WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF AIR QUALITY
601 57th Street, SE
Charleston, WV 25304
Phone: (304) 926-0475
www.dep.wv.gov/daq

PERMIT DETERMINATION FORM (PDF)

FOR AGENCY USE ONLY: PLANT I.D. # _____

PDF # _____ PERMIT WRITER: _____

1. NAME OF APPLICANT (AS REGISTERED WITH THE WV SECRETARY OF STATE'S OFFICE):
Covestro

2. NAME OF FACILITY (IF DIFFERENT FROM ABOVE):

3. NORTH AMERICAN INDUSTRY CLASSIFICATION SYSTEM (**NAICS**) CODE:
3 2 5 2 1 1

4A. MAILING ADDRESS:
17595 Energy Road
Proctor, WV 26055

4B. PHYSICAL ADDRESS:
17595 Energy Road
Proctor, WV 26055

5A. DIRECTIONS TO FACILITY (PLEASE PROVIDE **MAP** AS **ATTACHMENT A**):
The facility is located on State Route 2, approximately 7 miles north of New Martinsville, WV

5B. NEAREST ROAD:
State Route 2

5C. NEAREST CITY OR TOWN:
New Martinsville

5D. COUNTY:
Marshall

5E. UTM NORTHING (KM):
514.5

5F. UTM EASTING (KM):
4397.3

5G. UTM ZONE:
17

6A. INDIVIDUAL TO CONTACT IF MORE INFORMATION IS REQUIRED:
Mary Ann Henderson

6B. TITLE:
Regulatory Affairs Lead

6C. TELEPHONE:
304-451-2431

6D. FAX:

6E. E-MAIL:
Maryann.henderson@covestro.com

7A. DAQ PLANT I.D. NO. (FOR AN EXISTING FACILITY ONLY):
0 5 1 – 0 0 0 0 9

7B. PLEASE LIST ALL CURRENT 45CSR13, 45CSR14, 45CSR19 AND/OR TITLE V (45CSR30) PERMIT NUMBERS ASSOCIATED WITH **THIS** PROCESS (FOR AN EXISTING FACILITY ONLY):
R13-2507

7C. IS THIS PDF BEING SUBMITTED AS THE RESULT OF AN ENFORCEMENT ACTION? IF YES, PLEASE LIST:
No

8A. TYPE OF EMISSION SOURCE (CHECK ONE):
☐ **NEW SOURCE** ☐ **ADMINISTRATIVE UPDATE**
☒ **MODIFICATION** ☐ **OTHER** (PLEASE EXPLAIN IN 11B)

8B. IF ADMINISTRATIVE UPDATE, DOES DAQ HAVE THE APPLICANT'S CONSENT TO UPDATE THE EXISTING PERMIT WITH THE INFORMATION CONTAINED HEREIN?
☐ **YES** ☐ **NO**

9. IS *DEMOLITION* OR PHYSICAL *RENOVATION* AT AN EXISTING FACILITY INVOLVED? ☒ **YES** ☐ **NO**

10A. DATE OF ANTICIPATED INSTALLATION OR CHANGE:
5/1/2017

10B. DATE OF ANTICIPATED START-UP:
10/1/2017

11A. PLEASE PROVIDE A **DETAILED PROCESS FLOW DIAGRAM** SHOWING EACH PROPOSED OR MODIFIED PROCESS EMISSION POINT AS **ATTACHMENT B**. See Attached

11B. PLEASE PROVIDE A **DETAILED PROCESS DESCRIPTION** AS **ATTACHMENT C**. See Attached

12. PLEASE PROVIDE **MATERIAL SAFETY DATA SHEETS (MSDS)** FOR ALL MATERIALS PROCESSED, USED OR PRODUCED AS **ATTACHMENT D**. FOR CHEMICAL PROCESSE, PLEASE PROVIDE A MSDS FOR EACH COMPOUND EMITTED TO AIR. **See Attached**

Covestro 17595 Energy Road Proctor West Virginia 26055	Responsible Official: Jeffrey S. Bolton Plant Manager Phone: (304) 455-4400 Fax: (304) 451-2950
Confidential Information submitted by: M. A. Henderson Phone: (304) 451-2431 Title: Manager, Regulatory Affairs	

Reason for Submittal of Confidential Information:
Required by inventory

Identification of Confidential Information	Rationale for confidential claim	Confidential Treatment Time Period
Process and tank throughputs	Proprietary Information	Until Notified

Signature of Responsible Official Signature:	JSBolton
Date:	12/15/16

Note: **Must be signed in BLUE INK**

13A. **REGULATED AIR POLLUTANT EMISSIONS:**

⇒ **FOR A NEW FACILITY,** PLEASE PROVIDE PLANT WIDE EMISSIONS BASED ON THE POTENTIAL TO EMIT (PTE) FOR THE FOLLOWING AIR POLLUTANTS INCLUDING ALL PROCESSES.

⇒ **FOR AN EXISTING FACILITY,** PLEASE PROVIDE THE PROPOSED CHANGE IN EMISSIONS BASED ON THE PTE OF ALL PROCESS CHANGES FOR THE FOLLOWING AIR POLLUTANTS.

PTE FOR A GIVEN POLLUTANT IS TYPICALLY BEFORE AIR POLLUTION CONTROL DEVICES AND IS COLLECTED BASED ON THE MAXIMUM DESIGN CAPACITY OF PROCESS EQUIPMENT.

POLLUTANT	HOURLY PTE (LB/HR)	YEARLY PTE (TON/YR) (HOURLY PTE MULTIPLIED BY 8760 HR/YR) DIVIDED BY 2000 LB/TON
PM		
PM_{10}		
VOCs	0.0542	0.1937
CO		
NO_x		
SO_2		
Pb		
HAPs (AGGREGATE AMOUNT)	0.0125	0.0547
TAPs (INDIVIDUALLY)*		
OTHER (INDIVIDUALLY)*		

* ATTACH ADDITIONAL PAGES AS NEEDED

13B. PLEASE PROVIDE ALL **SUPPORTING CALCULATIONS** AS **ATTACHMENT E.** See Attached

CALCULATE AN HOURLY AND YEARLY PTE OF EACH PROCESS EMISSION POINT (SHOWN IN YOUR DETAILED PROCESS FLOW DIAGRAM) FOR ALL AIR POLLUTANTS LISTED ABOVE INCLUDING INDIVIDUAL HAP'S (LISTED IN SECTION 112[b] OF THE 1990 CAAA), TAP'S (LISTED IN 45CSR27), AND OTHER AIR POLLUTANTS (E.G. POLLUTANTS LISTED IN TABLE 45-13A OF 45CSR13, MINERAL ACIDS PER 45CSR7, ETC.).

14. **CERTIFICATION OF DATA**

I, JEFFREY S. BOLTON (*TYPE NAME*) ATTEST THAT ALL THE REPRESENTATIONS CONTAINED IN THIS APPLICATION, OR APPENDED HERETO, ARE TRUE, ACCURATE, AND COMPLETE TO THE BEST OF MY KNOWLEDGE BASED ON INFORMATION AND BELIEF AFTER REASONABLE INQUIRY, AND THAT I AM A ***RESPONSIBLE OFFICIAL*** (*PRESIDENT, VICE PRESIDENT, SECRETARY OR TREASURER, GENERAL PARTNER OR SOLE PROPRIETOR*) OF THE APPLICANT.

SIGNATURE OF RESPONSIBLE OFFICIAL: _____

TITLE: GENERAL PLANT MANAGER DATE: 12 / 15 / 16

** THE DEFINITION OF THE PHRASE '***RESPONSIBLE OFFICIAL***' CAN BE FOUND AT 45CSR13, SECTION 2.23.

NOTE: PLEASE CHECK ENCLOSED ATTACHMENTS:

☒ **ATTACHMENT A** ☒ **ATTACHMENT B** ☒ **ATTACHMENT C** ☒ **ATTACHMENT D** ☒ **ATTACHMENT E**

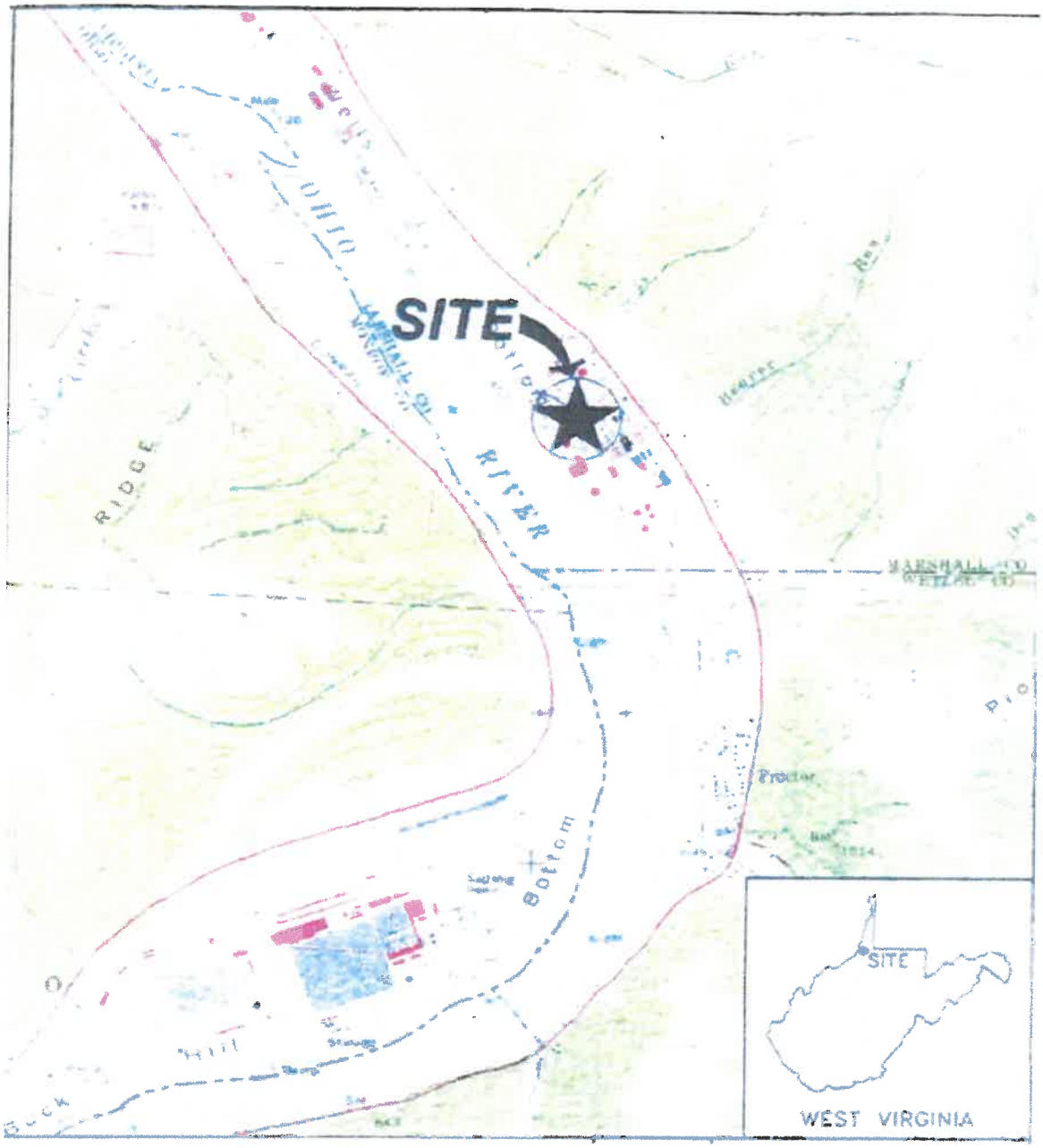
RECORDS ON ALL CHANGES ARE REQUIRED TO BE KEPT AND MAINTAINED ON-SITE FOR TWO (2) YEARS.

