1. CHEMICAL PRODUCT IDENTIFICATION:

PRODUCT NAME........: Mondur MT-40
PRODUCT CODE........: G-232
CHEMICAL FAMILY.....: Aromatic Isocyanate
CHEMICAL NAME.......: Toluene Diisocyanate (TDI) - Diphenylmethane Diisocyanate (MDI) Blend
FORMULA.............: Not Applicable

2. COMPOSITION/INFORMATION ON INGREDIENTS:

<table>
<thead>
<tr>
<th>INGREDIENT NAME</th>
<th>/CAS NUMBER</th>
<th>EXPOSURE LIMITS</th>
<th>CONCENTRATION (%)</th>
</tr>
</thead>
</table>
| ***** HAZARDOUS INGREDIENTS *****

The 2,4-TDI (CAS# 584-84-9) and the 2,6-TDI (CAS# 91-08-7) isomer mixture is known as Toluene Diisocyanate (CAS# 26471-62-5). For Regulatory and State Right to Know information on this product CAS# 26471-62-5 and its isomers 2,4-TDI and 2,6-TDI please refer to the regulatory section of this msds.

2,4-Toluene Diisocyanate
584-84-9  OSHA : .02 ppm Ceiling
           .15 mg/m3 Ceiling
           ACGIH: .005 ppm TWA
           .036 mg/m3 TWA
           .02 ppm STEL
           .14 mg/m3 STEL

2,6-Toluene Diisocyanate
91-08-7  OSHA : Not Established
ACGIH: Not Established

There are no established guidelines for the 2,6-TDI isomer. However, Bayer recommends the established 2,4-TDI guideline limits be used for the 2,6-TDI isomer.
2. COMPOSITION/INFORMATION ON INGREDIENTS (Continued)

<table>
<thead>
<tr>
<th>INGREDIENT NAME</th>
<th>/CAS NUMBER</th>
<th>EXPOSURE LIMITS</th>
<th>CONCENTRATION (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4,4-Diphenylmethane Diisocyanate</td>
<td>101-68-8</td>
<td>OSHA: .02 ppm Ceiling</td>
<td>8-15 %</td>
</tr>
<tr>
<td></td>
<td></td>
<td>.20 mg/m3 Ceiling</td>
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<td></td>
<td></td>
<td>ACGIH: .005 ppm Ceiling</td>
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<tr>
<td></td>
<td></td>
<td>.051 mg/m3 TWA</td>
<td></td>
</tr>
<tr>
<td>Diphenylmethane Diisocyanate</td>
<td>26447-40-5</td>
<td>OSHA: Not Established</td>
<td>12-15 %</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ACGIH: Not Established</td>
<td></td>
</tr>
<tr>
<td>Higher Oligomers of MDI</td>
<td>9016-87-9</td>
<td>OSHA: Not Established</td>
<td>15-35 %</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ACGIH: Not Established</td>
<td></td>
</tr>
</tbody>
</table>

3. HAZARDS IDENTIFICATION:

EMERGENCY OVERVIEW

* DANGER! Toxic; Color: Amber-Brown; Form: Liquid; Odor: *
* Sharp, Pungent; Causes respiratory tract irritation; May *
* cause allergic respiratory reaction; Harmful if inhaled; *
* Respiratory sensitizer; Causes skin irritation; Skin *
* sensitizer; Causes eye irritation; Harmful if swallowed; May *
* cause lung damage; Use cold water spray to cool fire-exposed *
* containers to minimize the risk of rupture; Toxic *
* gases/fumes are given off during burning or thermal *
* decomposition; Closed container may explode under extreme *
* heat. *

POTENTIAL HEALTH EFFECTS:

ROUTE(S) OF ENTRY: Inhalation of vapors or aerosols from TDI.
Although MDI is low in volatility, an inhalation hazard can exist from MDI
aerosols or vapors formed during heating, foaming or spraying. Skin
contact from liquid, vapors or aerosols for both TDI and MDI.

HUMAN EFFECTS AND SYMPTOMS OF OVEREXPOSURE:

ACUTE INHALATION: TDI or MDI vapors, mist, or aerosols at
concentrations above the TLV can irritate (burning sensation) the mucous
membranes in the respiratory tract (nose, throat, lungs) causing runny
nose, sore throat, coughing, chest discomfort, shortness of breath and
reduced lung function (breathing obstruction). Persons with a preexisting,
nonspecific bronchial hyperreactivity can respond to concentrations below
the TLV with similar symptoms as well as asthma attack. Exposure well
above the TLV may lead to bronchitis, bronchial spasm and pulmonary edema
(fluid in lungs). These effects are usually reversible. Chemical or
hypersensitive pneumonitis, with flu-like symptoms (e.g., fever, chills), has also been reported. These symptoms can be delayed up to several hours after exposure.

