	MAX. PAINT THROUGHPUT	TAP EMISSIONS	TAP EMISSIONS	SOLIDS VOLUME	SOLIDS QUANTITY
			% by wt	lb/gal	lb/gal	gal/yr	lb/hr	T/yr	%	lb/gal
Vapor Barrier Primer										
	mica	12001-26-2	2	9.91	0.20	2508	0.06	0.25	29	2.97
1999 throughput							2090		0.25	

ADHESIVES

ADHESIVE	TAP's	CAS NUMBER	TAP WEIGHT PERCENT	PAINT DENSITY	TAP QUANTITY	MAXIMUM THROUGHPUT	TAP EMISSIONS	TAP EMISSIONS	AMBIENT ANALYSIS	
			% by wt	lb/gal	lb/gal	gal/yr	lb/hr	T/yr	TAP's	CAS NUMBER
HENKEL URETHANE										
	MDI	101-68-8	30	9.13	2.739	2739	1584	1.49E-06	6.53E-06	
1999 throughput							1320		6.53E-06	

ADHESIVE	TAP's	CAS NUMBER	TAP WEIGHT PERCENT	PAINT DENSITY	TAP QUANTITY	MAXIMUM THROUGHPUT	TAP EMISSIONS	TAP EMISSIONS	AMBIENT ANALYSIS	
			% by wt	lb/gal	lb/gal	gal/yr	lb/hr	T/yr	TAP's	CAS NUMBER
FOAM SUPPLIES										
FOAM NAIL A										
	MDI	101-68-8	45	10.29	4.6305	4644.5481	5.71E-06	2.50E-05	2.50E-05	
1999 throughput							34682	lb/yr	2.50E-05	

Note: MAXIMUM THROUGHPUT = 1999 throughput X 1.2

TAP = TOXIC AIR POLLUTANT

Paint PM-10 transfer efficiency is 50%

TOTAL TAP's	
T/yr	4.67

TOTAL PM-10	
T/yr	13.99

TOTAL VOC's	
T/yr	6.63

AMBIENT ANALYSIS	
TAP's	CAS NUMBER
	cristobalite 14464-46-1
	kaolin 1332-58-7
	mica 12001-26-2
	zinc oxide 1314-13-2
	MDI 101-68-8
AMBIENT ANALYSIS	
CRITERIA AIR POLLUTANTS	PM-10 EMISSIONS
	lb/hr
PM-10	3.19
	VOC EMISSIONS
	lb/hr
VOC	1.51



**MID WESTERN DIVISION
INTER-COMPANY CORRESPONDENCE**

RECEIVERS LOCATION AND DEPARTMENT

DATE

January 25, 1999

TO (INDIVIDUALS NAME)

Mark Elliott

SENDERS LOCATION, DEPARTMENT, AND TELEPHONE NUMBER

Mid Western Div - Strongsville, OH

REFER TO LETTER OF

SUBJECT

**CHAMPION HOMES REQUEST FOR
ETHYLENE GLYCOL FREE PRODUCTS**

Per your request, our product development lab has investigated the use of Ethylene Glycol in products you sell to Champion Homes. The good news is that none of their products contain Ethylene Glycol, but rather Propylene Glycol, which is free of any HAPS issues.

Following is the list of products we discussed. I trust this is sufficient to resolve their concerns.

Ethylene Glycol Free Products used by Champion Homes

1. Low Temp 35 Satin -- B17 Series
2. Contractor Satin -- B20WF520 Series
3. Vapor Barrier Primer -- B72WF200

If I can be of further assistance, please contact me at 440-846-4317.

Sincerely,



Jon Foerster
Wholesale Marketing Director

JF:rh

cc: D. Olin
T. Braach
B. Karwacki
L. Auctette
J. Collins
B. Clark
Spokane File
Modular Home File

ENCLOSURE # 2

MATERIAL SAFETY DATA SHEET

B17W496
04 00

MANUFACTURER'S NAME
THE SHERWIN-WILLIAMS COMPANY
101 Prospect Avenue N.W.
Cleveland, OH 44115

EMERGENCY TELEPHONE NO.
(216) 566-2917

DATE OF PREPARATION
16-FEB-00

INFORMATION TELEPHONE NO.
(216) 566-2902

Section I -- PRODUCT IDENTIFICATION

PRODUCT NUMBER	HMIS CODES		
B17W496	Health		1*
	Flammability		0
	Reactivity		0
PRODUCT NAME	LOWTEMP 35* Exterior Latex Satin finish, Tinting White		
PRODUCT CLASS	Latex Paint		

Section II -- HAZARDOUS INGREDIENTS

INGREDIENT CAS No.	% by WT	ACGIH TLV	OSHA REL	UNITS	V.P.
Cristobalite 14464-46-1	0.4	0.05	0.05	MG/M3	as Resp. Dust
Kaolin 1332-58-7	3	2		5 MG/M3	as Resp. Dust
Titanium Dioxide 13463-67-7	13	10	10(5)	MG/M3	as Dust ***
Zinc Oxide 1314-13-2	3	10	10(5)	MG/M3	as Dust ***
pH - 9.5					

not regulated

*** Total Dust (Respirable Fraction)

Section III -- PHYSICAL DATA

PRODUCT WEIGHT -- 9.95 lb./gal. EVAPORATION RATE -- Slower than Ether
 SPECIFIC GRAVITY -- 1.20 VAPOR DENSITY -- Heavier than Air > 1
 BOILING POINT -- 212-477 F MELTING POINT -- N.A.
 VOLATILE VOLUME -- 66 % SOLUBILITY IN WATER -- N.A.
 VOC (Theoretical) -- 0.84 lb/gal 101 ga. (less Federally Except Solvents)

Section IV -- FIRE AND EXPLOSION HAZARD DATA

FLASH POINT	LEL	UEL
Not Applicable	N.A.	N.A.

FLAMMABILITY CLASSIFICATION

Not Applicable

EXTINGUISHING MEDIA

Carbon Dioxide, Dry Chemical, Alcohol Foam

UNUSUAL FIRE AND EXPLOSION HAZARDS

Closed containers may explode (due to the build-up of pressure) when exposed to extreme heat.

Continued on page 2

29% propylene glycol

H₂O + VOC < 1%

B17W496 Low Temp 35

page 2

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SPECIAL FIRE FIGHTING PROCEDURES

Full protective equipment including self-contained breathing apparatus should be used. Water spray may be ineffective. If water is used, fog nozzles are preferable. Water may be used to cool closed containers to prevent pressure build-up and possible autoignition or explosion when exposed to extreme heat.

=====

Section V -- HEALTH HAZARD DATA

ROUTES OF EXPOSURE

Exposure may be by INHALATION and/or SKIN or EYE contact, depending on conditions of use. To minimize exposure, follow recommendations for proper use, ventilation, and personal protective equipment.

ACUTE Health Hazards

EFFECTS OF OVEREXPOSURE

Irritation of eyes, skin and upper respiratory system. In a confined area vapors in high concentration may cause headache, nausea or dizziness.

SIGNS AND SYMPTOMS OF OVEREXPOSURE

Redness and itching or burning sensation may indicate eye or excessive skin exposure.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE

None generally recognized.

EMERGENCY AND FIRST AID PROCEDURES

IF INHALED: If affected, remove from exposure. Restore breathing. Keep warm and quiet.

IF ON SKIN: Wash affected area thoroughly with soap and water. Remove contaminated clothing and launder before re-use.

IF IN EYES: Flush eyes with large amounts of water for 15 minutes. Get medical attention.

IF SWALLOWED: Get medical attention.

CHRONIC Health Hazards

Crystalline Silica (Quartz, Cristobalite) is listed by IARC and NTP. Long term exposure to high levels of silica dust, which can occur only when sanding or abrading the dry film, may cause lung damage (silicosis) and possibly cancer.

Rats exposed to titanium dioxide dust at 250 mg./m³ developed lung cancer, however, such exposure levels are not attainable in the workplace.

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Section VI -- REACTIVITY DATA

STABILITY -- Stable

CONDITIONS TO AVOID

None known.

INCOMPATIBILITY

None known.

HAZARDOUS DECOMPOSITION PRODUCTS

By fire: Carbon Dioxide, Carbon Monoxide

HAZARDOUS POLYMERIZATION

Will not occur

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Section VII -- SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

Remove all sources of ignition. Ventilate and remove with inert absorbent.

Continued on page 3

B17W496

Low Temp 35

page 3

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WASTE DISPOSAL METHOD

Waste from this product is not hazardous as defined under the Resource Conservation and Recovery Act (RCRA) 40 CFR 261.

Incinerate in approved facility. Do not incinerate closed container. Dispose of in accordance with Federal, State, and Local regulations regarding pollution.

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Section VIII -- PROTECTION INFORMATION

PRECAUTIONS TO BE TAKEN IN USE

Use only with adequate ventilation. Avoid breathing vapor and spray mist. Avoid contact with skin and eyes. Wash hands after using.

This coating may contain materials classified as nuisance particulates (listed "as Dust" in Section II) which may be present at hazardous levels only during sanding or abrading of the dried film. If no specific dusts are listed in Section II, the applicable limits for nuisance dusts are ACGIH TLV 10 mg./m3 (total dust), 3 mg./m3 (respirable fraction), OSHA PEL 15 mg./m3 (total dust), 5 mg./m3 (respirable fraction).

VENTILATION

Local exhaust preferable." General exhaust acceptable if the exposure to materials in Section II is maintained below applicable exposure limits. Refer to OSHA Standards 1910.94, 1910.107, 1910.108.

RESPIRATORY PROTECTION

If personal exposure cannot be controlled below applicable limits by ventilation, wear a properly fitted organic vapor/particulate respirator approved by NIOSH/MSHA for protection against materials in Section II.

When sanding or abrading the dried film, wear a dust/mist respirator approved by NIOSH/MSHA for dust which may be generated from this product, underlying paint, or the abrasive.