THE PERMIT DETERMINATION FORM WITH THE INSTRUCTIONS CAN BE FOUND ON DAQ'S PERMITTING SECTION WEB SITE:

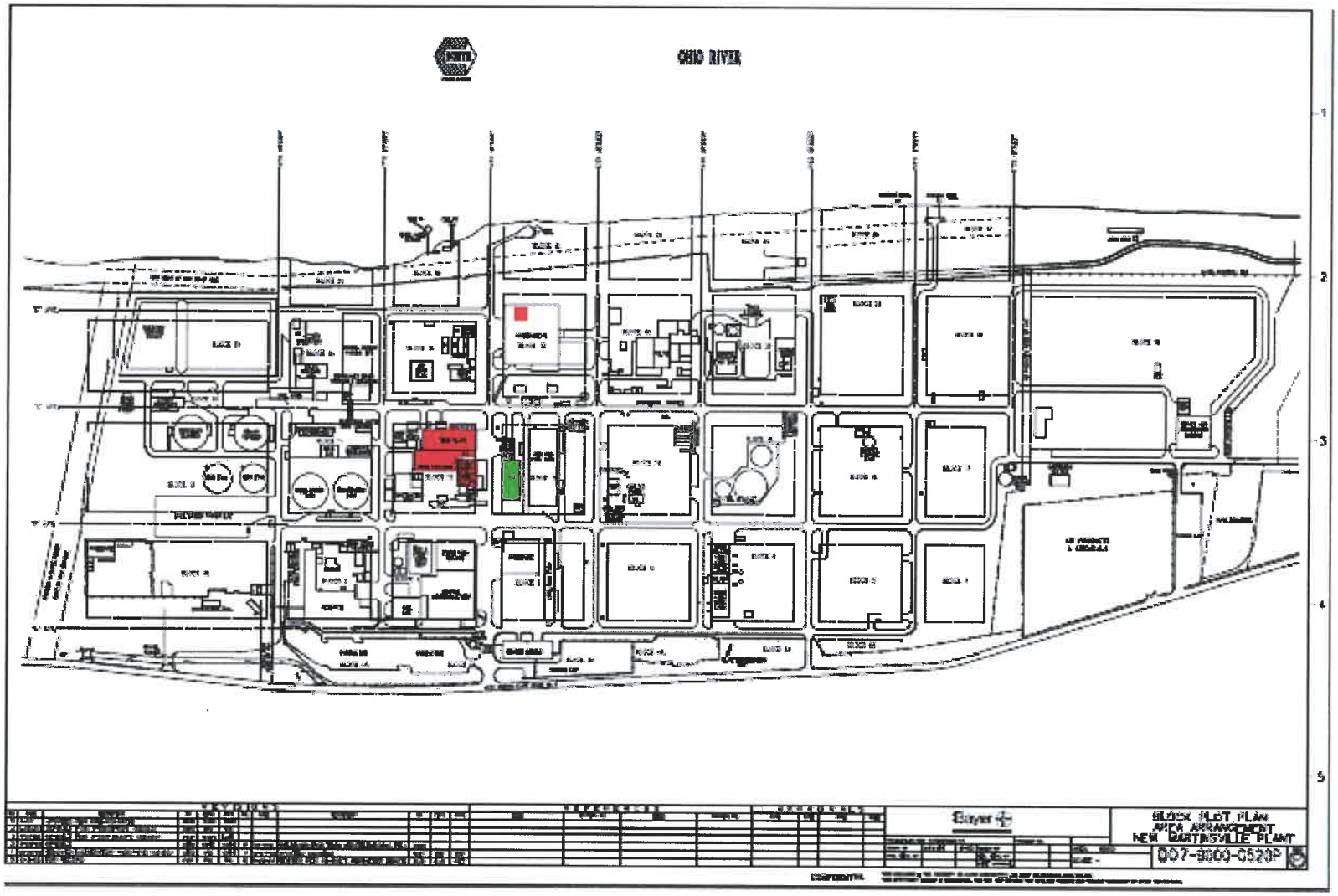
www.dep.wv.gov/daq

ATTACHMENT A
Maps

ATTACHMENT A-1, Location of Site

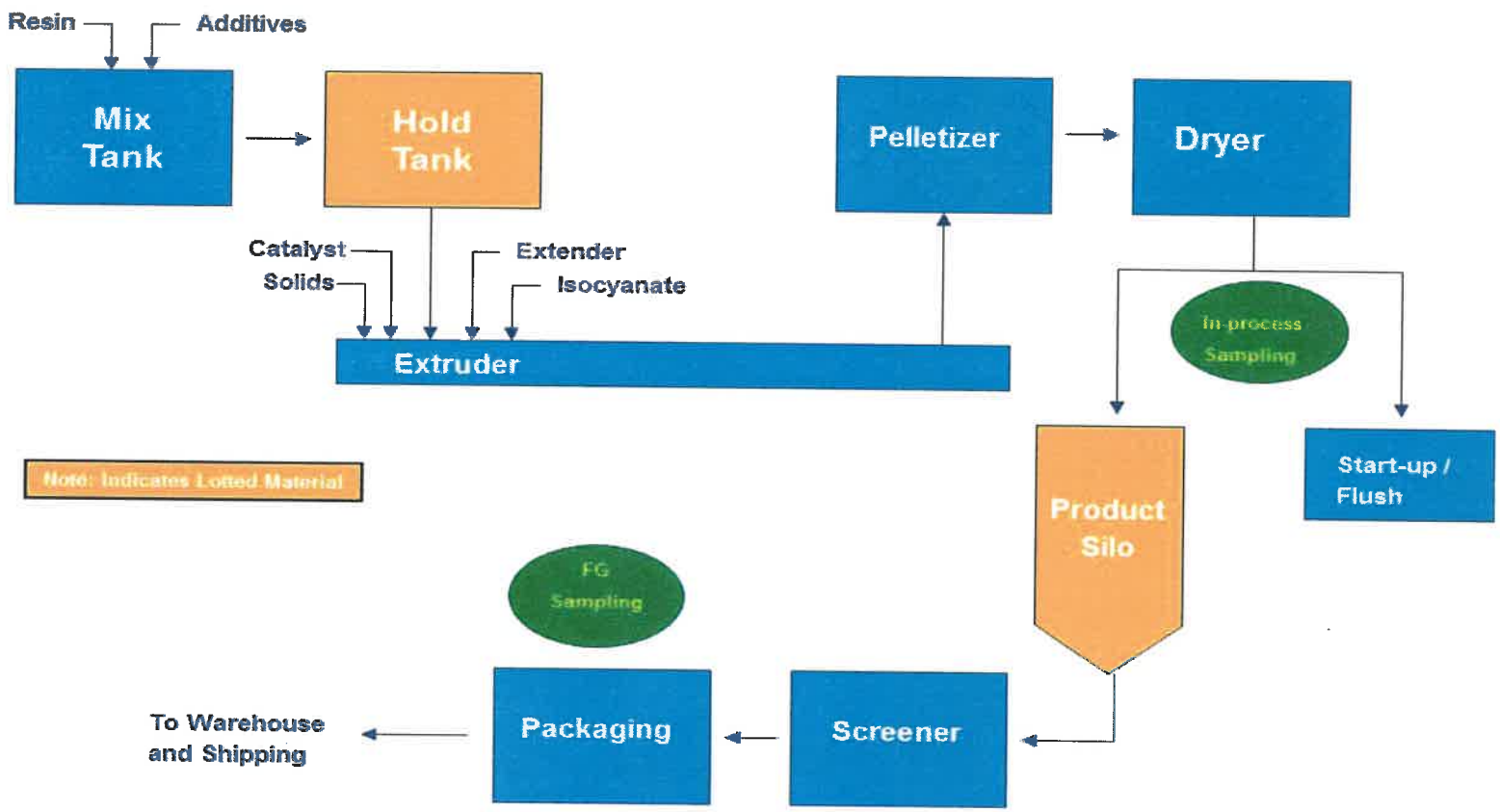


ATTACHMENT A-2, PLOT PLAN OF SITE



ATTACHMENT B
Process Flow Diagram

ATTACHMENT B, PROCESS FLOW DIAGRAM



ATTACHMENT C
Process Description

GENERAL PROCESS OVERVIEW - TEXIN

Product Description

TEXIN® TPU (Texin) is a solid thermoplastic urethane (TPU) whose name comes from the process:

T	-	**T**ransfer molding
EX	-	**EX**trusion
IN	-	**IN**jection molding

Texin materials bridge the gap between rubber and plastics. These materials are available in grades that go from very soft and flexible to very rigid. Many grades comply with FDA food-contact regulations. . Typical uses are automotive instrument panels, caster wheels, power tools, sporting goods, medical devices, and a variety of extruded film, sheet and profile applications.

Process Description

The New Martinsville site produces TEXIN via a continuous batch operation. Distinct and identifiable production lots are produced by three reactive extruder lines. The following process description, although typical for all three extruder lines, will focus primarily on products produced on Line 1, which is the focus of the current project.

The three primary raw materials for the production of Texin are an isocyanate, a resin and the chain extender. All three primary components, as well as additional small quantity additives, are ratio flow controlled using the Delta V distributed control system (DCS).

- The isocyanate (usually MDI) is supplied from a central storage tank and is either fed into the prepolymer line (equipped with mixing elements so it can combine with the resin) or be fed directly into the liquid feed nozzle.
- The chain extender (for example 1,4-Butanediol) is also fed into the extruder either directly to the liquid feed nozzle or through the prepolymer line depending on whether the TPU product is produced .
- The resin (typically PTMEG1000) is charged into a mix tank using weigh cells. Additives such as catalysts and UV stabilizers are manually added to the mix tank. The contents of the mix tank are agitated and transferred to the hold tank and then to the extruder.

Once these three materials are combined in the front end of the extruder, the feeds react to form the TPU. The extruder contains zones or blocks that are temperature controlled. Based upon which TPU product is being produced, temperature profiles across the extruder are in the range of 220° - 500°F (104° - 260°C).

The liquid TPU exits the extruder and flows through a die plate. As the liquid exits the die plate it is pelletized using a motor-driven set of blades cutting against the die plate face. Extruder Line 1 utilizes a Gala underwater pelletizing system where a continuous flow of water moves across the cutter blades and die plate face eliminating air emissions at this point.

The pellets are then sent to the dryer. From there they pneumatically conveyed to a storage and then to the packaging area

List of Typical Raw Materials (SDS's included in Attachment D)

mMDI
Poly THF 1000 (PTMEG1000)
1,4 Butanediol
Octanol
Acrawax C Beads
Licowax E
Irganox 1010
Epoxol 9-5

List of Typical Products (SDS's included in Attachment D)

Texin 1049
Texin 990
Texin 990R
Texin 950
Texin 950LW
Texin 985

Proposed Project

The planned project has three phases:

	Description	Proposed Installation Start Date	Proposed Operation Date
Phase 1	Debottle-neck the packaging system	May 2017	August 2017
Phase 2	Replace the current Line #1 extruder with a larger one	June 2017	September 2017
Phase 3	Utilize a larger storage tank for resin; one that is capable of accepting loads from rail cars	June 2017	October 2017

The impact emissions is discussed in Attachment E - Calculations

ATTACHMENT D
MSDS

MATERIAL SAFETY DATA SHEET

Bayer MaterialScience

Bayer MaterialScience LLC
Product Safety & Regulatory Affairs
100 Bayer Road
Pittsburgh, PA 15205-9741
USA

TRANSPORTATION EMERGENCY

CALL CHEMTREC:	(800) 424-9300
INTERNATIONAL:	(703) 527-3887

NON-TRANSPORTATION

Emergency Phone:	Call Chemtrec
Information Phone:	(800) 662-2927

1. Product and Company Identification

Product Name:	MONDUR® M (MOLTEN-BULK)
Material Number:	5326974
Chemical Family:	Aromatic Isocyanate
Chemical Name:	Diphenylmethane Diisocyanate (MDI)

2. Hazards Identification

Emergency Overview

Warning Color: White, Light yellow **Form:** liquid molten **Odor:** slight, musty.
Toxic gases/fumes may be given off during burning or thermal decomposition. Closed container may forcibly rupture under extreme heat or when contents have been contaminated with water. Use cold water spray to cool fire-exposed containers to minimize the risk of rupture. Causes respiratory tract irritation. May cause allergic respiratory reaction. Harmful if inhaled. Respiratory sensitizer. Lung damage and respiratory sensitization may be permanent. Causes skin irritation. May cause allergic skin reaction. Skin sensitizer. Animal tests and other research indicate that skin contact with MDI can play a role in causing isocyanate sensitization and respiratory reaction. Causes eye irritation. May cause lung damage.