CHRONIC INHALATION............: As a result of previous repeated overexposures or a single large dose, certain individuals may develop isocyanate sensitization (chemical asthma) which will cause them to react to a later exposure to isocyanate at levels well below the TLV. These symptoms, which can include chest tightness, wheezing, cough, shortness of breath or asthmatic attack, could be immediate or delayed up to several hours after exposure. Similar to many non-specific asthmatic responses, there are reports that once sensitized an individual can experience these symptoms upon exposure to dust, cold air or other irritants. This increased lung sensitivity can persist for weeks and in severe cases for several years. Chronic overexposure to isocyanate has also been reported to cause lung damage (including decrease in lung function) which may be permanent.

Sensitization can either be temporary or permanent. There has been a preliminary report on a possible new finding on sensitization. A TDI manufacturer, BASF, reported that 15 out of 269 TDI production employees developed asthma-like reactions attributed to TDI exposure. They indicated that the number of employees experiencing these reactions (about 1% per year) is not unusual. What is unusual is that 7 out of 15 individuals had experienced prior exposures to respiratory irritants, such as phosgene and chlorine, and this may have led to an increased risk of sensitization to TDI. Chlorine and phosgene are used in the synthesis of TDI and are not expected to be present in user facilities.*


ACUTE SKIN CONTACT............: Isocyanates react with skin protein and moisture and can cause irritation which may include the following symptoms: reddening, swelling, rash, scaling or blistering. Cured material is difficult to remove.

CHRONIC SKIN CONTACT..........: Prolonged contact can cause reddening, swelling, rash, scaling, blistering, and, in some cases, skin sensitization. Individuals who have developed a skin sensitization can develop these symptoms as a result of contact with very small amounts of liquid material or as a result of exposure to vapor. Refer to the Animal Toxicity Section of this MSDS for further information on TDI and MDI sensitization.

ACUTE EYE CONTACT.............: Liquid, aerosols or vapors are severely irritating and can cause pain, tearing, reddening and swelling. If left untreated, corneal damage can occur and injury is slow to heal. However, damage is usually reversible. See First Aid Section for treatment.

CHRONIC EYE CONTACT.........: Prolonged vapor contact may cause conjunctivitis.

ACUTE INGESTION..............: Can result in irritation and corrosive action in the mouth, stomach tissue and digestive tract. Symptoms can include sore throat, abdominal pain, nausea, vomiting and diarrhea.

CHRONIC INGESTION...........: None Found

CARCINOGENICITY.............: Neither MDI nor polymeric MDI are listed by the NTP, IARC or regulated by OSHA as carcinogens. The International Isocyanate Institute reported for TDI that in lifetime inhalation studies
3. HAZARDS IDENTIFICATION (Continued)

in rats and mice no carcinogenic activity was observed.

NTP.........................: The National Toxicology Program reported that
TDI caused an increase in the number of tumors in exposed rats over those
counted in non-exposed rats. The TDI was administered in corn-oil and
introduced into the stomach through a tube. Based on this study, the NTP
has listed TDI as a substance that may reasonably be anticipated to be a
carcinogen in its Fourth Annual Report on Carcinogens.

IARC.........................: IARC has listed Toluene Diisocyanate (TDI) as a
substance for which there is sufficient evidence for its carcinogenicity in
experimental animals but inadequate evidence for the carcinogenicity of TDI
to humans (Group 2B) (IARC Monograph 39).

OSHA.........................: TDI is not regulated.

OTHER.......................: See results of two year MDI inhalation study -
Animal Toxicity Data, CARCINOGENICITY.

MEDICAL CONDITIONS

AGGRAVATED BY EXPOSURE......: Asthma, other respiratory disorders
(bronchitis, emphysema, bronchial hyperreactivity), skin allergies, eczema.

4. FIRST AID MEASURES:

FIRST AID FOR EYES.......: Flush with copious amounts of water, preferably
lukewarm for at least 15 minutes holding eyelids open all the time. Refer
individual to physician or an ophthalmologist for immediate follow-up.

FIRST AID FOR SKIN.......: Remove contaminated clothing and shoes immediately.
Wash affected areas thoroughly with soap and water for at least 15 minutes.
Tincture of green soap and water is also effective in removing isocyanates.
Wash contaminated clothing thoroughly before reuse. For severe exposures,
get under safety shower after removing clothing, then get medical
attention. For lesser exposures, seek medical attention if irritation
develops or persists after the area is washed.