PROTECTIVE GLOVES

Wear gloves which are recommended by glove supplier for protection against materials in Section II.

EYE PROTECTION

Wear safety spectacles with unperforated sideshields.

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Section IX -- PRECAUTIONS

DOL STORAGE CATEGORY

Not Applicable

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING

Keep container closed when not in use. Transfer only to approved containers with complete and appropriate labeling. Do not take internally. Keep out of the reach of children.

=====
Section X -- OTHER REGULATORY INFORMATION

SARA 313 (40 CFR 372.630) SUPPLIER NOTIFICATION

Table with 4 columns: CAS No., CHEMICAL/COMPOUND, % by WT, % Element. Row 1: Zinc Compound, 2, 2.0

CALIFORNIA PROPOSITION 65

WARNING: This product contains a chemical known to the State of California to cause cancer.

TSCA CERTIFICATION

All chemicals in this product are listed, or are exempt from listing, on the TSCA Inventory.

B17N496 *Low Temp 35*

page 4

The above information pertains to this product as currently formulated, and is based on the information available at this time. Addition of reducers or other additives to this product may substantially alter the composition and hazards of the product. Since conditions of use are outside our control, we make no warranties, express or implied, and assume no liability in connection with any use of this information.

MATERIAL SAFETY DATA SHEET

B20WF520
01 00

MANUFACTURER'S NAME
THE SHERWIN-WILLIAMS COMPANY
101 Prospect Avenue N.W.
Cleveland, OH 44115

EMERGENCY TELEPHONE NO.
(216) 566-2917

DATE OF PREPARATION
16-FEB-00

INFORMATION TELEPHONE NO.
(216) 566-2902

Section I -- PRODUCT IDENTIFICATION

PRODUCT NUMBER

B20WF520

HMS CODES

Health 1+
Flammability 0
Reactivity 0

PRODUCT NAME

Contractor's Satin Interior Latex Finish, White

PRODUCT CLASS

Latex Paint

Section II -- HAZARDOUS INGREDIENTS

INGREDIENT CAS No.	% by WT	ACGIH TLV	OSHA PEL	UNITS	U.D.
Cristobalite 14464-46-1	0.1	0.05	0.05	MG/M3	as Resp. Dust
Kaolin 1332-50-7	5	2	5	MG/M3	as Resp. Dust
Mica 12001-26-2	2	3	3	MG/M3	as Resp. Dust
Titanium Dioxide. <i>not regulated</i> 13463-67-7	13	10	10(5)	MG/M3	as Dust ***
*** Total Dust (Respirable Fraction)					
pH - 9.5					

Section III -- PHYSICAL DATA

PRODUCT WEIGHT -- 10.45 lb./gal. EVAPORATION RATE -- Slower than Ether
 SPECIFIC GRAVITY -- 1.26 VAPOR DENSITY -- Heavier than Air
 BOILING POINT -- 212-369 F MELTING POINT -- N.A.
 VOLATILE VOLUME -- 59 % SOLUBILITY IN WATER -- N.A.
 VOC (Theoretical) -- 0.95 lb/gal 114 gm. (less Federally Exempt Solvents)

Section IV -- FIRE AND EXPLOSION HAZARD DATA

FLASH POINT LEL UEL
 Not Applicable N.A. N.A.
 FLAMMABILITY CLASSIFICATION
 Not Applicable
 EXTINGUISHING MEDIA
 Carbon Dioxide, Dry Chemical, Alcohol Foam
 UNUSUAL FIRE AND EXPLOSION HAZARDS
 Closed containers may explode (due to the build-up of pressure) when
 exposed to extreme heat.

B20WF520

Contractors Satin

page 2

SPECIAL FIRE FIGHTING PROCEDURES

Full protective equipment including self-contained breathing apparatus should be used. Water spray may be ineffective. If water is used, fog nozzles are preferable. Water may be used to cool closed containers to prevent pressure build-up and possible autoignition or explosion when exposed to extreme heat.

Section V -- HEALTH HAZARD DATA

ROUTES OF EXPOSURE

Exposure may be by INHALATION and/or SKIN or EYE contact, depending on conditions of use. To minimize exposure, follow recommendations for proper use, ventilation, and personal protective equipment.

ACUTE Health Hazards**EFFECTS OF OVEREXPOSURE**

Irritation of eyes, skin and upper respiratory system. In a confined area vapors in high concentration may cause headache, nausea or dizziness.

SIGNS AND SYMPTOMS OF OVEREXPOSURE

Redness and itching or burning sensation may indicate eye or excessive skin exposure.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE

None generally recognized.

EMERGENCY AND FIRST AID PROCEDURES

IF INHALED: If affected, remove from exposure. Restore breathing. Keep warm and quiet.

If on SKIN: Wash affected area thoroughly with soap and water. Remove contaminated clothing and launder before re-use.

If in EYES: Flush eyes with large amounts of water for 15 minutes. Get medical attention.

If SWALLOWED: Get medical attention.

CHRONIC Health Hazards

Crystalline Silica (Quartz, Cristobalite) is listed by IARC and NTP. Long term exposure to high levels of silica dust, which can occur only when sanding or abrading the dry file, may cause lung damage (silicosis) and possibly cancer.

Rats exposed to titanium dioxide dust at 250 mg./m³ developed lung cancer, however, such exposure levels are not attainable in the workplace.

Section VI -- REACTIVITY DATA

STABILITY -- Stable
CONDITIONS TO AVOID

None known.

INCOMPATIBILITY

None known.

HAZARDOUS DECOMPOSITION PRODUCTS

By fire: Carbon Dioxide, Carbon Monoxide

HAZARDOUS POLYMERIZATION

Will not occur

Section VII -- SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

Remove all sources of ignition. Ventilate and remove with inert absorbent.

Continued on page 3

B20WF520

Contractors Satin

page 3

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WASTE DISPOSAL METHOD

Waste from this product is not hazardous as defined under the Resource Conservation and Recovery Act (RCRA) 40 CFR 261.

Incinerate in approved facility. Do not incinerate closed container. Dispose of in accordance with Federal, State, and Local regulations regarding pollution.

=====
Section VIII -- PROTECTION INFORMATION

PRECAUTIONS TO BE TAKEN IN USE

Use only with adequate ventilation. Avoid breathing vapor and spray mist. Avoid contact with skin and eyes. Wash hands after using.

This coating may contain materials classified as nuisance particulates (listed "as Dust" in Section II) which may be present at hazardous levels only during sanding or abrading of the dried film. If no specific dusts are listed in Section II, the applicable limits for nuisance dusts are ACGIH TLV 10 mg./m3 (total dust), 3 mg./m3 (respirable fraction), OSHA PEL 10 mg./m3 (total dust), 5 mg./m3 (respirable fraction).

VENTILATION

Local exhaust preferable. General exhaust acceptable if the exposure to materials in Section II is maintained below applicable exposure limits. Refer to OSHA Standards 1910.34, 1910.107, 1910.108.

RESPIRATORY PROTECTION

If personal exposure cannot be controlled below applicable limits by ventilation, wear a properly fitted organic vapor/particulate respirator approved by NIOSH/MSHA for protection against materials in Section II.

When sanding or abrading the dried film, wear a dust/mist respirator approved by NIOSH/MSHA for dust which may be generated from this product, underlying paint, or the abrasive.

PROTECTIVE GLOVES

Wear gloves which are recommended by glove supplier for protection against materials in Section II.

EYE PROTECTION

Wear safety spectacles with unperforated sideshields.

=====
Section IX -- PRECAUTIONS

DUL STORAGE CATEGORY

Not Applicable

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING

Keep container closed when not in use. Transfer only to approved containers with complete and appropriate labeling. Do not take internally. Keep out of the reach of children.

=====
Section X -- OTHER REGULATORY INFORMATION

SARA 313 (40 CFR 372.650) SUPPLIER NOTIFICATION

CAS No. CHEMICAL/COMPOUND % By WT X Element

No ingredients in this product are subject to SARA 313 (40 CFR 372.650) Supplier Notification.

CALIFORNIA PROPOSITION 65

WARNING: This product contains chemicals known to the State of California to cause cancer.

B20WFS20 Contractors Satin

page-4

TSCA CERTIFICATION

All chemicals in this product are listed, or are exempt from listing, on the TSCA Inventory.

The above information pertains to this product as currently formulated, and is based on the information available at this time. Addition of reducers or other additives to this product may substantially alter the composition and hazards of the product. Since conditions of use are outside our control, we make no warranties, express or implied, and assume no liability in connection with any use of this information.

MATERIAL SAFETY DATA SHEET

B72WF200
02 00

MANUFACTURER'S NAME
THE SHERWIN-WILLIAMS COMPANY
101 Prospect Avenue N.W.
Cleveland, OH 44115

EMERGENCY TELEPHONE NO.
(216) 566-2917

DATE OF PREPARATION
16-FEB-00

INFORMATION TELEPHONE NO.
(216) 566-2902

Section I -- PRODUCT IDENTIFICATION

PRODUCT NUMBER	B72WF200	HMIS CODES	
		Health	1*
		Flammability	0
		Reactivity	0
PRODUCT NAME	FROMAK* Moisture Vapor Barrier		
PRODUCT CLASS	Latex Paint		

Section II -- HAZARDOUS INGREDIENTS

INGREDIENT	CAS No.	% by WT	ACGIH TLV	OSHA PEL	UNITS	V.P.
Mica	12001-26-2	2	3	3	MG/M3 as Resp. Dust	
Calcium Carbonate.	471-34-1	5	10	15(S)	MG/M3 as Dust ***	
Titanium Dioxide.	13463-67-7	8	10	10(S)	MG/M3 as Dust ***	
pH - 9.0						

not regulated

Section III -- PHYSICAL DATA

PRODUCT WEIGHT -- 9.91 lb./gal. EVAPORATION RATE -- Slower than Ether
 SPECIFIC GRAVITY -- 1.19 VAPOR DENSITY -- Heavier than Air
 BOILING POINT -- 212-369 F MELTING POINT -- N.A.
 VOLATILE VOLUME -- 71 % SOLUBILITY IN WATER -- N.A.
 VOC (Theoretical) -- 0.70 lb/gal 84 gr. (less Federally Exempt Solvents)

Section IV -- FIRE AND EXPLOSION HAZARD DATA

FLASH POINT LEL UEL
 Not Applicable N.A. N.A.
 FLAMMABILITY CLASSIFICATION
 Not Applicable
 EXTINGUISHING MEDIA
 Carbon Dioxide, Dry Chemical, Alcohol Foam
 UNUSUAL FIRE AND EXPLOSION HAZARDS
 Closed containers may explode (due to the build-up of pressure) when exposed to extreme heat.