Potential Health Effects

Primary Routes of Entry:	Skin Contact, Inhalation, Eye Contact
Medical Conditions Aggravated by Exposure:	Asthma, Respiratory disorders, Skin Allergies, Eczema

HUMAN EFFECTS AND SYMPTOMS OF OVEREXPOSURE

Inhalation
Acute Inhalation
For Product: MONDUR® M (MOLTEN-BULK)
Diisocyanate vapors or mist at concentrations above the TLV or PEL 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 or PEL with similar symptoms as well as asthma attack or asthma-like symptoms. Exposure well above the TLV

or PEL may lead to bronchitis, bronchial spasm and pulmonary edema (fluid in lungs). Chemical or hypersensitivity pneumonitis, with flu-like symptoms (e.g., fever, chills), has also been reported. These symptoms can be delayed up to several hours after exposure. These effects are usually reversible.

Chronic Inhalation
For Product: MONDUR® M (MOLTEN-BULK)
As a result of previous repeated overexposures or a single large dose, certain individuals may develop sensitization to diisocyanates (asthma or asthma-like symptoms) that may cause them to react to a later exposure to diisocyanates at levels well below the TLV or PEL. 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. Extreme asthmatic reactions can be life threatening. 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. Sensitization can be permanent. Chronic overexposure to diisocyanates has also been reported to cause lung damage (including fibrosis, decrease in lung function) that may be permanent.

Skin
Acute Skin
For Product: MONDUR® M (MOLTEN-BULK)
Causes irritation with symptoms of reddening, itching, and swelling. Persons previously sensitized can experience allergic skin reaction with symptoms of reddening, itching, swelling, and rash. Cured material is difficult to remove. Contact with MDI can cause discoloration.

Chronic Skin
For Product: MONDUR® M (MOLTEN-BULK)
Prolonged contact can cause reddening, swelling, rash, and, in some cases, skin sensitization. Animal tests and other research indicate that skin contact with MDI can play a role in causing isocyanate sensitization and respiratory reaction.

Eye
Acute Eye
For Product: MONDUR® M (MOLTEN-BULK)
Causes irritation with symptoms of reddening, tearing, stinging, and swelling. May cause temporary corneal injury. Vapor or aerosol may cause irritation with symptoms of burning and tearing.

Chronic Eye
For Product: MONDUR® M (MOLTEN-BULK)
Prolonged vapor contact may cause conjunctivitis.

Ingestion
Acute Ingestion
For Product: MONDUR® M (MOLTEN-BULK)
May cause irritation; Symptoms may include abdominal pain, nausea, vomiting, and diarrhea.

Carcinogenicity:
No Carcinogenic substances as defined by IARC, NTP and/or OSHA

3. Composition/Information on Ingredients

Hazardous components

Weight %	Components	CAS-No.
>=95%	4,4'-Diphenylmethane Diisocyanate (MDI)	101-68-8
1 - 5%	2,4'-Diphenylmethane Diisocyanate	5873-54-1

(MDI)

4. First aid measures

Eye contact
In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Use lukewarm water if possible. Use fingers to ensure that eyelids are separated and that the eye is being irrigated. Get medical attention.

Skin contact
Immediately remove contaminated clothing and shoes. Wash off with soap and water. Use lukewarm water if possible. Wash contaminated clothing before reuse. For severe exposures, immediately get under safety shower and begin rinsing. Get medical attention if irritation develops.

Inhalation
Move to an area free from further exposure. Get medical attention immediately. Administer oxygen or artificial respiration as needed. Asthmatic symptoms may develop and may be immediate or delayed up to several hours. Extreme asthmatic reactions can be life threatening.

Ingestion
Do NOT induce vomiting. Wash mouth out with water. Do not give anything by mouth to an unconscious person. Get medical attention.

Notes to physician
Eyes: Stain for evidence of corneal injury. If cornea is burned, instill antibiotic/steroid preparation as needed. Workplace vapors could produce reversible corneal epithelial edema impairing vision. Skin: This compound is a skin sensitizer. Treat symptomatically as for contact dermatitis or thermal burn. Ingestion: Treat symptomatically. There is no specific antidote. Inducing vomiting is contraindicated because of the irritating nature of the compound. Inhalation: Treatment is essentially symptomatic. An individual having a dermal or pulmonary sensitization reaction to this material should be removed from further exposure to any diisocyanate.

5. Fire-fighting measures

Suitable extinguishing media: Dry chemical, Carbon dioxide (CO_2), Foam, water spray for large fires.

Special Fire Fighting Procedures
Firefighters should wear NFPA compliant structural firefighting protective equipment, including self-contained breathing apparatus and NFPA compliant helmet, hood, boots and gloves. Avoid contact with product. Decontaminate equipment and protective clothing prior to reuse. During a fire, isocyanate vapors and other irritating, highly toxic gases may be generated by thermal decomposition or combustion. Exposure to heated diisocyanate can be extremely dangerous.

Unusual Fire/Explosion Hazards
Closed container may forcibly rupture under extreme heat or when contents are contaminated with water (CO_2 formed). Use cold-water spray to cool fire-exposed containers to minimize the risk of rupture. Large fires can be extinguished with large volumes of water applied from a safe distance, since reaction between water and hot diisocyanate can be vigorous.

6. Accidental release measures

Spill and Leak Procedures
Evacuate non-emergency personnel. Isolate the area and prevent access. Remove ignition sources. Notify management. Put on protective equipment. Control source of the leak. Ventilate. Contain the spill to prevent spread into drains, sewers, water supplies, or soil. Call Bayer at 412-923-1800 for assistance and advice. Major Spill or Leak (Standing liquid): Released material may be pumped into closed, but not sealed, metal container for disposal. Process can generate heat. Minor Spill or Leak (Wet surface): Cover spill area with suitable absorbent material (Kitty Litter, Oil-Dri®, etc). Saturate absorbent material with neutralization solution and mix. Wait 15 minutes. Collect material in open-head metal containers. Repeat applications of decontamination solution, with scrubbing, followed by absorbent until the surface is decontaminated. Check for residual surface contamination. Swype® test kits have been used for this purpose. Apply lid loosely and allow containers to vent for 72 hours to let carbon dioxide (CO2) escape.

Additional Spill Procedures/Neutralization
Neutralization solutions:
(1) Colorimetric Laboratories Inc. (CLI) decontamination solution.
(2) A mixture of 75% water, 20% non-ionic surfactant (e.g. Plurafac SL-62, Tergitol TMN-10) and 5% n-propanol.
(3) A mixture of 80% water, 20% non-ionic surfactant (e.g. Plurafac SL-62, Tergitol TMN-10).
(4) A mixture of 90% water, 3-8% ammonium hydroxide or concentrated ammonia, and 2% liquid detergent.

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:

minimum:	41 °C (105.8 °F)
maximum:	43 °C (109.4 °F)

Storage period
< 1 Months: Recommended

Handling/Storage Precautions
Do not breathe vapors, mists, or dusts. Use adequate ventilation to keep airborne isocyanate levels below the exposure limits. Wear respiratory protection if material is heated, sprayed, used in a confined space, or if the exposure limit is exceeded. Warning properties (irritation of the eyes, nose and throat or odor) are not adequate to prevent 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. Individuals with lung or breathing problems or prior allergic reactions to isocyanates must not be exposed to vapor or spray mist. Avoid contact with skin and eyes. Wear appropriate eye and skin protection. Wash thoroughly after handling. Do not breathe smoke and gases created by overheating or burning this material. Decomposition products can be highly toxic and irritating. Store in tightly closed containers to prevent moisture contamination. Do not reseal if contamination is suspected.

Further Info on Storage Conditions
Employee education and training in the safe use and handling of this product are required under the OSHA Hazard Communication Standard 29 CFR 1910.1200.

8. Exposure controls / personal protection

4,4'-Diphenylmethane Diisocyanate (MDI) (101-68-8)

US. ACGIH Threshold Limit Values
Time Weighted Average (TWA): 0.005 ppm
US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)
Ceiling Limit Value: 0.02 ppm, 0.2 mg/m3

Industrial Hygiene/Ventilation Measures
Local exhaust should be used to maintain levels below the TLV whenever MDI is heated, sprayed, or aerosolized. Standard reference sources regarding industrial ventilation (e.g., ACGIH Industrial Ventilation Manual) should be consulted for guidance about adequate ventilation. To ensure that published exposure limits have not been exceeded, monitoring for airborne diisocyanate should become part of the overall employee exposure characterization program. NIOSH, OSHA, Bayer, and others have developed sampling and analytical methods. Bayer methods can be made available, upon request.

Respiratory protection
Airborne MDI concentrations greater than the ACGIH TLV-TWA (TLV) or OSHA PEL-C (PEL) can occur in inadequately ventilated environments when MDI is sprayed, aerosolized, or heated. In such cases, respiratory protection must be worn. The type of respiratory protection selected must comply with the requirements set forth in OSHA's Respiratory Protection Standard (29 CFR 1910.134). The type of respiratory protection available includes (1) an atmosphere-supplying respirator such as a self-contained breathing apparatus (SCBA) or a supplied air respirator (SAR) in the positive pressure or continuous flow mode, or (2) an air-purifying respirator (APR). If an APR is selected then (a) the cartridge must be equipped with an end-of-service life indicator (ESLI) certified by NIOSH, or(b) a change out schedule, based on objective information or data that will ensure that the cartridges are changed out before the end of their service life, must be developed and implemented. The basis for the change out schedule must be described in the written respirator program. Further, if an APR is selected, the airborne diisocyanate concentration must be no greater than 10 times the TLV or PEL. The recommended APR cartridge is an organic vapor/particulate filter combination cartridge (OV/P100).

Hand protection
Gloves should be worn., Nitrile rubber showed excellent resistance., Butyl rubber, neoprene and PVC are also effective.

Eye protection
When directly handling liquid product, eye protection is required. Examples of eye protection include a chemical safety goggle, or chemical safety goggle in combination with a full face shield when there is a greater risk of splash.

Skin and body protection
Avoid all skin contact. Depending on the conditions of use, cover as much of the exposed skin area as possible with appropriate clothing to prevent skin contact., Animal tests and other research indicate that skin contact with MDI can play a role in causing isocyanate sensitization and respiratory reaction., This data reinforces the need to prevent direct skin contact with isocyanates.

Medical Surveillance
All applicants who are assigned to an isocyanate work area should undergo a pre-placement medical evaluation. A history of eczema or respiratory allergies such as hay fever, are possible reasons for medical exclusion from isocyanate areas. Applicants who have a history of adult asthma should be restricted from work with isocyanates. Applicants with a history of prior isocyanate sensitization should be excluded from further work with isocyanates. A comprehensive annual medical surveillance program should be instituted for all employees who are potentially exposed to diisocyanates. Once a worker has been diagnosed as sensitized to any isocyanate, no further exposure can be permitted. Refer to the Bayer pamphlet (Medical Surveillance Program for Isocyanate Workers) for additional guidance.