FIRST AID FOR INHALATION: Move to an area free from risk of further exposure.
Administer oxygen or artificial respiration as needed (to be done by
qualified medical personnel). Obtain medical attention. Asthmatic-type
symptoms may develop and may be immediate or delayed up to several hours.
Consult physician.

FIRST AID FOR INGESTION.: Do not induce vomiting. Give 1 to 2 cups of milk or
water to drink. DO NOT GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON.
Consult physician immediately.

NOTE TO PHYSICIAN.......: EYES - Stain for evidence of corneal injury. If
cornea is burned, instill antibiotic steroid preparation frequently.
Workplace vapors have produced reversible corneal epithelial edema
impairing vision. SKIN - MDI and TDI are known skin sensitizers. Treat
symptomatically as for contact dermatitis or thermal burns. INGESTION -
Treat symptomatically. There is no specific antidote. Inducing vomiting
is contraindicated because of the irritating nature of the compound.
RESPIRATORY - MDI and TDI are known pulmonary sensitizers. Treatment is
essentially symptomatic. An individual having a skin or pulmonary

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Approval date: 11/14/2003
4. FIRST AID MEASURES (Continued)

sensitization reaction to this material should be removed from exposure to any isocyanate.

5. FIRE FIGHTING MEASURES:

FLASH POINT.................: 275.0 F (135.0 C) Pensky-Martens Closed Cup (ASTM D-93)

FLAMMABLE LIMITS:
   UPPER EXPLOSIVE LIMIT (UEL)(%): 9.5% - Toluene Diisocyanate (TDI)
   LOWER EXPLOSIVE LIMIT (LEL)(%): 0.9% - Toluene Diisocyanate (TDI)

EXTINGUISHING MEDIA..........: Dry Chemical; Carbon Dioxide; Foam; Water spray for large fires.

SPECIAL FIRE FIGHTING PROCEDURES: Full emergency equipment with self-contained breathing apparatus and full protective clothing (such as rubber gloves, boots, bands around legs, arms and waist) should be worn by fire fighters. No skin surface should be exposed. During a fire, TDI and MDI vapors and other irritating, highly toxic gases may generated by thermal decomposition or combustion. At temperatures greater than 350 F (177 C) TDI and MDI form carbodiimides with the release of CO2 which can cause pressure build-up in closed containers. Explosive rupture is possible. Therefore, use cold water spray to cool fire-exposed containers.

UNUSUAL FIRE / EXPLOSION HAZARDS: CAUTION: Reaction between water or foam and hot Toluene Diisocyanate (TDI) can be vigorous.

6. ACCIDENTAL RELEASE MEASURES:

SPILL OR LEAK PROCEDURES..........: Evacuate area of all persons not wearing proper protective equipment; if indoors, ventilate area to maximum extent possible; if product is on the ground, dike area to prevent entry into water system; wear full protective equipment, including respiratory equipment during clean-up. (See Protective Equipment Section). Major Spill or Leak (10 gallons or more): Call Bayer Corporation at 412/923-1800 for assistance and advice. If temporary control of isocyanate vapor is required, a blanket of protein foam (available at most fire departments) may be spread. Released product may be pumped into closed, but not sealed, container for disposal. Minor Spill or Leak (less than 10 gallons): Absorb isocyanate with sawdust or other absorbent, place in suitable unsealed containers, transport to well-ventilated area (outside) and treat with neutralizing solution.

NEUTRALIZATION CHEMICALS..........: New data has indicated that the following solutions work best in neutralizing spills of TDI and minimizing TDI exposures during decontamination. (1). Colormetric Laboratories Inc. (CLI) decontamination solution. (2). A mixture of 75% water, 20% alkoxylated linear alcohol (e.g. Olin’s Poly-Tergent SL-62) and 5% n-propanol. (3). A mixture of 75% water, 20% Tergitol TMN-10 and 5% n-propanol. A mixture of
6. ACCIDENTAL RELEASE MEASURES (Continued)

90% water, 8% ammonium hydroxide and 2% liquid detergent has also been used effectively to neutralize TDI. Add about 10 parts of neutralizer per one part of isocyanate, with mixing. Allow to stand uncovered for 48 hours to let carbon dioxide (CO2) escape. CLEAN-UP: Decontaminate area with decontamination solution letting stand for at least 15 minutes. Call Bayer Corporation at 412/923-1800 if additional assistance or advice is desired.

DISTRIBUTION EMERGENCIES...........: Bayer requires that CHEMTREC be immediately notified (800-424-9300) when this product is unintentionally released from its container during its course of distribution, regardless of the amount released. Distribution includes transportation, storage incidental to transportation, loading and unloading. Such notification must be immediate and made by the person having knowledge of the release.