B72WF200 Vapor Barrier

page 2

SPECIAL FIRE FIGHTING PROCEDURES

Full protective equipment including self-contained breathing apparatus should be used. Water spray may be ineffective. If water is used, fog nozzles are preferable. Water may be used to cool closed containers to prevent pressure build-up and possible autoignition or explosion when exposed to extreme heat.

Section V -- HEALTH HAZARD DATA

ROUTES OF EXPOSURE

Exposure may be by INHALATION and/or SKIN or EYE contact, depending on conditions of use. To minimize exposure, follow recommendations for proper use, ventilation, and personal protective equipment.

ACUTE Health Hazards
EFFECTS OF OVEREXPOSURE

Irritation of eyes, skin and upper respiratory system. In a confined area vapors in high concentration may cause headache, nausea or dizziness.

SIGNS AND SYMPTOMS OF OVEREXPOSURE

Redness and itching or burning sensation may indicate eye or excessive skin exposure.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE

None generally recognized.

EMERGENCY AND FIRST AID PROCEDURES

If INHALED: If affected, remove from exposure. Restore breathing.

Keep warm and quiet.

If on SKIN: Wash affected area thoroughly with soap and water.

Remove contaminated clothing and launder before re-use.

If in EYES: Flush eyes with large amounts of water for 15 minutes.

Get medical attention.

If SWALLOWED: Get medical attention.

CHRONIC Health Hazards

No ingredient in this product is an IARC, NTP or OSHA listed carcinogen.

Rats exposed to titanium dioxide dust at 250 mg./m³ developed lung cancer, however, such exposure levels are not attainable in the workplace.

Section VI -- REACTIVITY DATA

STABILITY -- Stable
CONDITIONS TO AVOID

None known.

INCOMPATIBILITY

None known.

HAZARDOUS DECOMPOSITION PRODUCTS

By fire: Carbon Dioxide, Carbon Monoxide

HAZARDOUS POLYMERIZATION

Will not occur

Section VII -- SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

Remove all sources of ignition. Ventilate and remove with inert absorbent.

872WF200 Vapor Barrier

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WASTE DISPOSAL METHOD

Waste from this product is not hazardous as defined under the Resource Conservation and Recovery Act (RCRA) 40 CFR 261.

Incinerate in approved facility. Do not incinerate closed container. Dispose of in accordance with Federal, State, and Local regulations regarding pollution.

=====
Section VIII -- PROTECTION INFORMATION

PRECAUTIONS TO BE TAKEN IN USE

Use only with adequate ventilation. Avoid breathing vapor and spray mist. Avoid contact with skin and eyes. Wash hands after using.

This coating may contain materials classified as nuisance particulates (listed "as Dust" in Section II) which may be present at hazardous levels only during sanding or abrading of the dried film. If no specific dusts are listed in Section II, the applicable limits for nuisance dusts are ACGIH TLV 10 mg./m3 (total dust), 3 mg./m3 (respirable fraction), OSHA PEL 15 mg./m3 (total dust), 5 mg./m3 (respirable fraction).

VENTILATION

Local exhaust preferable. General exhaust acceptable if the exposure to materials in Section II is maintained below applicable exposure limits. Refer to OSHA Standards 1910.94, 1910.107, 1910.108.

RESPIRATORY PROTECTION

If personal exposure cannot be controlled below applicable limits by ventilation, wear a properly fitted organic vapor/particulate respirator approved by NIOSH/MSHA for protection against materials in Section II.

When sanding or abrading the dried film, wear a dust/mist respirator approved by NIOSH/MSHA for dust which may be generated from this product, underlying paint, or the abrasive.

PROTECTIVE GLOVES

Wear gloves which are recommended by glove supplier for protection against materials in Section II.

EYE PROTECTION

Wear safety spectacles with unperforated sideshields.

=====
Section IX -- PRECAUTIONS

DOL STORAGE CATEGORY

Not Applicable

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING

Keep container closed when not in use. Transfer only to approved containers with complete and appropriate labeling. Do not take internally. Keep out of the reach of children.

=====
Section X -- OTHER REGULATORY INFORMATION

SARA 313 (40 CFR 372.650) SUPPLIER NOTIFICATION

CAS No. CHEMICAL/COMPOUND % by WT % Element

No ingredients in this product are subject to SARA 313 (40 CFR 372.650) Supplier Notification.

CALIFORNIA PROPOSITION 65

WARNING: This product contains chemicals known to the State of California to cause cancer.

872WF200

Vapor Barrier

page 4

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TSCA CERTIFICATION

All chemicals in this product are listed, or are exempt from listing, on the TSCA Inventory.

The above information pertains to this product as currently formulated, and is based on the information available at this time. Addition of reducers or other additives to this product may substantially alter the composition and hazards of the product. Since conditions of use are outside our control, we make no warranties, express or implied, and assume no liability in connection with any use of this information.

*

1 tot = 320 gal

88 TOTES
1 c/H

HENKEL ADHESIVES CORP/EL
740 TOLLGATE ROAD
ELGIN IL 60123
847-931-9980

HENKEL ADHESIVES
740 TOLLGATE RD
ELGIN IL 60123

INVOICE#:
DATE: 07/31/98
PAGE: 1

24-HOUR EMERGENCY PHONE NO: CHEMTREC, 800/424-9300

MATERIAL SAFETY DATA SHEET

CHEMICAL NAME:
NONE

GRADE NAME: HENKEL# UR-8225BH-S
(5000 LBS. NOT HAZARDOUS

CHEMICAL FAMILY:
URETHANE

FORMULA:
MIXTURE

HAZARD CLASS:

U.N. NUMBER: PACKING GROUP:

*floor glue,
wall panels
- panel adhesive
not for*

***** HAZARDOUS COMPONENTS *****

NAME: DIPHENYLMETHANE-DIISOCYANATE (MDI)

CAS NUMBER:
101-68-8

% BY WEIGHT:
10-30%

ACGIH TLV: .005 PPM
OSHA PEL: .02 PPM
USHA STEL: NOT LISTED
COMMENT:

$MDI = (9.13 \text{ lb/gal}) \times (0.3) = 2.74 \text{ lb/gal}$

***** PHYSICAL PROPERTIES DATA *****

BOILING POINT: DECOMPOSES AT 646 F
SPECIFIC GRAVITY: 1.1 $(8.3 \text{ lb/gal} \times 1.1) = 9.13 \text{ lb/gal}$
VAPOR PRESSURE (mm HG AT 20 DEG C): BELOW 0.0004
PERCENT VOLATILE: NEGLIGIBLE
VAPOR DENSITY: (AIR = 1) 8.6
EVAPORATION RATE: NIL
SOLUBILITY IN WATER: REACTS
pH: NOT APPLICABLE
APPEARANCE AND ODOR:
DARK BROWN VISCOUS LIQUID WITH SLIGHT AROMATIC ODOR.

INVOICE#:
DATE: 07/31/98
PAGE: 2

MATERIAL SAFETY DATA SHEET

(HENKEL #: UR-8225BH-S)

***** FIRE AND EXPLOSION HAZARD DATA *****

FLASH POINT & METHOD: & METHOD: > 200 C
(CLEVELAND OPEN CUP)
FLAMMABLE LIMITS: N/A
LEL%: N/A
UEL%: N/A
EXTINGUISHING MEDIA:
DRY CHEMICAL, FOAM, CARBON DIOXIDE, HALON 1211. IF WATER IS USED,
USE VERY LARGE QUANTITIES. THE REACTION BETWEEN WATER AND HOT
ISOCYANATE MAY BE VIGOROUS.
SPECIAL FIRE FIGHTING PROCEDURES:
SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE
AND PROTECTIVE CLOTHING.
UNUSUAL FIRE & EXPLOSION HAZARDS:
WATER CONTAMINATION WILL PRODUCE CARBON DIOXIDE. DO NOT RESEAL
CONTAMINATED CONTAINER AS PRESSURE BUILDUP MAY RUPTURE THEM.