Additional Protective Measures
Emergency showers and eye wash stations should be available. Educate and train employees in the safe use and handling of this product. Follow all label instructions.

9. Physical and chemical properties

Form:	liquid
Appearance:	molten
Color:	White, Light yellow
Odor:	slight, musty
pH:	not applicable
Melting Point:	38 °C (100.4 °F)
Flash point:	201.67 °C (395.01 °F) (ASTM D 93)
Specific Gravity:	1.19 @ 25 °C (77 °F)
Solubility in Water:	Insoluble - Reacts slowly with water to liberate CO2 gas
Autoignition temperature:	> 400 °C (> 752 °F) (DIN 51794)
Decomposition temperature:	> 230 °C (> 446 °F)
Viscosity, dynamic:	4.1 mPa.s @ 40 °C (104 °F)
Bulk density:	1,190 kg/m3
Molecular Weight:	250

10. Stability and reactivity

Hazardous Reactions
Contact with moisture, other materials that react with isocyanates, or temperatures above 350 F (177 C), may cause polymerization.

Materials to avoid
Water, Amines, Strong bases, Alcohols, Copper alloys

Hazardous decomposition products
By Fire and High Heat: Carbon dioxide (CO2), carbon monoxide (CO), oxides of nitrogen (NOx), dense black smoke., Isocyanate, Isocyanic Acid, Other undetermined compounds

11. Toxicological information

Toxicity Data for MONDUR® M (MOLTEN-BULK)
Toxicity Note
Toxicity data based on polymeric MDI.

Acute oral toxicity
LD50: > 2,000 mg/kg (rat, Male/Female)

Acute inhalation toxicity
LC50: 490 mg/m3, 4 h (rat)

Skin irritation
rabbit, Slightly irritating

Repeated dose toxicity
90 Days, inhalation: NOAEL: 1 mg/m3, (rat, Male/Female, 6 hrs/day 5 days/week)

Irritation to lungs and nasal cavity.
2 years, inhalation: NOAEL: 0.2, (rat, Male/Female, 6 hrs/day 5 days/week)
Irritation to lungs and nasal cavity.

Mutagenicity
Genetic Toxicity in Vitro:
Bacterial - gene mutation assay: negative (Salmonella typhimurium, Metabolic Activation: with/without)

Carcinogenicity
rat, Male/Female, inhalation, 2 Years, 6 hrs/day 5 days/week,

Exposure to a level of 6 mg/m3 polymeric MDI was related to the occurrence of lung tumors. This level is significantly over the TLV for MDI.

Developmental Toxicity/Teratogenicity
rat, female, inhalation, gestation days 6-15, 6 hrs/day, NOAEL (teratogenicity): 12 mg/m3, NOAEL (maternal): 4 mg/m3

No Teratogenic effects observed at doses tested., Fetotoxicity seen only with maternal toxicity.

Toxicity Data for 4,4'-Diphenylmethane Diisocyanate (MDI)
Acute inhalation toxicity
LC50: 369 mg/m3, 4 h (rat, Male/Female)
LC50: > 2240 mg/m3, 1 h (rat)

Acute dermal toxicity
LD50: > 10,000 mg/kg (rabbit)

Skin irritation
rabbit, Draize Test, Slightly irritating

Eye irritation
rabbit, Draize Test, Slightly irritating

Sensitisation
dermal: sensitizer (guinea pig, Maximisation Test)
inhalation: sensitizer (Guinea pig)

Repeated dose toxicity
90 Days, inhalation: NOAEL: 0.3 mg/m3, (rat, Male/Female, 18 hrs/day, 5 days/week)
Irritation to lungs and nasal cavity.

Mutagenicity
Genetic Toxicity in Vitro:
Ames: (Salmonella typhimurium, Metabolic Activation: with/without)
Positive and negative results were reported. The use of certain solvents which rapidly hydrolyze diisocyanates is suspected of producing the positive mutagenicity results.
Genetic Toxicity in Vivo:
Micronucleus Assay: (mouse)
negative

Carcinogenicity
rat, Female, inhalation, 2 Years, 17 hrs/day, 5 days/week,
negative

12. Ecological information

Ecological Data for MONDUR® M (MOLTEN-BULK)

Biodegradation
0 %, Exposure time: 28 d, , i.e. not degradable

Bioaccumulation
Oncorhynchus mykiss (rainbow trout), Exposure time: 112 d, < 1 BCF
Does not bioaccumulate.

Acute and Prolonged Toxicity to Fish
LC0: > 1,000 mg/l (Brachydanio rerio (zebra fish), 96 h)
LC0: > 3,000 mg/l (Oryzias latipes (Orange-red killifish), 96 h)

Acute Toxicity to Aquatic Invertebrates
EC50: > 1,000 mg/l (Water flea (Daphnia magna), 24 h)

Toxicity to Aquatic Plants
NOEC: 1,640 mg/l, End Point: growth (Green algae (Scenedesmus subspicatus), 72 h)

Toxicity to Microorganisms
EC50: > 100 mg/l, (activated sludge, 3 h)

Additional Ecotoxicological Remarks
Ecotoxicity data based on polymeric MDI

Ecological Data for 4,4'-Diphenylmethane Diisocyanate (MDI)

Acute and Prolonged Toxicity to Fish
LC50: > 500 mg/l (Zebra fish (Brachydanio rerio), 24 h)

Acute Toxicity to Aquatic Invertebrates
EC50: > 500 mg/l (Water flea (Daphnia magna), 24 h)

13. Disposal considerations

Waste Disposal Method
Waste disposal should be in accordance with existing federal, state and local environmental control laws. Incineration is the preferred method.

Empty Container Precautions
Empty containers retain product residue; observe all precautions for product. Do not heat or cut empty container with electric or gas torch because highly toxic vapors and gases are formed. Do not reuse without thorough commercial cleaning and reconditioning. If container is to be disposed, ensure all product residues are removed prior to disposal.

14. Transport information

Land transport (DOT)

Proper shipping name:	Other regulated substances, liquid, n.o.s. (contains 4,4'-Diphenylmethane Diisocyanate (MDI))
Hazard Class or Division:	9
UN/NA Number:	NA3082

Packaging group: III
Hazard Label(s): Class 9

RSPA/DOT Regulated Components:
4,4'-Diphenylmethane Diisocyanate (MDI)

Reportable Quantity: 2,267 kg

Sea transport (IMDG)
Non-Regulated

Air transport (ICAO/IATA)
Non-Regulated

Additional Transportation Information
When in individual containers of less than the Product RQ, this material ships as non-regulated.

15. Regulatory information

United States Federal Regulations

OSHA Hazcom Standard Rating: Hazardous

US. Toxic Substances Control Act: Listed on the TSCA Inventory.

US. EPA CERCLA Hazardous Substances (40 CFR 302):
Components
4,4'-Diphenylmethane Diisocyanate (MDI) Reportable quantity: 5000 lbs

SARA Section 311/312 Hazard Categories:
Acute Health Hazard, Chronic Health Hazard

US. EPA Emergency Planning and Community Right-To-Know Act (EPCRA) SARA Title III Section 302 Extremely Hazardous Substance (40 CFR 355, Appendix A):
Components
None

US. EPA Emergency Planning and Community Right-To-Know Act (EPCRA) SARA Title III Section 313 Toxic Chemicals (40 CFR 372.65) - Supplier Notification Required:
Components
4,4'-Diphenylmethane Diisocyanate (MDI)

US. EPA Resource Conservation and Recovery Act (RCRA) Composite List of Hazardous Wastes and Appendix VIII Hazardous Constituents (40 CFR 261):
If discarded in its purchased form, this product would not be a hazardous waste either by listing or by characteristic. However, under RCRA, it is the responsibility of the product user to determine at the time of disposal, whether a material containing the product or derived from the product should be classified as a hazardous waste. (40 CFR 261.20-24)

State Right-To-Know Information

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.

This product contains a trace (ppm) amount of phenyl isocyanate (CAS# 103-71-9) and monochlorobenzene (CAS# 108-90-7) as impurities.

Massachusetts, New Jersey or Pennsylvania Right to Know Substance Lists:

Weight %	Components	CAS-No.
>=95%	4,4'-Diphenylmethane Diisocyanate (MDI)	101-68-8
1 - 5%	2,4'-Diphenylmethane Diisocyanate (MDI)	5873-54-1

New Jersey Environmental Hazardous Substances List and/or New Jersey RTK Special Hazardous Substances Lists:

Weight %	Components	CAS-No.
95 - 100%	4,4'-Diphenylmethane Diisocyanate (MDI)	101-68-8

California Prop. 65:

To the best of our knowledge, this product does not contain any of the listed chemicals, which the state of California has found to cause cancer, birth defects or other reproductive harm.

16. Other information

NFPA 704M Rating

Health	2
Flammability	1
Reactivity	1
Other	

0=Insignificant 1=Slight 2=Moderate 3=High 4=Extreme

HMIS Rating

Health	2*
Flammability	1
Physical Hazard	1

0=Minimal 1=Slight 2=Moderate 3=Serious 4=Severe
* = Chronic Health Hazard

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

Contact person:	Product Safety Department
Telephone:	(412) 777-2835
MSDS Number:	112000013623
Version Date:	08/06/2009
Report version:	1.1

This information is furnished without warranty, express or implied. This information is believed to be accurate to the best knowledge of Bayer MaterialScience LLC. The information in this MSDS relates only

to the specific material designated herein. Bayer MaterialScience LLC assumes no legal responsibility for use of or reliance upon the information in this MSDS.

BASF
The Chemical Company

GNDSL
3/11/16

TSCA STATUS
On / Exempt 1/28/15
~~R & D Only~~
PS / RA
Supplier Cert.

Safety Data Sheet
PolyTHF® 1000 Polyether

1. Identification

Product identifier used on the label

PolyTHF® 1000 Polyether

Recommended use of the chemical and restriction on use

* The "Recommended use" identified for this product is provided solely to comply with a US Federal requirement and is not part of the seller's published specification The terms of this Safety Data Sheet (SDS) do not create or infer any warranty, express or implied, including by incorporation into or reference in the seller's sales agreement

Details of the supplier of the safety data sheet

Company
BASF CORPORATION
100 Park Avenue
Florham Park, NJ 07932, USA

Telephone +1 973 245-6000

Emergency telephone number

CHEMTREC 1-800-424-9300
BASF HOTLINE 1-800-832-HELP (4357)

Other means of identification

Molecular formula	HO(-CH(2)CH(2)C(2)CH(2)-)nH
Chemical family	polyether
Synonyms	Alpha-hydro-omega-hydroxy-poly(oxy 1,4 butanediyl)

2. Hazards Identification

According to Regulation 2012 OSHA Hazard Communication Standard; 29 CFR Part 1910.1200

Classification of the product

No need for classification according to GHS criteria for this product

Label elements

The product does not require a hazard warning label in accordance with GHS criteria

Hazards not otherwise classified

If applicable information is provided in this section on other hazards which do not result in classification but which may contribute to the overall hazards of the substance or mixture

According to Regulation 1994 OSHA Hazard Communication Standard; 29 CFR Part 1910.1200

Emergency overview

CAUTION
INGESTION MAY CAUSE GASTRIC DISTURBANCES
Use with local exhaust ventilation
Avoid contact with the skin, eyes and clothing
Avoid inhalation of dusts/mists/vapours
Wear protective clothing
Eye wash fountains and safety showers must be easily accessible
Wear safety glasses with side-shields

3. Composition / Information on Ingredients

According to Regulation 2012 OSHA Hazard Communication Standard; 29 CFR Part 1910.1200