7. HANDLING AND STORAGE:

STORAGE TEMPERATURE(MIN/MAX): 70 F (21 C)/90 F (32 C)
SHELF LIFE.................: 6 months
SPECIAL SENSITIVITY.........: If container is exposed to high heat, 350 F (177 C) it can be pressurized and possibly rupture. TDI and MDI react slowly with water to form polyureas and will liberate CO2 gas (Carbon dioxide gas). This gas can cause sealed containers to expand and possibly rupture.
HANDLING/STORAGE PRECAUTIONS: Store in tightly closed containers to prevent moisture contamination. Do not reseal if contamination is suspected. Prevent all contact. Do not breathe the vapors. Warning properties (irritation of the eyes, nose and throat or odor) are not adequate to prevent chronic overexposure from inhalation. This material can produce asthmatic sensitization upon either single inhalation exposure to a relatively high concentration or upon repeated inhalation exposures to lower concentrations. Exposure to vapors of heated TDI or MDI can be extremely dangerous. Employee education and training in safe handling of this product are required under the OSHA Hazard Communication Standard.

8. PERSONAL PROTECTION:

EYE PROTECTION REQUIREMENTS.......: Liquid chemical goggles. Vapor resistant goggles should be worn if contact lenses are in use. In a splash hazard environment chemical goggles should be used in combination with a full-face, air-supplied respirator.
SKIN PROTECTION REQUIREMENTS.......: Permeation resistant gloves (butyl rubber, nitrile rubber, polyvinyl alcohol). However, please note that PVA degrades in water. Cover as much of the exposed skin area as possible with appropriate clothing. If skin creams are used, keep the area covered only by the cream to a minimum.
VENTILATION REQUIREMENTS..........: Local exhaust should be used to maintain levels below the TLV whenever MDI and TDI are processed, heated or spray
8. PERSONAL PROTECTION (Continued)

Applied. At normal room temperatures (70°F) TDI levels quickly exceed the TLV unless properly ventilated. Standard reference sources regarding industrial ventilation (i.e., ACGIH Industrial Ventilation) should be consulted for guidance about adequate ventilation.

RESPIRATOR REQUIREMENTS............: An approved positive pressure air-supplied respirator is required whenever TDI concentrations are not known or exceed the Short-Term Exposure or Ceiling Limit of 0.02 ppm or exceed the 8-hour Time Weighted Average TLV of 0.005 ppm. An approved air-supplied respirator with full facepiece must also be worn during spray application, even if exhaust ventilation is used. For emergency and other conditions where the exposure limits may be greatly exceeded, use an approved, positive pressure self-contained breathing apparatus. TDI has poor warning properties since the odor at which TDI can be smelled is substantially higher than 0.02 ppm. Observe OSHA regulations for respirator use (29 CFR 1910.134).

MONITORING.........................: Isocyanate exposure levels must be monitored. Monitoring of airborne isocyanates in the breathing zone of individuals should become part of the overall employee exposure characterization program. Monitoring techniques have been developed by NIOSH and OSHA. Upon request Bayer Corporation can make available methods which are modifications of these NIOSH and OSHA methods. (Contact Bayer Corporation Product Safety for guidance).

MEDICAL SURVEILLANCE...............: Medical supervision of all employees who handle or come in contact with isocyanates is recommended. These should include preemployment and periodic medical examinations with respiratory function tests (FEV, FVC as a minimum). Persons with asthmatic-type conditions, chronic bronchitis, other chronic respiratory diseases or recurrent skin eczema or sensitization should be excluded from working with isocyanates. Once a person is diagnosed as sensitized to isocyanates, no further exposure can be permitted.

ADDITIONAL PROTECTIVE MEASURES.....: Safety showers and eyewash stations should be available. Educate and train employees in safe use of product. Follow all label instructions. For additional information, contact Bayer Product Safety Department for Polymers.

9. PHYSICAL AND CHEMICAL PROPERTIES:

PHYSICAL FORM.............: Liquid
COLOR.....................: Amber-Brown
ODOR......................: Sharp, Pungent
ODOR THRESHOLD............: Greater than TLV of 0.005 ppm
pH .......................: Not Established
BOILING POINT.............: Approximately 484°F (251°C) for TDI;
MELTING/FREEZING POINT....: Approximately 55°F (13°C) for TDI
SOLUBILITY IN WATER ......: Not Soluble. TDI and MDI react slowly with water to liberate CO2 gas.
SPECIFIC GRAVITY ..........: 1.22 @ 77°F (25°C)
BULK DENSITY...............: 10.18 lbs/gal
9. PHYSICAL AND CHEMICAL PROPERTIES (Continued)