***** HEALTH HAZARD INFORMATION *****

THRESHOLD LIMIT VALUE: .02PPM CEILING
PRIMARY ROUTES OF EXPOSURE: SKIN, NOSE, MOUTH, EYES
OTHER EFFECTS OF OVEREXPOSURE: NO OTHER ADVERSE CLINICAL EFFECTS
ARE KNOWN TO BE ASSOCIATED WITH EXPOSURES TO THIS MATERIAL.
EYE CONTACT:
THIS MATERIAL WILL PROBABLY IRRITATE HUMAN EYES FOLLOWING CONTACT.
SKIN CONTACT: NO IRRITATION IS LIKELY TO DEVELOP
FOLLOWING CONTACT WITH HUMAN SKIN. DERMATITIS AND SKIN
SENSITIZATION CAN DEVELOP AFTER REPEATED AND/OR PROLONGED CONTACT.
INHALATION:
NO HARMFUL EFFECTS OCCURED WHEN RATS WERE EXPOSED ACUTELY FOR 6-8
HOURS TO AIR SATURATED WITH VAPORS OF A SIMILAR MATERIAL.
HOWEVER, EVIDENCE SUGGEST THAT MDI CAN INDUCE ASTHMA-LIKE
RESPIRATORY SENSITIZATION WHICH IS SIMILAR TO TDI SENSITIZATION.
VAPORS AND AEROSOLS CAN IRRITATE EYES, NOSE AND RESPIRATORY
PASSAGES AND CAN RESULT IN PERMANENT DECREASES IN LUNG FUNCTION.
INGESTION:
THE ACUTE ORAL LD50 IN RATS IS PROBABLY ABOVE 10G/KG. RELATIVE TO
OTHER MATERIALS, A SINGLE DOSE OF THIS PRODUCT IS PRACTICALLY
NONTOXIC BY INGESTION. IRRITATION OF THE MOUTH, PHARYNX, ESOPHAGUS
AND STOMACH CAN DEVELOP FOLLOWING INGESTION.
CHRONIC EFFECTS OF EXPOSURE: AS NOTED ABOVE

***** FIRST AID *****

EYE FIRST AID:
IMMEDIATELY FLUSH WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES

INVOICE#:
DATE: 07/31/98
PAGE:

MATERIAL SAFETY DATA SHEET

(HENKEL #: UR-8225BH-S)

AND HAVE EYES EXAMINED AND TREATED BY MEDICAL PERSONNEL.

SKIN FIRST AID:

WASH MATERIAL OFF SKIN WITH PLENTY OF SOAP & WATER. IF REDNESS, ITCHING OR BURNING SENSATION DEVELOPS, GET MEDICAL ATTENTION.

INHALATION FIRST AID:

REMOVE VICTIM TO FRESH AIR. IF COUGH OR OTHER RESPIRATORY SYMPTOMS DEVELOP CONSULT MEDICAL PERSONNEL.

INGESTION FIRST AID: GIVE ONE OR TWO GLASSES OF WATER TO DRINK. IF GASTROINTESTINAL SYMPTOMS DEVELOP CONSULT MEDICAL PERSONNEL. (NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON.)

***** REACTIVITY DATA *****

STABLE OR UNSTABLE: STABLE

CONDITIONS TO AVOID: STABLE UNDER NORMAL CONDITIONS.

INCOMPATIBILITY:

THIS PRODUCT WILL REACT WITH ANY MATERIALS CONTAINING ACTIVE HYDROGENS SUCH AS WATER, ALCOHOL, AMMONIA, AMINES, ALKALIES AND ACIDS. THE REACTION WITH WATER IS VERY SLOW UNDER 50 C BUT IS ACCELERATED AT A HIGHER TEMPERATURE & IN THE PRESENCE OF ALKALIE, TERTIARY AMINE AND METAL COMPOUNDS. SOME REACTIONS CAN BE VIOLENT.

HAZARDOUS DECOMPOSITION PRODUCTS:

COMBUSTION PRODUCTS ARE CARBON DIOXIDE, CARBON MONOXIDE, NITROGEN OXIDES, TRACES OF HYDROGEN CYANIDE.

HAZARDOUS POLYMERIZATION: MAY OCCUR

CONDITIONS TO AVOID:

HIGH TEMPERATURES AND THE PRESENCE OF ALKALIES, TERTIARY AMINES, AND MET COMPOUNDS WILL ACCELERATE POLYMERIZATION. POSSIBLE EVOLUTION OF CARBON DIOXIDE GAS MAY RUPTURE CLOSED CONTAINERS.

***** SPILL AND DISPOSAL PROCEDURES *****

SPILL PROCEDURES:

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: WEAR SKIN, EYE AND RESPIRATORY PROTECTION DURING CLEAN UP. MIX WITH AN ABSORBENT AND SHOVEL INTO WASTE CONTAINER. COVER CONTAINER, BUT DO NOT SEAL, AND REMOVE IT FROM THE WORK AREA. PREPARE A DECONTAMINATION SOLUTION OF 0.2-5% LIQUID DETERGENT AND 3-8% CONCENTRATED AMMONIUM HYDROXIDE IN WATER (5-10% SODIUM CARBONATE MAY BE SUBSTITUTED FOR THE AMMONIUM HYDROXIDE.) TREAT THE SPILL AREA WITH THIS SOLUTION, USING ABOUT 10 PARTS SOLUTION FOR EACH PART OF SPILL & ALLOW IT TO REACT FOR 10 MINS. CARBON DIOXIDE WILL BE EVOLVED, LEAVING INSOLUBLE POLYUREAS.

DISPOSAL PROCEDURES:

SLOWLY STIR THE ISOCYANATE WASTE INTO THE DECONTAMINATION SOLUTION DESCRIBED ABOVE, USING 10 PARTS OF THE SOLUTION FOR EACH PART OF ISOCYANATE. LET STAND FOR 48 HOURS ALLOWING THE EVOLVED CARBON DIOXIDE TO VENT AWAY. NEUTRALIZE THE WASTE. NEITHER THE SOLID

INVOICE#: _____
DATE: 07/31/98
PAGE: _____

MATERIAL SAFETY DATA SHEET

(HENKEL #: UR-8225BH-S)

NOR THE LIQUID PORTION IS A HAZARDOUS WASTE UNDER RCRA,
40 CFR 261.

***** PROTECTIVE EQUIPMENT *****

VENTILATION: USE LOCAL EXHAUST TO KEEP EXPOSURES TO A MINIMUM.

RESPIRATORY PROTECTION:

BECAUSE OF THE LOW VAPOR PRESSURE, VENTILATION IS USUALLY
SUFFICIENT TO KEEP VAPORS BELOW THE TLV AT ROOM TEMPERATURES.
EXCEPTIONS ARE WHEN THE MATERIAL IS SPRAYED OR HEATED. IF
NECESSARY, USE A MSHA NIOSH APPROVED POSITIVE PRESSURE SUPPLIED
AIR RESPIRATOR WITH A FULL FACE PIECE. EMERGENCIES USE POSITIVE
PRESSURE/SELF-CONTAINED BREATHING APPARATUS.

PROTECTIVE CLOTHING: GLOVES, APRON, ARM COVERS OR FULL BODY SUIT.

EYE PROTECTION:

EYE WASH STATION IN WORK AREA. CHEMICAL TIGHT GOGGLES;
FULL FACESHIELD IN ADDITION IF SPLASHING IS POSSIBLE.

***** SPECIAL PRECAUTIONS *****

HANDLING & STORAGE PRECAUTIONS:

PREVENT SKIN AND EYE CONTACT. OBSERVE TLV LIMITATIONS. AVOID
BREATHING VAPORS OR AEROSOLS. A SENSITIZED INDIVIDUAL SHOULD NOT
BE EXPOSED TO THE PRODUCT WHICH CAUSED THE SENSITIZATION. STORE
IN TIGHTLY SEALED CONTAINERS TO PROTECT FROM ATMOSPHERIC MOISTURE.
STORE AT TEMPERATURE OF 60-100 F.

SPECIAL COMMENTS:

NONHAZARDOUS INGREDIENTS WITHHELD UNDER PA TRADE SECRET STATUS.

EPA SARA TITLE III HAZARD CLASS:

COMBUSTIBLE LIQUID
WATER REACTIVE

THIS PRODUCT CONTAINS THE FOLLOWING CHEMICALS SUBJECT TO THE REPORTING
REQUIREMENTS OF EPA SARA TITLE III SECTION 313 (40CFR372):

CHEMICAL	CAS NUMBER	WEIGHT PERCENT
DIPHENYLMETHANE-DIISOCYANATE (MDI)	101-68-8	N/A

THE INFORMATION SUPPLIED HEREIN RELATES TO THE PRODUCT NAMED AND IS BASED UPON
INFORMATION HENKEL ADHESIVES BELIEVES TO BE ACCURATE. NO WARRANTY, EXPRESS OR
IMPLIED, IS INTENDED. THIS INFORMATION IS OFFERED SOLELY FOR YOUR CONSIDERATION
AND INTERPRETATION.

PREPARED BY: JOHN CAIN

DATE: 11/21/97

Material Safety Data Sheet

Date Revised: 1/4/1999

Date Printed: 2/4/1999

Foam Supplies, Inc.
4387 North Rider Trail
Earth City, MO 63045-1103

Emergency Phone Number
Day: 314-344-3330
Night: 314-344-3330

1. Chemical Product & Company Identification

Name: FoamNail® Part A }
Class: Polyurethane Adhesive } *Sealing Foam*

2. Composition/Information on Ingredients

Polymethylene polyphenyl isocyanate	CAS# 009016-87-9	90-100% <i>not regulated</i>
containing 4,4' Methylene bisphenyl isocyanate	CAS# 000101-68-8	42-45%
(see Regulatory Information Page)		

3. Hazards Identification

EMERGENCY OVERVIEW

Brown liquid. Harmful if inhaled. May cause allergic skin reaction. May cause allergic respiratory reaction. Toxic fumes are released in fire situations. Avoid temperature above 105F (41C). Toxic flammable gases and heat are released under decomposition conditions. Reacts slowly with water, releasing carbon dioxide, which can cause pressure buildup and rupture of closed containers. Elevated temperatures accelerate this process.

POTENTIAL HEALTH EFFECTS (See Section 2 for toxicological data.)

EYE: May cause moderate eye irritation. May cause very slight transient (temporary) corneal injury.

SKIN: Prolonged or repeated exposure may cause skin irritation. Skin contact may result in allergic skin reactions or respiratory sensitization but is not expected to result in absorption of amounts sufficient to cause other adverse effects. May stain skin.

INGESTION: Single dose oral toxicity is considered to be extremely low. No hazards anticipated from swallowing small amounts incidental to normal handling operations.