This product does not contain any components classified as hazardous under the referenced regulation

According to Regulation 1994 OSHA Hazard Communication Standard; 29 CFR Part 1910.1200

CAS Number	Content (W/W)	Chemical name
25190-06-1	100 0 %	Polytetramethylene ether glycol

4. First-Aid Measures

Description of first aid measures

General advice:
Remove contaminated clothing

If inhaled:
Remove the affected individual into fresh air and keep the person calm Assist in breathing if necessary Seek medical attention if necessary

If on skin:
Wash affected areas thoroughly with soap and water If irritation develops, seek medical attention

If in eyes:
In case of contact with the eyes, rinse immediately for at least 15 minutes with plenty of water If irritation develops, seek medical attention

If swallowed:
Rinse mouth and then drink plenty of water Never induce vomiting or give anything by mouth if the victim is unconscious or having convulsions Immediate medical attention required

Most important symptoms and effects, both acute and delayed

Symptoms No significant reaction of the human body to the product known

Indication of any immediate medical attention and special treatment needed

Note to physician
Treatment Treat according to symptoms (decontamination, vital functions), no known specific antidote

5. Fire-Fighting Measures

Extinguishing media

Suitable extinguishing media
water spray, foam, dry powder, carbon dioxide

Special hazards arising from the substance or mixture

Hazards during fire-fighting
nitrogen oxides, carbon oxides
The substances/groups of substances mentioned can be released in case of fire

Advice for fire-fighters

Protective equipment for fire-fighting
Firefighters should be equipped with self-contained breathing apparatus and turn-out gear

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

Wear appropriate respiratory protection Use personal protective clothing Ensure adequate ventilation Handle in accordance with good industrial hygiene and safety practice

Environmental precautions

This product is not regulated by RCRA This product is not regulated by CERCLA ('Superfund')

Methods and material for containment and cleaning up

Spills should be contained, solidified, and placed in suitable containers for disposal

7. Handling and Storage

Precautions for safe handling

Ensure thorough ventilation of stores and work areas Prevent contact with air/oxygen (formation of peroxide) Handle under dry inert gas

Protection against fire and explosion
Prevent electrostatic charge - sources of ignition should be kept well clear - fire extinguishers should be kept handy

Conditions for safe storage, including any incompatibilities

Segregate from strong acids

Further information on storage conditions Containers should be stored tightly sealed in a dry place Keep under nitrogen

Keep container tightly closed Blanket partially filled container with dry nitrogen Keep container dry because product takes up the humidity of air

Storage stability
Storage temperature 20 - < 95 °C
Storage duration 24 Months
The product is stabilized, the shelf life should be noted
From the data on storage duration in this safety data sheet no agreed statement regarding the warrantee of application properties can be deduced
Protect from temperatures above 90 °C
If transport time lasts more than 2 days the packed product must be protected against exceeding the indicated temperature

additives
BHT (CAS Number 128-37-0)

8. Exposure Controls/Personal Protection

Advice on system design:
Provide local exhaust ventilation to control vapours/mists Provide local exhaust ventilation to control dust

Personal protective equipment

Respiratory protection:
Wear a NIOSH-certified (or equivalent) organic vapour/particulate respirator as needed Observe OSHA regulations for respirator use (29 CFR 1910 134)

Hand protection:
Chemical resistant protective gloves, chloroprene rubber (Neoprene), nitrile rubber (Buna N)

Eye protection:
Wear face shield or tightly fitting safety goggles (chemical goggles) if splashing hazard exists Safety glasses with side-shields (frame goggles) (e g EN 166)

Body protection:
Body protection must be chosen based on level of activity and exposure

General safety and hygiene measures:
Eye wash fountains and safety showers must be easily accessible Avoid inhalation of dust Wear protective clothing as necessary to minimize contact When using, do not eat, drink or smoke Hands and/or face should be washed before breaks and at the end of the shift Gloves must be inspected regularly and prior to each use Replace if necessary (e g pinhole leaks) Take off immediately all contaminated clothing Wash contaminated clothing before reuse Store work clothing separately

9. Physical and Chemical Properties

Form	liquid to waxy, wax	
Odour	odourless	
Odour threshold		not applicable, odour not perceivable
Colour	colourless	
pH value		No data available
Melting point	26 °C	
Boiling point	> 250 °C	
Flash point	240 °C	(DIN ISO 2592)

Flammability	not highly flammable	
Lower explosion limit		For solids not relevant for classification and labelling
Upper explosion limit		For solids not relevant for classification and labelling
Autoignition	> 245 °C	(DIN 51794)
Vapour pressure	< 0 1 mbar	(20 °C)
Density	0 982 g/cm3	(30 °C)
Bulk density	0 982 g/cm3	(30 °C)
Partitioning coefficient n-octanol/water (log Pow)	18 9	(25 °C) (calculated)
Thermal decomposition	> 240 °C	
Viscosity, dynamic	440 mPa s	(30 °C)
Solubility in water	< 10 g/l	(20 °C)
Solubility (quantitative)		organic solvents soluble
Evaporation rate		Value can be approximated from Henry's Law Constant or vapor pressure

10. Stability and Reactivity

Reactivity
No hazardous reactions if stored and handled as prescribed/indicated

Corrosion to metals
No corrosive effect on metal

Chemical stability
The product is stable if stored and handled as prescribed/indicated

Possibility of hazardous reactions
Risk of self-ignition when a large surface area is produced due to fine dispersion Self-ignition at high temperatures

Conditions to avoid
Temperature > 100 degrees Celsius

Incompatible materials
strong oxidizing agents

Hazardous decomposition products

Decomposition products
Possible decomposition products tetrahydrofuran
No hazardous decomposition products if stored and handled as prescribed/indicated

Thermal decomposition
> 240 °C

11. Toxicological information

Primary routes of exposure

Routes of entry for solids and liquids are ingestion and inhalation, but may include eye or skin contact Routes of entry for gases include inhalation and eye contact Skin contact may be a route of entry for liquefied gases

Acute Toxicity/Effects

Acute toxicity
Assessment of acute toxicity Virtually nontoxic after a single ingestion

Information on Polytetrahydrofuran wax

Oral
Type of value LD50
Species rat
Value > 5,000 mg/kg (BASF-Test)

Irritation / corrosion
Assessment of irritating effects Not irritating to the skin Not irritating to the eyes

Skin
Species rabbit
Result non-irritant
Method Draize test

Eye
Species rabbit
Result non-irritant
Method Draize test

Sensitization
Assessment of sensitization The chemical structure does not suggest a sensitizing effect

Chronic Toxicity/Effects

Genetic toxicity
Assessment of mutagenicity The substance was not mutagenic in bacteria

Other Information
No experimental evidence available for genotoxicity in vitro (Ames test negative)

Symptoms of Exposure

No significant reaction of the human body to the product known

12. Ecological Information

Toxicity

Aquatic toxicity
Assessment of aquatic toxicity
The inhibition of the degradation activity of activated sludge is not anticipated when introduced to biological treatment plants in appropriate low concentrations Acutely harmful for aquatic organisms

Toxicity to fish
LC50 (96 h) 68 49 mg/l, Brachydanio rerio (OECD Guideline 203, semistatic)

The details of the toxic effect relate to the nominal concentration The product has not been tested The statement has been derived from substances/products of a similar structure or composition The product has low solubility in the test medium An aqueous dispersion has been tested Damage can occur as a result of mechanical effects of the product (e g bonding)

Microorganisms/Effect on activated sludge

Toxicity to microorganisms
DIN EN ISO 8192-OECD 209-88/302/EEC,P C aerobic
activated sludge, domestic/EC20 (30 min) approx 450 mg/l
The details of the toxic effect relate to the nominal concentration

Persistence and degradability

Assessment biodegradation and elimination (H2O)
Not readily biodegradable (by OECD criteria) Poorly biodegradable

Elimination information

10 - 20 % BOD of the ThOD (32 d) (OECD 301F, ISO 9408, 92/69/EEC, C 4-D) (aerobic, activated sludge, adapted)

Bioaccumulative potential

Bioaccumulation potential
Because of the n-octanol/water distribution coefficient (log Pow) accumulation in organisms is possible

Mobility in soil

Assessment transport between environmental compartments
The substance will not evaporate into the atmosphere from the water surface
Adsorption to solid soil phase is expected

Additional information

Adsorbable organically-bound halogen (AOX)
This product contains no organically-bound halogen

Other ecotoxicological advice
The inhibition of the degradation activity of activated sludge is not anticipated when introduced to biological treatment plants in appropriate low concentrations

13. Disposal considerations

Waste disposal of substance:
Incinerate in a licensed facility Dispose of in accordance with local authority regulations
Do not discharge substance/product into sewer system Dispose of in accordance with national, state and local regulations

Container disposal:
Dispose of in a licensed facility Recommend crushing, puncturing or other means to prevent unauthorized use of used containers

14. Transport Information

Land transport
USDOT

Not classified as a dangerous good under transport regulations

Sea transport
IMDG

Not classified as a dangerous good under transport regulations

Air transport
IATA/ICAO

Not classified as a dangerous good under transport regulations

15. Regulatory Information

Federal Regulations

Registration status:
Chemical TSCA, US released / listed ✓

EPCRA 311/312 (Hazard categories): Not hazardous,

NFPA Hazard codes:
Health 1 Fire 1 Reactivity 0 Special

HMIS III rating
Health 1 Flammability 1 Physical hazard 0

Assessment of the hazard classes according to UN GHS criteria (most recent version):

Skin Corr /Irrit	3	Skin corrosion/irritation

16. Other Information

SDS Prepared by:
BASF NA Product Regulations
SDS Prepared on 2014/07/31

We support worldwide Responsible Care® initiatives We value the health and safety of our employees, customers, suppliers and neighbors, and the protection of the environment Our commitment to Responsible Care is integral to conducting our business and operating our facilities in a safe and environmentally responsible fashion, supporting our customers and suppliers in ensuring the safe and environmentally sound handling of our products, and minimizing the impact of our operations on society and the environment during production, storage, transport, use and disposal of our products

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END OF DATA SHEET

SAFETY DATA SHEET

1. Identification

Covestro LLC
formerly Bayer MaterialScience LLC
1 Covestro Circle
Pittsburgh, PA 15205
USA

TRANSPORTATION EMERGENCY

CALL CHEMTREC:	(800) 424-9300
INTERNATIONAL:	(703) 527-3887

NON-TRANSPORTATION

Emergency Phone:	Call Chemtrec
Information Phone:	(844) 646-0545

Product Name:	1,4-BUTANEDIOL
Material Number:	5106141
Use:	Polyol components for the production of polyurethanes

2. Hazards Identification

GHS Classification

Acute toxicity (Oral):	Category 4
Eye irritation:	Category 2B
Specific target organ toxicity - single exposure:	Category 3 (Central nervous system)

GHS Label Elements

Hazard pictograms:

Signal word: Warning

Hazard statements:
Harmful if swallowed.
Causes eye irritation.
May cause drowsiness or dizziness.

Precautionary statements:

Prevention:
Avoid breathing dust, mist, gas, vapors or spray.
Wash skin and face thoroughly after handling.
Do not eat, drink or smoke when using this product.
Use only outdoors or in a well-ventilated area.

Response:
IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell.
IF INHALED: Remove person to fresh air and keep at rest in a

position comfortable for breathing.
IF IN EYES: Rinse cautiously with water for several minutes.
Remove contact lenses, if present and easy to do. Continue rinsing.
Call a doctor or emergency medical facility (i.e. 911) if you feel unwell.
Rinse mouth.
If eye irritation persists: Get medical attention.

Storage:
Store in a well-ventilated place.
Store locked up.
Keep container tightly closed.

Disposal:
Dispose of contents and container in accordance with existing federal, state, and local environmental control laws.