% VOLATILE BY VOLUME.......: Negligible
VAPOR PRESSURE ...........: Approximately 0.025 mmHg @ 77 F (25 C) for TDI;
                           Less than 10-5 mmHg @ 77 F (25 C) for MDI.
VAPOR DENSITY ............: 6.0 for TDI; 8.5 for MDI (Air = 1)

10. STABILITY AND REACTIVITY:

STABILITY.................: This is a stable material.
HAZARDOUS POLYMERIZATION...: May occur; May occur if in contact with moisture
or other materials which react with isocyanates. Self-reaction may occur
at temperatures over 350 F (177 C) for TDI or 400 F (204 C) for MDI or at
lower temperatures if sufficient time is involved.
INCOMPATIBILITIES.........: Water, amines, strong bases, alcohols. Will cause
some corrosion to copper alloys and aluminum. Reacts with water to form
heat, CO2 and insoluble ureas.
INSTABILITY CONDITIONS.....: Exposure to high heat.
DECOMPOSITION PRODUCTS.....: By high heat and fire: carbon monoxide, oxides of
nitrogen, traces of HCN, TDI and MDI vapors, mist and aerosols.

11. TOXICOLOGICAL INFORMATION:

TOXICITY DATA FOR: Toluene Diisocyanate
ACUTE TOXICITY

ORAL LD50...........: Rat: males = 5110 mg/kg, females = 4130 mg/kg.;
                     Mouse: males = 4130 mg/kg, females = 5260 mg/kg.
DERMAL LD50.........: Greater than 10,000 mg/kg (Rabbit)
INHALATION LC50.....: LC50 (1 hr)-Rat: males and females - 480 mg/m3; LC50
                     (4 hr) - Rat: Males = 350 mg/m3, females = 360mg/m3; LC50 (6 hr) - Mouse:
                     males = 138 mg/m3, females = 103 mg/m3; LC50 (4 hr) - Rabbit: 80 mg/m3;
                     LC50 (4 hr) - Guinea pig: 92 mg/m3.
EYE EFFECTS.........: Rabbit: severe irritant, capable of producing corneal
                     opacity.
SKIN EFFECTS.......: Rabbit: moderate irritant (3.6/8.0 with Draize
                     scoring).
SENSITIZATION.......: Guinea pig: positive sensitizer via dermal and
                     inhalation exposure. Cross sensitization with MDI. Mouse: positive
                     sensitizer via dermal exposure. Cross sensitization with MDI, HDI, and HMDI.
                     Rat: Positive sensitizer via dermal exposure.
OTHER ACUTE EFFECTS: SUBACUTE: Repeated inhalation exposure studies (2-30
days; doses of 0.03 - 10.6 ppm; 0.22 - 77 mg/m3 with rats, mice, and guinea
pigs have shown that the effects of TDI are limited to the nasal passage and
the pulmonary system. Pathological findings were peribronchitis, bronchitis,
bronchopneumonia, rhinitis, eye irritation, tracheobronchitis, pulmonary
fibrosis, severe lung damage with a marked increase in lung weight, infolding
of the surface epithelium in the trachea and bronchus at the electron micros

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11. TOXICOLOGICAL INFORMATION (Continued)

The LOEL was 0.03 ppm (10.6 mg/m³), based on infolding of the epithelium in the trachea and bronchus, and cyst-like structures in the bronchus. The NOEL was 0.2 ppm (1.5 mg/m³) for inflammation of the respiratory tract.

SUBCHRONIC TOXICITY....: Subchronic inhalation toxicity studies (doses of 0.1 - 1.5 ppm; 0.73 - 10.9 mg/m³) using rats, rabbits, guinea pigs, and dogs have shown that the effects of TDI via inhalation exposure are limited to the nasal passages and the pulmonary system. Pathological findings were rhinitis, bronchitis, bronchopneumonia, pneumonitis, pneumonia, mild congestion of the trachea, tracheitis, thick mucous plugs in bronchial branches. The LOEL = 0.1 ppm (0.73 mg/m³), based on bronchitis and bronchopneumonia.

CHRONIC TOXICITY.......: Chronic inhalation toxicity studies (doses of 0.05 - 1.5 ppm; 0.36 - 10.9 mg/m³) using rats, mice, and rabbits have shown that the effects of TDI via inhalation exposure are limited to the nasal passages and the pulmonary system. Pathological findings were rhinitis, bronchitis, bronchopneumonia, pneumonitis, proliferation of fibrous tissue in the bronchioles. The LOEL = 0.05 ppm (0.36 mg/m³), based on rhinitis, bronchitis, and pneumonitis.