INHALATION: At room temperature, vapors are minimal due to low vapor pressure. However, certain operations may generate vapor or aerosol concentrations sufficient to cause irritation or other adverse effects. Such operations include those in which the material is heated, sprayed, or otherwise mechanically dispersed such as drumming, venting or pumping. Excessive exposure may cause irritation of the eyes, upper respiratory tract, and lungs. May cause respiratory sensitization in susceptible individuals. MDI concentrations below the exposure guidelines may cause allergic respiratory reactions in individuals already sensitized. Symptoms may include coughing, difficult breathing and a feeling of tightness in the chest. Effects may be delayed. Impaired lung function (decreased ventilatory capacity) has been associated with overexposure to isocyanates.

CHRONIC EFFECTS:

SYSTEMIC (OTHER TARGET ORGAN) EFFECTS: Tissue injury in the upper respiratory tract and lung has been observed in laboratory animals after repeated excessive exposures to MDI/polymeric MDI aerosols.

CANCER INFORMATION: Lung tumors have been observed in laboratory animals exposed to aerosol droplets of MDI/Polymeric MDI (6 mg/m³) for their lifetime. Tumors occurred concurrently with respiratory irritation and lung injury. Current exposure guidelines are expected to protect against these effects.

TERATOLOGY (BIRTH DEFECTS): In laboratory animals, MDI/polymeric MDI did not produce birth defects; other fetal effects occurred only at high doses which were toxic to the mother.

4. First Aid

EYES: Irrigate with flowing water immediately and continuously for 15 minutes. Consult medical personnel.

SKIN: Wash with soap and plenty of water (warm water is preferable if readily available).

INGESTION: If swallowed, seek medical attention. Do not induce vomiting unless directed to do so by medical personnel.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, oxygen should be administered by qualified personnel. Call a physician or transport to a medical facility.

NOTE TO PHYSICIAN: May cause respiratory sensitization or asthma-like symptoms. Bronchodilators, expectorants, and antitussives may be of help. Respiratory symptoms, including pulmonary edema, may be delayed. Persons receiving significant respiratory distress. No specific antidote. Supportive care. Treatment based on judgment of the physician in response to reactions of the patient.

5. Fire Fighting Measures

FLAMMABLE PROPERTIES

FLASH POINT: >400°F, >204°C

METHOD USED: PMCC, ASTM D93

AUTOIGNITION TEMPERATURE: >1100 F 600 C

FLAMMABILITY LIMITS

LFL: Not determined

UFL: Not determined

HAZARDOUS COMBUSTION PRODUCTS: During a fire, smoke may contain the original material in addition to unidentified toxic and/or irritating compounds. Hazardous combustion products may include but are not limited to: nitrogen oxides, isocyanates, hydrogen cyanide, carbon monoxide, and carbon dioxide.

OTHER FLAMMABILITY INFORMATION: Dense smoke is produced when product burns. Violent steam generation or eruption may occur upon application of direct water stream to hot liquids. Spills of these organic liquids on hot fibrous insulations may lead to lowering of the autoignition temperatures possibly resulting in spontaneous combustion. Product reacts with water. Reaction may produce heat and/or gases. Container may rupture from gas generation in a fire situation. This reaction may be violent.

EXTINGUISHING MEDIA: Water fog or fine spray, carbon dioxide, dry chemical, foam. Alcohol resistant foams (ATC type) are preferred if available. General purpose synthetic foams (including AFFF) or protein foams may function, but much less effectively. Do not use direct water stream. May spread fire.

MEDIA TO BE AVOIDED: Do not use direct water stream.

FIRE FIGHTING INSTRUCTIONS: Keep people away. Isolate fire area and deny unnecessary entry. Water is not recommended, but may be applied in large quantities as fine spray when other extinguishing agents are not available. Stay upwind. Keep out of low areas where gases (fumes) can accumulate. Use water spray to cool fire exposed containers and fire affected zone until fire is out. Do not use direct water stream. May spread fire. Fight fire from protected location or safe distance. Consider use of unmanned hose holder or monitor. Immediately withdraw all personnel from area in case of rising sound from venting safety device or discoloration of the container. Move container from fire area if this is possible without hazard.

PROTECTIVE EQUIPMENT FOR FIRE FIGHTERS: Wear positive-pressure self-contained breathing apparatus (SCBA) and protective fire fighting clothing (includes fire fighting helmet, coat, pants, boots, and gloves). Avoid contact with this material during fire fighting operations. If contact is likely, change to full chemical resistant clothing with SCBA. This will not provide sufficient fire protection, consider fighting fire from a remote location. For protective equipment in post-fire or non-fire clean up situations, refer to the relevant sections.

6. Accidental Release Measures

(See Section 15 for Regulatory Information)

PROTECT PEOPLE: Avoid any contact. Barricade area. Clear non-emergency personnel from area. Keep upwind of spill. Ventilate area of leak or spill. The area must be evacuated and reentered by persons equipped for decontamination. Use appropriate safety equipment. For additional information, refer to "Exposure Controls/Personnel Protection", MSDS Section 8. See MSDS, Section 10, for information on stability and reactivity.

PROTECT THE ENVIRONMENT: Contain liquid to prevent contamination of soil, surface water or ground water.
CLEAN UP: Absorb with material such as: sawdust, vermiculite, dirt, sand, clay, cob grit, Milisorb (R). Avoid materials such as cement powder. Collect material in suitable and properly labeled open containers. Do not place in sealed container. Prolonged contact with water results in a chemical reaction which may result in rupture of the container. Place in: polylined fiber pacs, plastic drums, or properly labeled metal containers. Remove to a well ventilated area. Clean up floor areas. Attempt to neutralize by adding materials such as: 5% ammonia or 5% sodium (bi) carbonate solution; with 2 % detergent. If ammonia is used, use good ventilation to prevent vapor exposure. If you have any questions on how to neutralize call Foam Supplies, Inc.
Please refer to Disposal Information, MSDS Section 13. See Section 7 and 15 for more specific information.

7. Handling and Storage

HANDLING: Use only with adequate ventilation. Do not eat, drink, or smoke in working area.

Refer to Exposure Controls/Personal Protection, Section 8, of the MSDS.

STORAGE: See "Stability & Reactivity", Section 10, of the MSDS. Keep containers tightly closed when not in use. Protect from atmospheric moisture. Store in a dry place. Store between 75F-105F (24C-41C).

8. Exposure Controls/Personal Protection

ENGINEERING CONTROLS: Provide general and/or local exhaust ventilation to control airborne levels below the exposure guidelines.

PERSONAL PROTECTIVE EQUIPMENT

EYE/FACE PROTECTION: Use chemical goggles.

SKIN PROTECTION: Use protective clothing impervious to this material. Selection of specific items such as faceshield, gloves, boots, apron, or full-body suit will depend on operation. Remove contaminated clothing immediately, wash skin with soap and water (warm water if available) and launder clothing before reuse.

RESPIRATORY PROTECTION: Atmospheric levels should be maintained below the exposure guideline. When respiratory protection is required for certain operations, use an approved positive-pressure supplied-air respirator. For emergency and other conditions where the exposure guideline may be greatly exceeded, use an approved positive-pressure airline with auxiliary self-contained air supply.

EXPOSURE GUIDELINE (S):

Methylene bisphenyl isocyanate (MDI): ACGIH TLV is 0.005 ppm TWA and OSHA PEL is 0.02 ppm Ceiling.

PELs are in accord with those recommended by OSHA, as in the 1989 revision of PELs.

9. Physical and Chemical Properties

APPEARANCE/PHYSICAL STATE:	Brown liquid.
ODOR:	Slightly musty.
VAPOR PRESSURE:	$<1 \times 10^{-5}$ mmHg @ 25C
VAPOR DENSITY:	8.5 (air=1)
BOILING POINT:	410 °F, 210°C @ 5 mmHg
SOLUBILITY IN WATER:	Insoluble in water, reacts with evolution of CO ₂ .
SPECIFIC GRAVITY:	1.24 @ 20°C = 10.29 lb/gal (8.3 lb/gal x 1.24)
pH:	Not applicable.

10. Stability and Reactivity

CHEMICAL STABILITY: Stable under recommended storage conditions. See storage section.

CONDITIONS TO AVOID: Can react with itself at temperatures above 160C: 320F. Avoid temperatures above 105F, 41C. Avoid temperatures below 75F, 24C. Product can decompose at elevated temperatures. Generation of gas during decomposition can cause pressure in closed systems. Pressure buildup can be rapid. Avoid moisture. Material reacts slowly with water, releasing carbon dioxide, which can cause pressure buildup and rupture of closed containers. Elevated temperatures accelerate this reaction.

INCOMPATIBILITY WITH OTHER MATERIALS: Avoid unintended contact with polyols. The reaction of polyols and isocyanates generate heat. See Hazardous Polymerization Section. Avoid contact with acids, water, alcohols, amines, ammonia, bases, moist air, and strong oxidizers. Avoid contact with metals such as aluminum, zinc, brass, copper, galvanized metals. Reaction with water will generate carbon dioxide. Generation of a gas can cause pressure buildup in closed systems.

HAZARDOUS DECOMPOSITION PRODUCTS: Hazardous decomposition products depend upon temperature, air supply and the presence of other materials. Gases are released during decomposition.

HAZARD POLYMERIZATION: Can occur. Elevated temperatures can cause hazardous polymerization. Polymerization can be catalyzed by tertiary amines.

11. Toxicological Information

(See Section 3 for Potential Health Effects. For detailed toxicological data, write or call the address or non-emergency number shown in Section 1)

ACUTE

SKIN: The LD50 for skin absorption in rabbits is > 9400 mg/kg.

INGESTION: The oral LD50 for rats is > 10,000 mg/kg.

MUTAGENICITY (EFFECTS ON GENETIC MATERIAL): Mutagenicity data on MDI are inconclusive. MDI was weakly positive in some in-vitro (test tube) studies; other in-vitro studies were negative. A mutagenicity study in animals was negative.