3. Composition/Information on Ingredients

Hazardous Components

Weight Percent	Components	CAS-No.	Classification
90 - 100%	1,4-Butanediol	110-63-4	Acute toxicity Category 4 Oral. Specific target organ toxicity - single exposure Category 3 Central nervous system.

The specific chemical identity and/or exact percentage of component(s) have been withheld as a trade secret.

4. First Aid Measures

Most Important Symptom(s)/Effect(s)

Acute: Inhalation or ingestion may cause nervous system effects which can include symptoms of dizziness, incoordination, headache, numbness, and/or confusion., Causes eye irritation with symptoms of reddening, tearing, stinging, and swelling.

Eye Contact
In case of contact, flush eyes with plenty of lukewarm water.

Skin Contact
In case of skin contact, wash affected areas with soap and water.

Inhalation
If inhaled, remove to fresh air. Get medical attention if irritation develops.

Ingestion
If ingested, do not induce vomiting unless directed to do so by medical personnel. Get medical attention.

5. Firefighting Measures

Suitable Extinguishing Media: Carbon dioxide (CO2), Dry chemical, Foam, water spray for large fires.

Unsuitable Extinguishing Media No Data Available

Fire Fighting Procedure
Firefighters should be equipped with self-contained breathing apparatus to protect against potentially toxic and irritating fumes. Use cold water spray to cool fire-exposed containers to minimize the risk of rupture.

Hazardous Decomposition Products
By Fire: Carbon DioxideCarbon Monoxide other aliphatic fragments which have not been determined

6. Accidental Release Measures

Spill and Leak Procedures
Cover spill with inert material (e. g., dry sand or earth) and collect for proper disposal.

7. Handling and Storage

Handling/Storage Precautions
Handle in accordance with good industrial hygiene and safety practices. Wash thoroughly after handling. Keep container closed when not in use. Material is hygroscopic and may absorb small amounts of atmospheric moisture. If contamination with isocyanates is suspected, do not reseal containers.

Storage Period:
6 Months

Storage Temperature
Maximum: 45 °C (113 °F)

Substances to Avoid
Oxidizing agents, Isocyanates

8. Exposure Controls/Personal Protection

Country specific exposure limits have not been established or are not applicable

Any component which is listed in section 3 and is not listed in this section does not have a known ACGIH TLV, OSHA PEL or supplier recommended occupational exposure limit.

Industrial Hygiene/Ventilation Measures
Use local and general exhaust ventilation to control levels of exposure.

Respiratory Protection
None required under normal conditions of use.

Eye Protection
Safety glasses with side-shields

Skin Protection
No special skin protection requirements during normal handling and use.

Additional Protective Measures
Employees should wash their hands and face before eating, drinking, or using tobacco products. Educate and train employees in the safe use and handling of this product.

9. Physical and Chemical Properties

State of Matter:	liquid
Color:	Colorless
Odor:	Odorless
Odor Threshold:	No Data Available
pH:	neutral
Boiling Point:	229.2 °C (444.56 °F) @ 1,013 hPa
Flash Point:	ca. 135 °C (275 °F) (DIN 51758)
Evaporation Rate:	No Data Available
Lower Explosion Limit:	2.4 %(V)
Upper Explosion Limit:	15.3 %(V)
Vapor Pressure:	No Data Available
Vapor Density:	No Data Available
Density:	ca. 1.0169 g/cm³ @ 20 °C (68 °F) (DIN 51757)
Relative Vapor Density:	No Data Available
Specific Gravity:	No Data Available
Solubility in Water:	miscible
Partition Coefficient: n-octanol/water:	logPow: -0.88
Auto-ignition Temperature:	ca. 420 °C (788 °F) (DIN 51794)
Decomposition Temperature:	No Data Available
Dynamic Viscosity:	90 - 93 mPa.s @ 20 °C (68 °F) 71.5 mPa.s @ 25 °C (77 °F) (No statements available.)
Kinematic Viscosity:	No Data Available

10. Stability and Reactivity

Hazardous Reactions
Hazardous polymerisation does not occur.

Stability
Stable

Materials to Avoid
Oxidizing agents, Isocyanates

Hazardous Decomposition Products
By Fire: Carbon Dioxide; Carbon Monoxide; other aliphatic fragments which have not been determined

11. Toxicological Information

Likely Routes of Exposure: Skin Contact
Eye Contact

Health Effects and Symptoms

Acute: Inhalation or ingestion may cause nervous system effects which can include symptoms of dizziness, incoordination, headache, numbness, and/or confusion., Causes eye irritation with symptoms of reddening, tearing, stinging, and swelling.

Toxicity Data for: 1,4-BUTANEDIOL

Acute Oral Toxicity
LD50: 1780 mg/kg (rat)

LD50: 2180 mg/kg (Mouse)

Acute Dermal Toxicity
LD50: > 2000 mg/kg (rat)

Skin Irritation
Human, Patch Test, Non-irritating

Eye Irritation
rabbit, Draize, Slightly irritating

Sensitization
dermal: non-sensitizer (Guinea pig, Maximization Test)

dermal: non-sensitizer (Human, Patch Test)

Repeated Dose Toxicity
14 Days, inhalation: NOAEL: 1.1 mg/l, (Rat)

180 Days, oral: NOAEL: 25 mg/kg, (Rat)

Developmental Toxicity/Teratogenicity
Mouse, Female, oral, NOAEL (teratogenicity): 600 mg/kg,
No Teratogenic effects observed at doses tested.

Toxicity Data for 1,4-Butanediol
Acute Oral Toxicity
LD50: 1500 mg/kg (rat, male/female)

Acute Inhalation Toxicity
LC50: > 15 mg/l, 4 h, dust/mist(rat, male) (OECD Guideline 436)

Acute Dermal Toxicity
LD50: > 2000 mg/kg (rat, male/female)

Skin Irritation
rabbit, Draize Test, Non-irritating

Eye Irritation
rabbit, Draize, Non-irritating

Sensitization
Skin sensitisation according to Magnusson/Kligmann (maximizing test):: non-sensitizer (Guinea pig, Maximization Test)

dermal: non-sensitizer (Human, Patch Test)

Skin sensitisation according to Magnusson/Kligmann (maximizing test):: negative (Guinea pig, Magnusson/Kligmann (Maximization Test))

Repeated Dose Toxicity
14 Days, inhalation: NOAEL: 1.1 mg/l, (Rat)

180 Days, oral: NOAEL: 25 mg/kg, (Rat)

Chronic exposure damages the brain and the central nervous system.

oral: NOAEL: 200 mg/kg, (Rat, male and female, daily)

Mutagenicity
Genetic Toxicity in Vitro:
In vitro mammalian cell gene mutation test: negative (Chinese hamster ovary (CHO) cells, Metabolic Activation: with/without)

Toxicity to Reproduction/Fertility
Fertility Screening, Oral, daily, (rat, male/female) NOAEL (parental): 200 mg/kg,

Developmental Toxicity/Teratogenicity
Mouse, Female, oral, NOAEL (teratogenicity): 600 mg/kg, No Teratogenic effects observed at doses tested.Mouse, Female, oral, GD 6-15, daily, NOAEL (teratogenicity): 100, NOAEL (maternal): 100 mg/kg,

Other Relevant Toxicity Information
May cause drowsiness or dizziness if ingested.

Carcinogenicity:

No carcinogenic substances as defined by IARC, NTP and/or OSHA

12. Ecological Information

Biodegradation
Aerobic, 96 %, Exposure time: 14 Days
Readily biodegradable.

Acute and Prolonged Toxicity to Fish
LC50: 1,240 mg/l (Common Carp (Cyprinus carpio), 96 h)

Acute Toxicity to Aquatic Invertebrates
EC50: 813 mg/l (Water flea (Daphnia magna), 48 h)

Toxicity to Aquatic Plants
EC50: > 1,000 mg/l, End Point: biomass (Green algae (Scenedesmus subspicatus),72 h)

Toxicity to Microorganisms
EC10: 10,000 mg/l, (Pseudomonas putida)

Ecological Data for 1,4-Butanediol
Biodegradation
Aerobic, 96 %, Exposure time: 14 Days
Readily biodegradable.

Acute and Prolonged Toxicity to Fish

LC50: 1,240 mg/l (Common Carp (Cyprinus carpio), 96 h)

Acute Toxicity to Aquatic Invertebrates
EC50: 813 mg/l (Water flea (Daphnia magna), 48 h)

Toxicity to Aquatic Plants
EC50: > 1,000 mg/l, End Point: biomass (Green algae (Scenedesmus subspicatus), 72 h)

Toxicity to Microorganisms
EC10: 10,000 mg/l, (Pseudomonas putida)

13. Disposal Considerations

Waste Disposal Method
Waste disposal should be in accordance with existing federal, state and local environmental control laws.

Empty Container Precautions
Recondition or dispose of empty container in accordance with governmental regulations.

14. Transportation Information

Land transport (DOT)
Non-Regulated

Sea transport (IMDG)
Non-Regulated

Air transport (ICAO/IATA)
Non-Regulated

15. Regulatory Information

United States Federal Regulations
US. Toxic Substances Control Act: Listed on the TSCA Inventory.

No substances are subject to TSCA 12(b) export notification requirements.

US. EPA CERCLA Hazardous Substances (40 CFR 302) Components:
None

SARA Section 311/312 Hazard Categories:
Acute Health Hazard

US. EPA Emergency Planning and Community Right-To-Know Act (EPCRA) SARA Title III Section 302 Extremely Hazardous Substance (40 CFR 355, Appendix A) Components:
None

US. EPA Emergency Planning and Community Right-To-Know Act (EPCRA) SARA Title III Section 313 Toxic Chemicals (40 CFR 372.65) - Supplier Notification Required Components:
None

US. EPA Resource Conservation and Recovery Act (RCRA) Composite List of Hazardous Wastes

and Appendix VIII Hazardous Constituents (40 CFR 261):
Under RCRA, it is the responsibility of the person who generates a solid waste, as defined in 40 CFR 261.2, to determine if that waste is a hazardous waste.

State Right-To-Know Information
The following chemicals are specifically listed by individual states; other product specific health and safety data in other sections of the SDS may also be applicable for state requirements. For details on your regulatory requirements you should contact the appropriate agency in your state.

Massachusetts, New Jersey or Pennsylvania Right to Know Substance Lists:

Weight percent	Components	CAS-No.
100%	1,4-Butanediol	110-63-4

California Prop. 65:
To the best of our knowledge, this product does not contain any of the listed chemicals, which the state of California has found to cause cancer, birth defects or other reproductive harm.

Based on information provided by our suppliers, this product is considered "DRC Conflict Free" as defined by the SEC Conflict Minerals Final Rule (Release No. 34-67716; File No. S7-40-10; Date: 2012-08-22).

16. Other Information

The method of hazard communication for Covestro LLC is comprised of Product Labels and Safety Data Sheets.

Contact:	Product Safety Department
Telephone:	(412) 413-2835
SDS Number:	112000013472
Version Date:	09/10/2015
SDS Version:	2.2

This information is furnished without warranty, express or implied. This information is believed to be accurate to the best knowledge of Covestro LLC. The information in this SDS relates only to the specific material designated herein. Covestro LLC assumes no legal responsibility for use of or reliance upon the information in this SDS.

|| Changes since the last version are highlighted in the margin. This version replaces all previous versions.