CARCINOGENICITY........: No tumors were observed in carcinogenicity studies in which mice and rats were exposed to TDI via inhalation (doses of 0.05 and 0.15 ppm; 0.36 and 1.1 mg/m³; 10 and 30 times, respectively, the TLV for an 8-hr exposure). In carcinogenicity studies in which mice and rats were dosed via gavage (Rats: 0, 30, and 60 mg/kg for males, and 0, 60, and 120 mg/kg for females; Mice: 0, 120, and 240 mg/kg for males, and 0, 60, and 120 mg/kg for females), TDI caused an increase in the spontaneous tumor rate with both species for the following tumors: Rats (males and/or females)—benign and malignant subcutaneous tumors (fibroma and fibrosarcoma), benign pancreatic tumors (acinar and islet cell adenoma), benign liver tumors (neoplastic nodules), and benign mammary gland tumors (fibroadenoma). Mice (females only)—benign and malignant blood vessel tumors (hemangioma and hemangiosarcoma), benign liver tumors (hepatocellular adenoma). The NOEL for carcinogenicity in mice was 60 mg/kg. For rats, no NOEL was established for malignant or benign tumors. Although TDI induced tumors via gavage, no tumors were produced via inhalation, which is the relevant route of exposure for humans.

MUTAGENICITY.........: A number of in-vitro, in-vivo, and in-vivo/in-vitro mutagenicity assays have been conducted, with both positive and negative results being reported. Mutagenic assay results: 1. Salmonella typhimurium assay (Ames assay)—positive results with metabolic activation. 2. Sister chromatid exchange assay using cultured human lymphocytes—positive. 3. Sister chromatid exchange assay using Chinese hamster ovary cells—negative. 4. Micronucleus assay (mice and rats exposed via inhalation)—no biologically significant effect. 5. Unscheduled DNA synthesis (UDS) assay (rats exposed via inhalation: hepatocytes and lungs evaluated)—negative.

DEVELOPMENTAL TOXICITY: TDI has been evaluated for developmental toxicity using rats. Pregnant dams were exposed via inhalation to TDI concentrations of 0, 0.02, 0.1, and 0.5 ppm (0.1, 0.73, and 3.6 mg/m³). There were no teratogenic effects. At a dose of 0.5 ppm, which was maternally toxic (based on a reduction in body weight gain), there was an increase in the incidence of incompletely ossified centrum for the 5th cervical vertebra. This incomplete
ossification indicates minimal fetotoxicity at a dose of 0.05 ppm. For teratogenic effects the NOEL = 0.5 ppm, for fetal effects the NOEL = 0.1 ppm, and the maternal NOEL = 0.1 ppm.

**REPRODUCTION**
- TDI has been evaluated for reproductive toxicity in a two-generation reproduction study using rats. Adults and offspring were exposed via inhalation to TDI at concentrations of 0, 0.02, 0.08, and 0.3, ppm (0.1, 0.6, and 2 mg/m3). There were no reproductive effects. The only neonatal effect was a reduction in body weight during the lactation phase for the F2 pups in the 0.08 and 0.3 ppm dose groups (Note: there was no effect on the F1 pup body weights). The NOEL = 0.3 ppm for reproductive effects and 0.1 ppm for pup effects.

**TOXICITY DATA FOR: Diphenylmethane Diisocyanate (Monomeric and Polymeric)**

**ACUTE TOXICITY**
- **ORAL LD50**........: Greater than 10,000 mg/kg (Rat)
- **DERMAL LD50**........: Greater 6,200 mg/kg (Rabbit)
- **INHALATION LC50**...: The 4-hour LC50 for polymeric MDI in rats ranges from 370 to 490 mg/m3. The 4-hour LC50 for monomeric MDI in rats was estimated to be between 172 and 187 mg/m3. The 1-hour LC50 for monomeric MDI aerosol was greater than 2240 mg/m3 (Rat).
- **EYE EFFECTS**........: Slight to moderate irritation (Rabbit).
- **SKIN EFFECTS**.......: Slight to moderate irritation (Rabbit).
- **SENSITIZATION**.....: MDI has been shown to produce dermal sensitization in laboratory animals. Evidence of respiratory sensitization has also been observed in guinea pigs. In addition, there is some evidence suggestive of cross-sensitization between different types of diisocyanates.

**CHRONIC TOXICITY**
- In a combined chronic inhalation toxicity/oncogenicity study, rats were exposed to an aerosol of polymeric MDI for 6 hours per day, 5 days per week for one or two years. The exposure concentrations were 0, 0.2, 1.0 and 6.0 mg/m3. Microscopic examination of tissues revealed the effects of irritation to the nasal cavity and lungs in animals exposed to 1.0 and 6.0 mg/m3. The No Observable Effect Level (NOEL) was 0.2 mg/m3.