12. Ecological Information

(For detailed ECOLOGICAL data, write or call the address or non-emergency number shown in Section 1)

ENVIRONMENTAL FATE

MOVEMENT & PARTITIONING: Based on information for MDI and polymeric MDI. In the aquatic or terrestrial environment, movement is expected to be limited by its reactivity with water forming predominantly insoluble polymers.

DEGRADATION & PERSISTENCE: Based on information for MDI and polymer MDI. In the environment, material reacts with water forming insoluble polymers (polyurea crusts) which appear to be stable.

ECOTOXICITY: Based on information for MDI and polymeric MDI. Material is practically non-toxic to aquatic organisms on an acute basis (LC50 greater than 100 mg/L in most sensitive species).

13. Disposal Considerations

(See Section 15 for Regulatory Information)

DISPOSAL: DO NOT DUMP INTO ANY SEWERS, ON THE GROUND, OR INTO ANY BODY OF WATER. All disposal methods must be in compliance with all Federal, State/Provincial and local laws and regulations. Regulations may vary in different locations. Waste characterizations and compliance with applicable laws are the responsibility solely of the waste generator. FOAM SUPPLIES, INC. HAS NO CONTROL OVER THE MANAGEMENT PRACTICES OR MANUFACTURING PROCESSES OF PARTIES HANDLING OR USING THIS MATERIAL. THE INFORMATION PRESENTED HERE PERTAINS ONLY TO THE PRODUCT AS SHIPPED IN ITS INTENDED CONDITION AS DESCRIBED IN MSDS SECTION 2 (Composition/Information On Ingredients).

FOR UNUSED & UNCONTAMINATED PRODUCT, the preferred options include sending to a licensed, permitted: recycler, reclaimer, incinerator or other thermal destruction device.

For additional information, refer to:

- Handling & Storage Information, MSDS Section 7.
- Stability & Reactivity Information, MSDS Section 10.
- Regulatory Information, MSDS Section 15.

As a service to its customers, Foam Supplies, Inc. can provide lists of companies which recycle, reprocess or manage chemicals or plastics, and companies that manage used drums. Telephone Foam Supplies, Inc. at 800-325-4875 for further details.

14. Transport Information

DOT CLASSIFICATION/DESCRIPTION

For DOT regulatory information, if required, consult transportation regulations, product shipping papers, or your FSI representative.

CANADIAN TDG INFORMATION

For TDG regulatory information, if required, consult transportation regulations, product shipping papers, or your FSI representative.

15. Regulatory Information

(Not meant to be all-inclusive—selected regulations represented)

NOTICE: The information herein is presented in good faith and believed to be accurate as of the effective date shown above. However, no warranty, express or implied is given. Regulatory requirements are subject to change and may differ from one location to another; it is the buyer's responsibility to ensure that its activities comply with federal, state or provincial, and local laws. The following specific information is made for the purpose of complying with numerous federal, state or provincial, and local laws and regulations. See other sections for health and safety information.

U.S. Regulations

SARA 313 INFORMATION: This product contains the following substances subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372:

<u>CHEMICAL NAME</u>	<u>CAS NUMBER</u>	<u>CONCENTRATION</u>
METHYLENE BIS(PHENYLISOCYANATE) (MDI)	000101-68-8	42-45 %
POLYMERIC DIPHENYLMETHANE DIISOCYANATE	009016-87-9	95-100 % NR

SARA HAZARD CATEGORY: This product has been reviewed according to the EPA "Hazard Categories" promulgated under Sections 311 and 312 of the Superfund Amendment and Reauthorization Act of 1986 (SARA Title III) and is considered, under applicable definitions, to meet the following categories:

- An immediate health hazard
- A delayed health hazard

TOXIC SUBSTANCES CONTROL ACT (TSCA):

All ingredients are on the TSCA inventory or are not required to be listed on the TSCA inventory.

The CAS number(s) for TSCA is (are):

- CAS # 009016-87-9
- CAS # 000101-68-8

STATE RIGHT-TO-KNOW: The following product components are cited on certain state lists as mentioned. Non-listed components may be shown in the composition section of the MSDS.

<u>CHEMICAL NAME</u>	<u>CAS NUMBER</u>	<u>LIST</u>
METHYLENE BIS(PHENYLISOCYANATE) (MDI)	000101-68-8	NJ3 PA1 PA3 NJ2

- NJ2=New Jersey Environmental Hazardous Substance (present at greater than or equal to 1.0%).
- NJ3=New Jersey Workplace Hazardous Substance (present at greater than or equal to 1.0%).
- PA1=Pennsylvania Hazardous Substance (present at greater than or equal to 1.0%).

PA3=Pennsylvania Environmental Hazardous Substance (present at greater than or equal to 1.0%).

OSHA HAZARD COMMUNICATION STANDARD:

This product is a "HAZARD CHEMICAL" as defined by the OSHA HAZARD Communication Standard, 29 CFR 1910.1200.

COMPREHENSIVE ENVIRONMENTAL RESPONSE COMPENSATION AND LIABILITY ACT (CERCLA, or SUPERFUND):

This product contains the following substance(s) listed as "Hazardous Substances" under CERCLA which may require reporting of releases:

Category:

<u>CHEMICAL NAME</u>	<u>CAS NUMBER</u>	<u>% in PRODUCT</u>
Methylene bisphenyl isocyanate	000101-68-8	42-45

CANADIAN REGULATIONS

WHMIS INFORMATION: The Canadian Workplace Hazardous Materials Information System (WHMIS) Classification for this product is:

- D2A - respiratory tract sensitizer
- D2B - eye or skin irritant
- D2B - skin sensitizer

Refer elsewhere in the MSDS for specific warnings and safe handling information. Refer to the employer's workplace education program.

CPR STATEMENT: This product has been classified in accordance with the hazard criteria of the Canadian Controlled Products Regulations (CPR) and MSDS contains all the information required by the CPR.

HAZARDOUS PRODUCTS ACT INFORMATION: This product contains the following ingredients which are Controlled Products and/or on the Ingredient Disclosure List (Canadian HPA section 13 and 14):

<u>COMPONENTS:</u>	<u>CAS #</u>	<u>AMOUNT (%w/w)</u>
METHYLENE BIS(pbenylisocyanate) (MBI)	000101-68-8	42-45%
POLYMERIC DIPHENYLMETHANE DIISOCYANATE	009016-87-9	90-100%

16. Other Information

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) RATINGS:

Health	3
Flammability	1
Reactivity	1

OTHER INFORMATION: The reaction of polyols and isocyanates generate heat. Contact of the reacting materials with skin or eyes can cause severe burns and may be difficult to remove from the affected areas. In addition, such contact increases the risk of isocyanate vapors.

The information herein is given in good faith, but no warranty, express or implied, is made. Consult Foam Supplies, Inc. for further information.

MB:FoamNail Part A

FoamNail is a Registered trademark of Foam Supplies, Inc.

1/99



foam supplies, inc.

FS emk

MATERIAL SAFETY DATA SHEET

For chemicals, coatings, and related materials

4387 North Rider Trail
Earth City, Missouri 63045-1103
Tel: 314-344-3330
1-800-325-4875
Fax: 314-344-3331

Date Revised: 5/19/1999

Date Printed: 5/19/1999

Foam Supplies, Inc.
4387 North Rider Trail
Earth City, MO 63045

Emergency Phone Number

Day: 314-344-3330
Night: 314-344-3330

1. Product

Number: Foam Nail® Part B
Class: Polyurethane Adhesive

} ceiling panels

H.M.L.S. Hazard Codes

Health: 1 Slight
Flammability: 1 Slight
Reactivity: 0 Minimal

Personal Protective Equipment: X

2. Hazardous Ingredients

Ingredient	: Percent	: C. A. S.	: LEL	: Vapor Pressure
Material Description	: By Weight	: Registry No.	: %	: PSIA @ 25°C
Amine Catalyst	0-2	Proprietary	N/A	N/A
Oxyethylated Aliphatic Amine	0-15	62476-52-2	N/A	N/A
Formaldehyde, Polymer with nonylphenol, reaction products with Diethanolamine and Propylene Oxide.	20-60	68610-97-9	N/A	Very low

} none all regulated as TAP'S

*Remaining ingredients are non hazardous proprietary blend of polyols.

(IDAPA 58.01.01.5830
IDAPA 58.01.01.5860)

3. Health Hazard Data

Effects of Overexposure: Threshold Limit Values: See Section 11

Liquid contact may cause eye irritation. Vapors may be mildly irritating to eyes.
Repeated or prolonged skin contact may cause irritation and drying.

VOC'S → 1999 usage = 30,861 lb
 $P = (1.06 \times 8.8315/gal) = 8.8315/gal$

4. First Aid

Emergency and First Aid Procedures:

- Flush eyes with large amounts of water for at least 15 minutes. Get medical attention.
- Wash skin thoroughly with large amounts of soap and water. Consult a physician if irritation develops or persists.
- Remove contaminated clothing and wash before re-use.
- If affected by vapors, remove patient to fresh air and get medical attention. Give oxygen or artificial respiration if necessary. Do not give stimulants. Ephinephrine and similar drugs may adversely affect the heart due to a possible risk of eliciting cardiac dysrhythmias.
- If swallowed, do not induce vomiting. Get medical attention immediately.
- The hazard of aspirating material into the lungs is greater than the hazard associated with allowing material to progress through the intestinal tract.

$\therefore gal/yr = \frac{30,861 lb/yr}{8.8315/gal} = 3495 gal/yr$

Carcinogenic According to NTP, IARC, or OSHA

This product does not contain ingredients listed by NTP, IARC, or OSHA.

3495 gal/yr * 1.2 = 4194 gal/yr

5. Fire and Explosion Hazard Data

Flash Point: > 300.0 °F
(Method Used) Pensky-Martens

Explosive Limits: LEL UEL (%V in air)

Flammability Classification:

OSHA: Combustible Liquid - Class IIIB

DOT: Not regulated for flammability

Extinguishing Media:

Foam, alcohol foam, carbon dioxide, dry chemical, water fog.