TSCA
On / Exen 8/17/10
~~R&D On~~
PS / RA
Supplier cert'n -

SASOL

Material Safety Data Sheet

SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

Trade name	ALFOL® 8 Alcohol	
Synonyms	1-Octanol, Octyl Alcohol	
Manufacturer/Supplier	Sasol North America Inc.	
Address	900 Threadneedle, Houston, TX 77079	
Telephone	CHEMTREC North America Transportation Emergency (24-hr)	(800) 424-9300
	CHEMTREC World Wide	(703) 527-3887
	Other Emergencies (24-hr)	(337) 494-5142
	MSDS and Product Information (8:00am-4:30pm CST)	(281) 588-3491
	Health and Safety Information (8:00am-4:00pm CST)	(281) 588-3492

SECTION 2 COMPOSITION AND INFORMATION ON INGREDIENTS

Components	CAS-No.	Weight %
1-Octanol	111-87-5	98.8 - 99.7

See Section 8 for Exposure Guidelines and Section 15 for Regulatory Classifications.

SECTION 3 HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

Appearance Colorless liquid

Odor Sweet, pungent

Precautions **WARNING!** COMBUSTIBLE LIQUID AND VAPOR. CAUSES EYE AND SKIN IRRITATION. Avoid contact with skin, eyes and clothing. Wash thoroughly after handling. Keep away from heat and flame.

Environmental precautions Do not flush into surface water or sanitary sewer system. Toxic to aquatic life. Rapidly, readily and extensively biodegradable.

POTENTIAL HEALTH EFFECTS

Eyes Irritating to eyes. May cause corneal inflammation.

Skin Prolonged skin contact may cause skin irritation and/or dermatitis. Normal care and personal hygiene should prevent skin effects.

SECTION 6 ACCIDENTAL RELEASE MEASURES

Steps to be taken in case of spill or leak Evacuate personnel to safe areas. Remove all sources of ignition. Contain and collect spillage with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see Section 13). Do not flush into surface water or sanitary sewer system.

Spill precautions Material can create slippery conditions.

SECTION 7 HANDLING AND STORAGE

Safe handling advice Ensure all equipment is electrically grounded before beginning transfer operations.

Storage/Transport pressure Ambient.

Load/Unload temperature Ambient.

SECTION 8 EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING MEASURES

Mechanical ventilation may be necessary if working with this product in enclosed areas and/or at elevated temperatures.

PERSONAL PROTECTIVE EQUIPMENT

Eyes When contact with liquid is possible, use a face shield and/or chemical splash goggles. Otherwise use safety glasses with side shields or goggles.

Skin Wear suitable protective clothing, gloves and eye/face protection.

Inhalation Respiratory protection is normally not required except in emergencies or when conditions cause excessive airborne levels of mists or vapors. NIOSH-approved organic vapor air-purifying respirator, self-contained breathing apparatus, or air-supplied respirators where there may be potential for overexposure.

EXPOSURE GUIDELINES

Components	Exposure limit(s)
1-Octanol	AIHA WEEL (8-hour) 50 ppm (265 mg/m3)

PEL= Permissible Exposure Limits
TLV= Threshold Limit Value
EL= Excursion Limit
TWA= Time Weighted Average (8 hr.)
STEL= Short Term Exposure Limit (15 min.)
WEEL= Workplace Environmental Exposure Level

Skin Primary irritation index (rabbit): 5.3 (Maximum score is 8.0.)

Acute dermal LD50 (rabbit): 2,000 mg/kg

Inhalation Acute LC50 > 5.6 mg/l

Ingestion Acute oral LD50 (rat): 5,000 mg/kg

CARCINOGENICITY

This product contains no carcinogenic substances.

SECTION 12 ECOLOGICAL INFORMATION

Aquatic toxicity Toxic to aquatic life.

LC50 (P. Promelas (fathead minnow)) 96 hours: 13.4 mg/l
Test Substance:1-octanol

Biodegradation Rapidly, readily and extensively biodegradable.

SECTION 13 DISPOSAL CONSIDERATIONS

Waste code Any unused product or empty containers may be disposed of as non-hazardous in accordance with state and federal requirements. Re-evaluation of the product may be required by the user at the time of disposal, since the product uses, transformations, mixtures, contamination, and spillage may change the classification. If the resulting material is determined to be hazardous, please dispose in accordance with state and federal (40 CFR 262) hazardous waste regulations.

Disposal methods Dispose of only in accordance with local, state, and federal regulations.

Empty containers Empty containers retain product residue (liquid and/or vapor) and can be dangerous. DO NOT PRESSURIZE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND, OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION; THEY MAY EXPLODE AND CAUSE INJURY OR DEATH. Empty drums should be completely drained, triple-rinsed, properly bunged and promptly returned to a drum reconditioner, or properly disposed.

SECTION 14 TRANSPORT INFORMATION

DOT description Alcohols, n.o.s. (Octanol). Combustible liquid, UN 1987, III
This product is regulated as a hazardous material according to the Department of Transportation in bulk quantities (greater than 119 gallons per package) only.

Japanese Minister of International Trade and Industry (MITI) Inventory Listing
Listed on MITI.

Canadian Domestic Substance List (DSL) Inventory Listing
Listed on the DSL.

European Inventory of Existing Commercial Chemical Substances (EINECS) Listing
Listed on EINECS.

Phillipines Inventory List (PICCS)
Listed on PICCS.

Korean Inventory List
Listed on the ECL.

China Inventory List
Listed on the China inventory.

STATE REGULATIONS

California Safe Drinking Water Act (Prop 65) Listing

Components	CAS-No.

Contains no chemical subject to California Prop 65.

SECTION 16 OTHER INFORMATION

HAZARD RATINGS

	Health	Flammability	Reactivity
HMIS	2	2	0
NFPA	1	2	0

THE DATA AND INFORMATION CONTAINED HEREIN ARE BEING FURNISHED FOR INFORMATIONAL PURPOSES ONLY, UPON THE EXPRESS CONDITION THAT EACH CUSTOMER SHALL MAKE ITS OWN ASSESSMENT OF APPROPRIATE USE AND APPROPRIATE SHIPPING, TRANSFER AND STORAGE MATERIALS AND PROCEDURES FOR SASOL NORTH AMERICA'S PRODUCTS. ALTHOUGH BASED ON INFORMATION SOURCES WHICH SASOL NORTH AMERICA CONSIDERS ACCURATE AND RELIABLE, SASOL NORTH AMERICA MAKES NO WARRANTY, EITHER EXPRESS OR IMPLIED, INCLUDING ANY WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, REGARDING THE VALIDITY OF THIS INFORMATION, THE INFORMATION SOURCES UPON WHICH THE SAME ARE BASED, OR THE RESULTS TO BE OBTAINED, AND EXPRESSLY DISCLAIMS LIABILITIES FOR DAMAGES OR INJURIES RESULTING FROM THE USE THEREOF.

SAFETY DATA SHEET

112*34802

Lonza

ACRAWAX™ C BEADS

Version 1.1 MSDS Number: 000000002294 Revision Date: 2015.06.15

SECTION 1. IDENTIFICATION

TSCA STATUS
On / Exempt 7/21
[redacted]
PS / RA Anne Beatty
Supplier Certified

Commercial Product Name	:	ACRAWAX C BEADS
Product name	:	ACRAWAX™ C BEADS
Product code	:	000000002294

Manufacturer or supplier's details

Company : **Lonza Inc.**
90 Boroline Road
Allendale, NJ 07401
USA
Business Telephone 1-201-316-9200

Lonza Inc.
1200 Bluegrass Lakes Pkwy
Alpharetta, GA 30004
USA
Business Telephone 1-678-624-5800

E-mail address	:	prodinfo@lonza.com
Emergency telephone number	:	+41 61 313 94 94 (24h)
		For US only CHEMTREC 1-800-424-9300

Recommended use of the chemical and restrictions on use

Recommended use : Additive
Lubricant

SECTION 2. HAZARDS IDENTIFICATION

GHS Classification

This material is considered hazardous under the OSHA Hazard Communication Standard criteria, based on hazard(s) not otherwise classified.

GHS Label element

This material is considered hazardous under the OSHA Hazard Communication Standard criteria, based on hazard(s) not otherwise classified.
Handle in accordance with good industrial hygiene and safety practice.

Signal word	:	Warning
Hazard statements	:	May form combustible dust concentrations in air
Precautionary statements	:	**Prevention:** P240 Ground/bond container and receiving equipment. P241 Use explosion-proof electrical/ ventilating/ lighting/ .? / equipment. P260 Do not breathe dust or mist. P261 Avoid breathing mist or vapours. P270 Do not eat, drink or smoke when using this product.

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New Martinsville Texin Unit

P280 Wear face protection.
Response:
P314 Get medical advice/ attention if you feel unwell.
Storage:
P402 + P404 Store in a dry place. Store in a closed container.
P410 + P403 Protect from sunlight. Store in a well-ventilated place.
Disposal:
P501 Dispose of contents/container in accordance with local regulation.

Other hazards
No information available.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance / Mixture : Substance

Hazardous components

Chemical Name	CAS-No.	Concentration (%)
Octadecanamide, N,N'-1,2-ethanediylbis	110-30-5	80.00 - 98.00
Stearic acid	57-11-4	1.00 - 3.00

SECTION 4. FIRST AID MEASURES

If inhaled : Remove to fresh air.
If breathing is irregular or stopped, administer artificial respiration.
Give oxygen.
Consult a physician.

In case of skin contact : After contact with skin, wash immediately with plenty of soap and water.
In the case of skin irritation or allergic reactions see a physician.

In case of eye contact : Immediately flush eye(s) with plenty of water.
If eye irritation persists, consult a specialist.

If swallowed : If swallowed, do not induce vomiting - seek medical advice.
Immediately give large quantities of water to drink.
Never give anything by mouth to an unconscious person.

Most important symptoms and effects, both acute and delayed : No information available.

Notes to physician : No information available.

SECTION 5. FIREFIGHTING MEASURES

Suitable extinguishing media : Dry powder
Water spray
Foam

Specific hazards during firefighting : Heating or fire can release toxic gas.

Further information : Use water spray to cool unopened containers.

Special protective equipment for firefighters : In the event of fire, wear self-contained breathing apparatus.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures : Use personal protective equipment.

Environmental precautions

General advice : Prevent product from entering drains.

Methods and materials for containment and cleaning up : Sweep up or vacuum up spillage and collect in suitable container for disposal.

SECTION 7. HANDLING AND STORAGE

Advice on safe handling : Provide sufficient air exchange and/or exhaust in work rooms.

Conditions for safe storage : To maintain product quality, do not store in heat or direct sunlight.
Keep container tightly closed.
Keep in a dry, cool and well-ventilated place.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Value type (Form of exposure)	Control parameters / Permissible concentration	Basis
Stearic acid	57-11-4	TWA	10 mg/m3	ACGIH
		TWA	10 mg/m3	CAD ON OEL

Appropriate engineering controls

Personal protective equipment

Respiratory protection : No personal respiratory protective equipment normally required.

Hand protection
Material : Wear suitable gloves.

Eye protection : Safety glasses with side-shields

Skin and body protection : No special protective equipment required.

Protective measures : Risk of dust explosion.