**CARCINOGENICITY**
- In the study described above (See CHRONIC TOXICITY), the occurrence of pulmonary adenomas and a single pulmonary adenocarcinoma was considered to be related to MDI. These tumors were observed only in rats exposed to the high concentration of 6.0 mg/m3.

**MUTAGENICITY**
- Positive (Salmonella microsome test with metabolic activation; cell transformation assay) as well as negative (mouse lymphoma specific locus mutation test with or without metabolic activation) results have been observed "in vitro". The use of certain solvents which rapidly hydrolyze MDI is suspected of producing mutagenicity in some of these studies. MDI was negative in an "in vivo" (mouse micronucleus) assay.

**DEVELOPMENTAL TOXICITY:** Rats were exposed to polymeric MDI at air concentrations of 0, 1, 4 and 12 mg/m3 during days 6 - 15 of gestation. Maternal Toxicity (including mortality) was observed at the highest concentration of 12 mg/m3 accompanied by embryo and fetal toxicity. However, no teratogenic effects were observed even at this lethal concentration.
12. ECOLOGICAL INFORMATION:

ECOLOGY DATA FOR: Toluene Diisocyanate
AQUATIC TOXICITY...........: LC50 - 96 hr (static): 165 mg/liter (Fathead minnow) LC50 - 96 hr (static): Greater than 508 mg/liter (Grass shrimp) LC50 - 24 hr (static): Greater than 500 mg/liter (Daphnia magna)

ECOLOGY DATA FOR: Diphenylmethane Diisocyanate (Monomeric and Polymeric)
AQUATIC TOXICITY...........: LC50 - 24 hr. (static): Greater than 500 mg/liter for Daphnia magna, Limnea Stagnalis, and Zebra fish (Brachydanio rerio) for both polymeric and monomeric MDI.

13. DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD.......: Follow all federal, state or local regulations. TDI must be disposed of in a permitted incinerator or landfill. Incineration is the preferred method for liquids. Solids are usually incinerated or landfilled.

EMPTY CONTAINER PRECAUTIONS.: Empty containers must be handled with care due to product residue. Decontaminate containers prior to disposal. Empty decontaminated containers should be crushed to prevent reuse. DO NOT HEAT OR CUT EMPTY CONTAINER WITH ELECTRIC OR GAS TORCH. Vapors and gases may be highly toxic.

14. TRANSPORTATION INFORMATION:

TECHNICAL SHIPPING NAME........: Toluene Diisocyanate Solution containing Methylene diphenyl diisocyanate
FREIGHT CLASS BULK.............: Chemicals, NOI (Toluene Diisocyanate)
FREIGHT CLASS PACKAGE..........: Chemicals, NOI (Toluene Diisocyanate), NMFC 60000
PRODUCT LABEL..................: Product Label Established

DOT (DOMESTIC SURFACE)

PROPER SHIPPING NAME...........: Toluene Diisocyanate Solution
HAZARD CLASS OR DIVISION ......: 6.1
UN/NA NUMBER...................: UN2078
PACKING GROUP ..................: II, TOXIC
HAZARDOUS SUBSTANCE............: Toluene Diisocyanate, Methylene diphenyl diisocyanate
DOT PRODUCT RQ lbs (kgs).......: 125 lbs (56.7 kgs)
HAZARD LABEL(s)...............: Toxic
HAZARD PLACARD(s)..............: Toxic

Product Code: G-232
Approval date: 11/14/2003
14. TRANSPORTATION INFORMATION (Continued)

DOT (continued)

IMO / IMDG CODE (OCEAN)

PROPER SHIPPING NAME...........: Toluene Diisocyanate Solution
HAZARD CLASS DIVISION NUMBER...: 6.1
UN NUMBER......................: UN2078
PACKAGING GROUP................: II
HAZARD LABEL(s)................: Toxic
HAZARD PLACARD(s)..............: Toxic

ICAO / IATA (AIR)

PROPER SHIPPING NAME...........: Toluene Diisocyanate Solution
HAZARD CLASS DIVISION NUMBER...: 6.1
UN NUMBER......................: UN2078
SUBSIDIARY RISK...............: None
PACKING GROUP..................: II
HAZARD LABEL(s)................: Toxic
RADIOACTIVE?...................: Non-Radioactive
PASSENGER AIR - MAX. QTY. .....: 5 Liters
PASSENGER PACKING INSTRUCTION..: 609
CARGO AIR - MAX. QTY. .........: 60 Liters
CARGO AIR PACKING INSTRUCTION..: 611

15. REGULATORY INFORMATION:

OSHA STATUS.................: This product is hazardous under the criteria of the Federal OSHA Hazard Communication Standard 29 CFR 1910.1200.