Special Fire Fighting Procedures:

Fire fighters should wear a self-contained breathing apparatus with full facepiece operated in a positive pressure mode.

Fire fighters should wear full protective clothing to guard against exposure to toxic and irritating fumes.

Spray containers exposed to fire and heat with water to keep cool.

Unusual Fire and Explosion Hazards:

Do not weld or use a cutting torch on or near drums, even if empty.

Empty drums contain residual material which may decompose to emit toxic or irritating fumes if burned.

6. Spill or Leak Procedures

Steps for Material Spillage:

Properly protected personnel should contain the spill & soak it up with absorbent material. Shovel the absorbed material into containers for disposal.

Waste Disposal Methods:

Dispose of according to federal, state, and local regulations.

Empty containers retain product residue and are subject to all of the handling instructions on this sheet.

7. Special Precautions

Handling and Storage Precautions:

Avoid unnecessary skin contact with this product.

Avoid breathing vapors.

Provide adequate ventilation during use.

Wear an appropriate respirator during and after use unless airborne concentrations are known to be below the TLV.

Other Precautions:

Store in cool, dry location.

Keep containers tightly sealed and upright when not in use.

8. Special Protection Information

Respiratory Protection:

Under normal conditions, respiratory protection is not necessary. However, if the TLV for the solvent is exceeded, use a NIOSH/MSHA approved organic vapors mask. If the TLV is greatly exceeded, or in confined or poorly ventilated areas, use a positive pressure, air supplied or self contained breathing apparatus.

Ventilation:

Mechanical or local exhaust is required to keep concentrations below the TLV and/or to prevent any accumulation of vapors.

Vapors are heavier than air and will collect in low areas such as pits or tanks, reducing the oxygen available for breathing. NEVER ENTER AN AREA OF UNKNOWN CONCENTRATION WITHOUT FULL RESPIRATORY PROTECTION!

Protective Gloves:

Chemical resistant gloves.

Eye protection:

Chemical safety glasses or splash goggles to prevent eye contact.

Do not wear contact lenses.

Other Protective Equipment:

If needed to prevent unnecessary skin contact.

Primary Routes of Entry:

Skin contact

Inhalation

9. Physical Data

Boiling Range:	Not determined	Freezing Point:	N/A
Vapor Pressure:	Not determined	Vapor Density:	Not determined
Specific Gravity:	1.06 at 25 °C	H ₂ O Soluble:	(1%- 1.0%)
Evaporation Rate:	Faster (relative to n-butyl acetate)	% Volatile by Volume:	<6%
Appearance and Odor:	Clear to dark amber liquid; faint ethereal odor		

$(6.53 \text{ lb/gal}) \times (\% / 100) = 0.53 \text{ lb/g}$
 $(4194 \text{ gal/yr}) \times 0.53 \text{ lb vol/gal} \times (1 \text{ yr} / 8760 \text{ hr}) = 0.25 \text{ lb/hr}$
 $(0.25 \text{ lb/hr}) \times (8760 / 2000) = 1.10 \text{ T/y}$

10. Reactivity Data

Stability: Stable
Stability Conditions to Avoid:
 Open flames, welding arcs, or other high temperature sources can induce thermal decomposition. = 0.25 lb/hr
Incompatibility (Materials to Avoid Contact with):
 Avoid prolonged contact with, or storage in, aluminum, other alkali or alkaline earth metals such as powdered Zn, Mg, Na, K, Ca, Be, or their alloys.
Hazardous Decomposition Products:
 CO, CO₂
Hazardous Polymerization: Will not occur
Polymerization Conditions to Avoid: None,

11. Toxicological Information

Ingredient Material Description	: PEL : TLV (twa)		: LD50(mg/kg)		: LC50 (ppm)	
	: mg/m3	: mg/m3: ppm	: (rat)	: (rbt)	: (rat)	
Amine Catalyst	1-3 ppm	N/A	425mg/kg			
Oxyethylated Aliphatic Amine	N/A	N/A	>5g/kg	>2g/kg	>200mg/l	
Formaldehyde, Polymer with nonylphenol, reaction products with Diethanolamine and Propylene Oxide.	N/A	N/A	2.12g/kg	>16g/kg	N/D	

12. Ecological Information

Not Available

13. Disposal Considerations (See Section 15 for Regulatory Information)

Disposal: DO NOT PUMP INTO ANY SEWERS, ON THE GROUND, OR INTO ANY BODY OF WATER. All disposal methods must be in compliance with all Federal, State/Provincial and local laws and regulations.

Regulations may vary in different locations. Waste characterizations and compliance with applicable laws are the responsibility solely of the waste generator. Foam Supplies Inc. HAS NO CONTROL OVER THE MANAGEMENT PRACTICES OR MANUFACTURING PROCESSES OF PARTIES HANDLING OR USING THIS MATERIAL. THE INFORMATION PRESENTED HERE PERTAINS ONLY TO THE PRODUCTS AS SHIPPED IN ITS INTENDED CONDITION AS DESCRIBED IN MSDS SECTION 2 (Composition/Information on Ingredients).

FOR UNUSED & UNCONTAMINATED PRODUCT, the preferred options include sending to a licensed, permitted: recycler, reclaimer, incinerator or other thermal destructive device.

14. Transport Information

DOT CLASSIFICATION/DESCRIPTION

For DOT regulatory information, if required, consult transportation regulations, product shipping papers, or your FSI representative.

CANADIAN TDG INFORMATION

For TDG regulatory information, if required, consult transportation regulations, product shipping papers, or your FSI representative.

15. Regulatory Information

(Not meant to be all inclusive—selected regulations represented.)

NOTICE: The information herein is presented in good faith and believed to be accurate as of the effective date shown above. However, no warranty, express or implied, is given. Regulatory requirements are subject to change and may differ from one location to another; it is the buyer's responsibility to ensure that its activities comply with federal, state or provincial, and local laws. The following specific information is made for the purpose of complying with numerous federal, state or provincial, and local laws and regulations. See MSD sheet for health and safety information.

U. S. Regulations

SARA 313 INFORMATION: This product contains the following substances subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR.

Part 372:

<u>CHEMICAL NAME</u>	<u>CAS Number</u>	<u>CONCENTRATION</u>
~~~~~		

SARA HAZARD CATEGORY: This product has been reviewed according to the EPA "Hazard Categories" promulgated under Sections 311 and 312 of the Superfund Amendment and Reauthorization Act of 1986 (SARA Title III) and is considered, under applicable definitions, to meet the following categories:

- An immediate health hazard
- A delayed health hazard

TSCA (Toxic Substances Control Act) Regulations, 40 CFR 710:

All ingredients are on the TSCA Section 8 (b) Inventory.

### CANADIAN REGULATIONS

The Workplace Hazardous Materials Information System (W.H.M.I.S.) Classifications for this product is:

- D1B
- D2A
- D2B

## 16. Other information

The reaction of polyols and isocyanates generate heat. Contact of the reaction materials with skin or eyes can cause severe burns and may be difficult to remove from the affected areas. Immediately wash the affected areas with plenty of water and seek medical assistance.

**While the information and recommendations set forth herein are believed to be accurate as of the date hereof, Foam Supplies, Inc. makes no warranty with respect thereto and disclaims any liability from reliance thereon.**

MB:FoamNail  
5/99

Foam Nail is registered Trade Mark of Foam Supplies, Inc.

FOAM SUPPLIES, INC.

FACSIMILE TRANSMITTAL SHEET

TO: TOM SPURLING	FROM: PAULA ILGENRITZ
FAX NUMBER: 208-549-0060	DATE: MARCH 31, 2000
COMPANY: CHAMPION HOMES	TOTAL NO. OF PAGES INCLUDING COVER: 1
PHONE NUMBER: 208-549-1410 EXT 236	SENDER'S REFERENCE NUMBER:
RE: 1999 POUNDS PURCHASED - REDMAN/WEISER	YOUR REFERENCE NUMBER:

URGENT   
 FOR REVIEW   
 PLEASE COMMENT   
 PLEASE REPLY   
 PLEASE RECYCLE

NOTES/COMMENTS:

Redman Homes, 1425 Sunny Side Road, Weiser, ID 83672

A-side pounds = 34,682                      B-side pounds = 30,861

Redman Homes, 1442 Sunny Side Road, Weiser, ID 83672 (*Champion*)

A-side pounds = 15,764                      B-side pounds = 14,194

1387 NORTH RIDER TRAIL • EARTH CITY, MO 63045  
PHONE: 314/344-3330 • FAX: 314/344-3331

ENCLOSURE # 5

In regards to calculating MDI emissions for your foaming process the following is a possible method.

I have taken the calculations and assumptions from the MDI Emissions Reporting Guidelines published by the society of Plastics Industry, Inc 1992.

This letter comes under the same disclaimer as the NOTE TO READERS page enclosed.

I am using example six on page 4-19 to estimate your emissions as it most closely imitates your production process.

The assumptions made in this example will be the same as theirs except for:

3. I have estimated the average surface area of foam on an average ceiling to be 58.5ft² which would be 5.4M². I did this by assuming an average bead size of 3/4 " x 1 1/8" would give a third side width of .1125ft. I multiplied this times an average bead length for a 44ft ceiling of 416ft. I then multiplied this by a factor of 1.25 to accommodate for the rounded surface.
4. A 15-second or tack free time.
5. A production rate of 10 ceilings a day

Substituting these numbers for theirs in the calculations:

Calculation 1. Would be the same  $1.8 \times 10^{-6}$  atmospheres

Calculation 2. I did in assumption (3) = 5.4M²/ceiling.

Calculation 3.  $W = 4.32 \times 10^{-4}$  grams/sec

Calculation 4. MDI per ceiling

$$= 1.4 \times 10^{-5} \text{ lbs./ceiling}$$

Calculation 5. TOTAL MDI

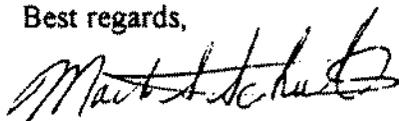
$$= 1.4 \times 10^{-5} \text{ lbs./ceiling} \times \frac{10 \text{ ceilings}}{\text{day}} \times \frac{250 \text{ days}}{\text{year}}$$

$$= .035 \text{ lbs./year}$$

As you can see from this sample even if my assumptions are off by a factor of 10 you would still be considerably less than one pound per year.

If you have any questions please do not hesitate to call.

Best regards,



Mark S. Schulte

MS/ks

PTE:

$$(0.035 \text{ lb/yr}) \left( \frac{365}{250} \right) = 0.05 \text{ lb/yr}$$

$$(0.05 \text{ lb/yr}) \left( \frac{1 \text{ yr}}{8760 \text{ hr}} \right) = 5.8E-06 \text{ lb/hr}$$

## Note to Readers:

This document reviews the requirements for reporting releases of listed chemicals of interest to members of the polyurethane industry under the provisions of Section 313 of the Emergency Planning and Community Right to Know Act (EPCRA). Its principal purpose is to outline suggested techniques for estimating emissions of 4,4'-methylene diphenyl diisocyanate (MDI) for completing the Environmental Protection Agency's (EPA) Form R. The methodologies used to estimate releases have been developed using standard techniques, but may not be suitable for estimating releases of other chemicals. The information provided in this document is offered in good faith and believed to be reliable, but is made **WITHOUT WARRANTY, EXPRESS OR IMPLIED, AS TO MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR ANY OTHER MATTER**. This document is not intended to provide emissions data for any particular product or process. Scenarios have been selected which are thought to be representative of situations where releases may occur. Other scenarios not reflected in this document may involve releases as well. It is the responsibility of all manufacturers, processors or users of any listed chemical to know and understand the reporting obligations, and to provide accurate information in accordance with the provisions of the law. Consult your own legal and technical advisors for specific advice applicable to your own facility.

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The Society of the Plastic Industry, Inc.

## Engineering Calculation

Release estimates derived from engineering calculations are based on credible application of physical/chemical properties and relationships, and knowledge of a particular process. Engineering calculations are used extensively in the remainder of this workbook as the basis for estimating releases of MDI from polyurethane activities. For example, in estimating MDI releases from closed mold-type processes, knowledge about the relationship between vapor pressure, temperature, and volume is used to calculate the maximum amount of MDI that can be released from any single mold filling activity. Multiplying the amount of MDI released or emitted per mold filling by the number of mold fillings that occur in a given year provides a reasonable estimate of annual MDI releases for that operation. In many of the examples in which releases will be small we have used simplified estimation techniques. For example, in virtually all calculations that involve volatilization of MDI, we have assumed that MDI comprises 100% of any mixture from which volatilization occurs.⁵ This is typically not true.⁶ The degree to which substances in a mixture are volatilized depends upon the ratio of mixture components and vapor pressures of each of the mixture components. The partial pressure (a measure of volatilization) of any one component in the mixture will be less than the vapor pressure of that pure component at the same temperature and pressure. Accordingly, release estimates based on that assumption will be conservatively high.

General equations and assumptions are used repeatedly throughout this workbook. These assumptions are intended to provide conservative or reasonable worst case assumptions in estimating MDI releases.⁵ Examples in the workbook were selected to reflect major scenarios where MDI releases are likely to occur. There may be release scenarios particular to your facility that are not described here.

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⁵ These general approaches may be suitable for estimating releases of other relatively non-volatile chemicals in similar applications. You will need chemical specific vapor pressure information for other chemicals. These approaches are not suitable for solvents or other volatile substances such as blowing agents or low molecular weight amine catalysts.

- (2) Calculate the number of cubic feet of cavity space filled based on the density of foam and the amount of foam feedstocks used.

$$\begin{aligned}\text{Total cavity volume} &= \frac{\text{quantity of foam feedstocks used (lbs/yr)}}{\text{average foam density (lbs/ft}^3\text{)}} \\ &= \frac{(20,000,000 \text{ lbs/yr})}{2.0 \text{ lbs/ft}^3} \\ &= 10,000,000 \text{ ft}^3/\text{yr}\end{aligned}$$

- (3) Calculate the total MDI emissions per year.

$$\begin{aligned}\text{Total MDI released} &= (\text{SVC of MDI (lbs/ft}^3\text{)} \times \\ &\quad \text{(total cavity volume (ft}^3\text{/yr)}) \\ &= (1.2 \times 10^{-4} \text{ lbs/ft}^3)(10,000,000 \text{ ft}^3/\text{yr}) \\ &= 12 \text{ lbs/yr}\end{aligned}$$

## Open Processes

The open process estimation approaches can be used for applications in which MDI based products are introduced into a mold or cavity, but are cured with a significant fraction of the MDI containing product exposed to the atmosphere, or in which the MDI-based product is layered, sprayed or coated onto a surface. Examples of open process applications are provided below.

- Slabstock/Bunstock
- Laminate Boardstock
- Metal Skin Panels
- Carpet Backing/Flooring
- Rebond Production
- Coatings

- Spray Foaming
- Adhesives
- Sealants

The basic assumption used in calculating MDI releases from "open" processes is that MDI vapor will volatilize from all exposed surfaces of a curing foam, adhesive, coating or other MDI-containing product. Evaporative releases from open processes (or spills) depend upon many factors including: (1) the volatility of the material, (2) the surface area from which evaporation occurs, (3) the temperature of the curing product, (4) the airflow rate, and (5) the duration of the activity.

A fairly simple model that accounts for all of these factors is provided by the following equation. (See Reference 4.)

$$W = 25.4 \frac{(P_T^* M_T)}{T} \mu^{0.78} A$$

- Where
- W = evaporation rate in grams/second
  - $P_T^*$  = liquid vapor pressure in atmospheres
  - $M_T$  = average molecular weight (= 250 for MDI)
  - T = temperature in Kelvin
  - $\mu$  = airflow rate in meters (m)/second
  - A = area exposed in  $M^2$

**Example 6: Slabstock/bunstock manufacture (batch process)**

Assume 1) The maximum temperature in the MDI foam at the "tack free" or "string" time⁸ during the curing process is 160°F (70°C, 343K) (this is a reasonable worst case assumption if operation specific data is not available),

---

⁸ As discussed in Example 4, using the maximum exotherm temperature instead of the "tack free" time temperature will result in an overestimate of MDI releases.

- 2) a ventilation flow rate of 3 meters (M)/second,
- 3) a foam block size of 2 x 1 x 1M,
- 4) a 2 minute "tack free" time during which appreciable unreacted MDI may remain in the foam, and
- 5) a production rate of 120 blocks per day.

(1) Determine  $P_T^*$  for MDI at the tack free time temperature.

Based on the VP/T chart on page 6-1, the vapor pressure of MDI at 70°C is  $1.4 \times 10^3$  mm mercury (mm).

$$\frac{1.4 \times 10^3 \text{ mm}}{760 \text{ mm}} = 1.8 \times 10^{-4} \text{ atmospheres}$$

(2) Determine A.

The exposed area of foam from which MDI can volatilize is the top of the rising bun. If the bun is relatively flat, this surface area will be the width times the length of the mold. If the surface becomes rounded as the foam expands, a larger surface area will result. A factor of 1.25 times the flat surface area will adequately account for a rounded rising surface.

$$\begin{aligned} \text{Area} &= (2M)(1M)(1.25 \text{ "rise" factor}) \\ &= 2.5 M^2 \end{aligned}$$

(3) Determine W.

$$W = \frac{25.4 (1.8 \times 10^{-4}) (250) (3)^{0.78} (2.5)}{343}$$
$$= 2.0 \times 10^{-4} \text{ grams/sec.}$$

(4) Determine MDI released per mold.

$$\text{MDI per mold} = \frac{(2.0 \times 10^{-4} \text{ g}) (60 \text{ sec}) (2 \text{ min}) (1 \text{ lb.})}{\text{sec} \quad 1 \text{ min} \quad 1 \text{ mold} \quad 454 \text{ g}}$$
$$= 5.3 \times 10^{-5} \text{ lb/mold}$$

(5) Determine total MDI released.

$$\text{Total MDI} = \frac{(5.3 \times 10^{-5} \text{ lb}) (120 \text{ mold}) (250 \text{ days})}{\text{mold} \quad \text{day} \quad \text{yr}}$$
$$= 1.6 \text{ lbs}$$

***Example 7: Laminate boardstock or slabstock  
(continuous process)***

Laminate boardstock, slabstock and metal skin panel manufacture can be treated as open processes by assuming that MDI will migrate from all exposed surfaces. In some applications, such as in the manufacture of metal skin panels only the sides of the rising foam will be exposed. In other applications, both the top and sides may be exposed. Materials used as top facers in laminate production may be permeable to MDI vapor, therefore, if you do not have information that would lead you to believe that the facer material used at your facility is impermeable to MDI, it is recommended that you treat the top surface

# **APPENDIX F**

”  
*AIRS Information*

*Redman Home Builders*  
*Weiser, Idaho*

*T200072*  
*September 2000*

ABBREVIATED AIRS DATA ENTRY SHEET

Name of Facility: Redman Home Builders

AIRS/Permit #: 087-00007

Permit Issue Date: 9/00

*Source/Emissions Unit Name (25 spcs)  
(Please use name as indicated in permit)

SCC #  
(8 digit #)

Air Program  
(SIP/NESHAP/  
NSPS/PSD)

*Construction: Contractors

31100199

SIP

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RETURN TO PAT RAYNE  
AIRS-PT.LST (3/99)