TSCA STATUS.................: On TSCA Inventory
CERCLA REPORTABLE QUANTITY..: 100 lbs. for TDI; 1 lb. for MDI
SARA TITLE III:
    SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES..: 2,4-Toluene Diisocyanate (CAS# 584-84-9) 36-44%; 2,6-Toluene Diisocyanate (CAS# 91-08-7) 9-11%
    SECTION 311/312 HAZARD CATEGORIES......: Immediate Health Hazard; Delayed Health Hazard; Reactive Hazard
    SECTION 313 TOXIC CHEMICALS.......: 2,4-Toluene Diisocyanate (CAS# 584-84-9) 36-44%; 2,6-Toluene Diisocyanate (CAS# 91-08-7) 9-11%; 4,4’-Diphenylmethane Diisocyanate (CAS# 101-68-8) 8-15%
RCRA STATUS.................: TDI is listed as a hazardous waste (No. U-223) under Title 40 Code of Federal Regulations, Section 261.33 (f). The residue from decontaminating a TDI spill is also classified as
The following chemicals are specifically listed by individual states; other product specific health and safety data in other sections of the MSDS may also be applicable for state requirements. For details on your regulatory requirements you should contact the appropriate agency in your state.

<table>
<thead>
<tr>
<th>COMPONENT NAME</th>
<th>/CAS NUMBER</th>
<th>CONCENTRATION</th>
<th>STATE CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,4-Toluene Diisocyanate</td>
<td>584-84-9</td>
<td>36-44 %</td>
<td>PA1, PA2, PA4, CA1, FL, IL, MA, RI, MI, NJ1, NJ2, NJ4, CN2, NY</td>
</tr>
<tr>
<td>2,6-Toluene Diisocyanate</td>
<td>91-08-7</td>
<td>9-11 %</td>
<td>PA1, PA4, CA1, FL, IL, MA, NJ1, NJ2, NJ3, NJ4, CN2, NY</td>
</tr>
<tr>
<td>4,4-Diphenylmethane Diisocyanate</td>
<td>101-68-8</td>
<td>8-15 %</td>
<td>PA1, PA4, FL, IL, MA, RI, NJ1, NJ2, NJ4, CN2</td>
</tr>
<tr>
<td>Diphenylmethane Diisocyanate</td>
<td>26447-40-5</td>
<td>12-15 %</td>
<td>PA3, NJ4</td>
</tr>
<tr>
<td>Higher Oligomers of MDI</td>
<td>9016-87-9</td>
<td>15-35 %</td>
<td>PA3, NJ4</td>
</tr>
</tbody>
</table>

CA1 = Warning! This chemical is known to the State of California to cause cancer.
FL = Florida Substance List
IL = Illinois Toxic Substances List
MA = Massachusetts Hazardous Substance List
MI = Michigan Hazardous Substance List
NJ1 = New Jersey Hazardous Substance List
NJ2 = New Jersey Environmental Hazardous Substance List
NJ3 = New Jersey Special Health Hazardous Substance List
NJ4 = New Jersey Other - included in 5 predominant ingredients > 1%
NY = New York Hazardous Substance List
PA1 = Pennsylvania Hazardous Substance List
PA2 = Pennsylvania Special Substances List
PA3 = Pennsylvania Non-hazardous present at 3% or greater.
PA4 = Pennsylvania Environmental Hazardous Substance List.
RI = Rhode Island List of Designated Substances
CN2 = Canada WHMIS Ingredient Disclosure List over 0.1%.

NFPA 704M RATINGS: Health Flammability Reactivity Other

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16. OTHER INFORMATION (Continued)

HMIS RATINGS:          Health   Flammability   Reactivity
            3*          1             1
0=Insignificant  1=Slight   2=Moderate   3=High     4=Extreme

HMIS RATINGS:          Health   Flammability   Reactivity
            3*          1             1
0=Minimal       1=Slight   2=Moderate   3=Serious   4=Severe
*=Chronic Health Hazard

Bayer’s method of hazard communication is comprised of Product Labels and
Material Safety Data Sheets. HMIS and NFPA ratings are provided by Bayer as a
customer service.

REASON FOR ISSUE...........: Revised toxicology section.
PREPARED BY.................: P. E. Malichky
APPROVED BY...............: J. H. Chapman
APPROVAL DATE..............: 11/14/2003
SUPERSEDES DATE............: 02/05/2001
MSDS NUMBER...............: 01792

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