		Use only in area provided with appropriate exhaust ventilation.
Hygiene measures	:	Handle in accordance with good industrial hygiene and safety practice.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	:	solid
Colour	:	light brown
Odour	:	fatty odour
Odour Threshold	:	no data available
pH	:	6.5 - 7.5, (20 °C)
Melting point/range	:	140 - 145 °C
Boiling point/boiling range	:	no data available
Flash point	:	270 - 290 °C Method: open cup
Evaporation rate	:	no data available
Upper explosion limit	:	no data available
Lower explosion limit	:	no data available
Vapour pressure	:	no data available
Relative vapour density	:	no data available
Relative density	:	no data available
Density	:	< 1 g/cm3
Solubility(ies) Water solubility	:	0.01 mg/l (25 °C)
Solubility in other solvents	:	12.1 g/l (78 °C) Solvent: Ethanol
Partition coefficient: n-octanol/water	:	no data available
Auto-ignition temperature	:	no data available
Decomposition temperature	:	no data available
Viscosity, dynamic	:	no data available

Viscosity, kinematic	:	no data available

SECTION 10. STABILITY AND REACTIVITY

Reactivity	:	Stable under recommended storage conditions.
Chemical stability	:	Stable under normal conditions.
Possibility of hazardous reactions	:	Risk of dust explosion.Stable under normal conditions.
Conditions to avoid	:	Avoid dust formation. Heat, flames and sparks.
Incompatible materials	:	Strong oxidizing agents Reducing agents
Hazardous decomposition products	:	Nitrogen oxides (NOx) Carbon oxides

SECTION 11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure	:	Inhalation Eyes Skin Ingestion

Acute toxicity

Acute oral toxicity (LD50)	:	> 15,380 mg/kg Species: Rat
Acute inhalation toxicity (LC50)	:	> 58 mg/l Species: Rat Method: US-EPA
Acute dermal toxicity (LD50)	:	> 20,000 mg/kg Species: Rabbit Method: US-EPA

Skin corrosion/irritation

Skin irritation	:	No skin irritation Species: Rabbit

Serious eye damage/eye irritation

Eye irritation	:	Mild eye irritation Species: Rabbit

Respiratory or skin sensitisation

Sensitisation	:	Remarks: no data available

Germ cell mutagenicity

Genotoxicity in vitro	:	negative Ames test, Salmonella typhimurium

Further information

Remarks: Information given is based on data on the components and the toxicology of similar products. No data is available on the product itself.

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity

Toxicity to fish (LC50)	:	> 1,000 mg/l Species: Oncorhynchus mykiss (rainbow trout) Acute toxicity Exposure time: 96 h GLP: yes
Toxicity to daphnia and other aquatic invertebrates (EC50)	:	140 mg/l Species: Daphnia magna (Water flea) Immobilization Exposure time: 48 h

Persistence and degradability

Biodegradability	:	Test Type: Modified Sturm Test Concentration: 10 mg/l Result: Not readily biodegradable. Biodegradation: 15 % Exposure time: 28 d Method: OECD Test Guideline 301B GLP: yes

Bioaccumulative potential

no data available

Mobility in soil

no data available

Other adverse effects

Additional ecological information	:	Information given is based on data on the components and the ecotoxicology of similar products.

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods

Waste from residues	:	Dispose of in accordance with local regulations. Contact waste disposal services.
Contaminated packaging	:	Dispose of as unused product.

SECTION 14. TRANSPORT INFORMATION

IATA

Not dangerous goods

UN number	: Not applicable
Proper shipping name	: Not applicable
Transport hazard class	: Not applicable
Packing group	: Not applicable
Environmental hazards	: no

IMDG

Not dangerous goods

UN number	: Not applicable
Proper shipping name	: Not applicable
Transport hazard class	: Not applicable
Packing group	: Not applicable
Environmental hazards	: Marine pollutant: no

ADR

Not dangerous goods

UN number	: Not applicable
Proper shipping name	: Not applicable
Transport hazard class	: Not applicable
Packing group	: Not applicable
Environmental hazards	: no

RID

Not dangerous goods

UN number	: Not applicable
Proper shipping name	: Not applicable
Transport hazard class	: Not applicable
Packing group	: Not applicable
Environmental hazards	: no

DOT

Not dangerous goods

UN number	: Not applicable
Proper shipping name	: Not applicable
Transport hazard class	: Not applicable
Packing group	: Not applicable
Environmental hazards	: no

TDG : Not dangerous goods

UN number	: Not applicable
Proper shipping name	: Not applicable
Transport hazard class	: Not applicable
Packing group	: Not applicable
Environmental hazards	: no
Special precautions for user	: none
Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code	: Not applicable

SECTION 15. REGULATORY INFORMATION

EPCRA - Emergency Planning and Community Right-to-Know Act

SARA 311/312 Hazards : No SARA Hazards

SARA 302

No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313

This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

US State Regulations

Massachusetts Right To Know

No components are subject to the Massachusetts Right to Know Act.

Pennsylvania Right To Know

No components are subject to the Pennsylvania Right to know act

New Jersey Right To Know

No components are subject to the New Jersey Right to know act

California Prop 65

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

The components of this product are reported in the following inventories:

: All components of this product are listed on the EPA TSCA 8(b) inventory list.

Inventories

AICS (Australia), DSL (Canada), IECSC (China), REACH (European Union), ENCS (Japan), ISHL (Japan), KECI (Korea), NZIoC (New Zealand), PICCS (Philippines), TSCA (USA)

SECTION 16. OTHER INFORMATION

Revision Date : 2015.06.15

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

MATERIAL SAFETY DATA SHEET

CLARIANT

Licowax E Pdr

Substance key: SXR021324	Revision Date: 02/09/2014
Version : 2 - 18 / USA	Date of printing :02/10/2015

TSCA STATUS
On / Exempt 6/5/15
~~R & D Only~~
PS / RA
Supplier cert.

Section 01 - Product and company identification

Identification of the company:	Clariant Corporation 4000 Monroe Road Charlotte, NC, 28205 Telephone No.: +1 704 331 7000
	Information of the substance/preparation: Product Safety 1-704-331-7710
	Emergency tel. number: +1 800-424-9300 CHEMTREC

Trade name:	**Licowax E Pdr**
Material number:	105199
CAS number:	73138-45-1
Primary product use:	Industrial uses are not restricted by REACH legislation.
Chemical family:	ester of montanic acids (an acid mixture approx. C24-C34)

Section 02 - Hazards identification

Emergency overview:

Yellow to light tan powder.
May cause mild eye and skin irritation.
May cause irritation of respiratory tract.
Minimize dust generation and accumulation.
Avoid release to the environment.

Expected Route of entry:

Inhalation:	May cause irritation of respiratory tract.
Skin contact:	May cause mild skin irritation.
Eye contact:	May cause mild eye irritation
Ingestion:	Not expected to be toxic.
Skin absorption:	Route of exposure unlikely.

Health effects of exposure:

Any available toxicological data is shown in Section 11. No other information was found in the public literature for any effects of exposure and no health evaluation is thus possible. Therefore, handle with care and avoid unnecessary exposures.

Known effects on other illnesses:	None known.
Listed carcinogen:	IARC: No NTP: No OSHA: No Other: No

HMIS:

Health: 1 Flammability: 1 Reactivity: 0 Personal protection: E

Section 03 - Composition/information on ingredients

Hazardous ingredients:

This material is not considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).
None under Title III of SARA

Section 04 - First aid measures

After inhalation:
Move the victim to fresh air.
Give oxygen or artificial respiration if needed.
Get immediate medical advice/ attention.
Never give anything by mouth to an unconscious person.

After contact with skin:
Wash thoroughly with soap and water for 15 minutes. If skin irritation occurs, seek medical attention.

After contact with eyes:
Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes.
Get medical attention immediately if irritation develops and persists.

After ingestion:
If swallowed, DO NOT induce vomiting.
Do not give anything to drink.
Call a physician immediately.

Advice to doctor / Treatment:
None known.

Section 05 - Fire fighting measures

Flashpoint:	not applicable
Lower explosion limit:	not tested.
Upper explosion limit:	not tested.
Self ignition:	Method: Expert judgement Not relevant
Ignition temperature:	> 716 °F Dust

Hazardous combustion products:
None known.

Extinguishing media:	Dry powder Foam Carbon dioxide (CO2) Water mist

Special fire fighting procedure:
Exercise caution when fighting any chemical fire. Use NIOSH approved self-contained breathing apparatus and full protective clothing.

Unusual fire and explosion hazards:	Electrical grounding of equipment is required to prevent possible dust explosion. Emits toxic fumes under fire conditions.

Section 06 - Accidental release measures

Steps to be taken in case of spill or leak:

Wearing appropriate personal protective equipment, contain spill and collect into a suitable container.
Prevent from entering into soil, ditches, sewers, waterways and/or groundwater.

Section 07 - Handling and storage

Advice on safe handling:

Avoid dust formation. Keep away from sources of ignition. Lead off electrostatic charges.
Avoid inhalation, ingestion and contact with skin and eyes.
Wash thoroughly after handling.

Further info on storage conditions:

Store in original container.
Keep container tightly closed.
Store in a cool, dry, well-ventilated area.

Section 08 - Exposure controls / personal protection

Respiratory protection:	Use NIOSH/MSHA approved respirators following manufacturer's recommendations where dust or fume may be generated.
Hand protection:	Butyl Rubber, PVC Or Neoprene.
Eye protection:	Safety glasses or chemical splash goggles.
Other protective equipment:	Wear suitable protective equipment.
Advice on system design:	Local ventilation recommended - mechanical ventilation may be used.

Section 09 - Physical and chemical properties

Form:	powder
Color:	white yellowish
Odor:	not specified
Odor limit:	cannot be determined
pH:	approx. 7 (20 °C) saturated aqueous solution
Solubility in water:	24 mg/l (20 °C) Method: OECD Test Guideline 105
Miscibility with water:	practically insoluble
Soluble in ... :	not tested.
Solubility / qualitative:	not tested.

Density:	1.02 g/cm3 (20 °C) Method: ISO 1183
Melting point :	approx. 170 °F Method: DSC
Boiling point :	Decomposes below the boiling point.
Sublimation point :	not applicable
Vapor pressure:	0 Torr (25 °C) Method: 92/69/EEC, A.4.
Relative vapor density:	not applicable
Partitioning coef. octanol/water:	0.9 (20 °C) Method: other (calculated)
Viscosity / (dynamic):	ca. 20 mPa.s (100 °C) Method: DIN 53019
Viscosity / (kinematic):	not applicable

Section 10 - Stability and reactivity

Thermal decomposition:	> 180 °C Method: DSC
Chemical stability:	Stable under normal conditions.
Hazardous Polymerization:	Hazardous polymerisation does not occur. Conditions to avoid: None known.
Conditions to avoid:	Keep away from heat. Keep away from flames and sparks.

Section 11 - Toxicological information

Product information:

Acute oral toxicity:	LD50 > 2,000 mg/kg (rat) Method: OECD Test Guideline 401
Acute inhalation toxicity:	not required
Acute dermal toxicity:	LD50 > 2,000 mg/kg (rat) Method: OECD Test Guideline 402
Skin irritation:	non-irritant (4 h, rabbit) Method: OECD Test Guideline 404
Eye irritation:	non-irritant (24 h, rabbit eye) Method: OECD Test Guideline 405
Sensitization:	non-sensitizing (mouse) Method: OECD Test Guideline 429

Section 12 - Ecological information

Product information:

Biodegradation:
54 % (28 d, BOD in % of theoretical OD)
Not readily biodegradable.
Method: OECD Test Guideline 301D

Fish toxicity:
LC50 > 10 g/l (96 h, Danio rerio (zebra fish))
Method: OECD Test Guideline 203
The details of the toxic effect relate to the nominal concentration.

LC0 10 g/l (96 h, Danio rerio (zebra fish))
Method: OECD Test Guideline 203
The details of the toxic effect relate to the nominal concentration.

Daphnia toxicity:
EC50 > 10 g/l (48 h, Daphnia magna (Water flea))
Method: OECD Test Guideline 202
The details of the toxic effect relate to the nominal concentration.

NOEC 10 g/l (48 h, Daphnia magna (Water flea))
Method: OECD Test Guideline 202
The details of the toxic effect relate to the nominal concentration.

Algae toxicity:
EC10 (Growth rate) > 320 mg/l (72 h, Desmodesmus subspicatus (Scenedesmus subspicatus))
Method: OECD Test Guideline 201
The details of the toxic effect relate to the nominal concentration.

EC20 (Growth rate) > 320 mg/l (72 h, Desmodesmus subspicatus (Scenedesmus subspicatus))
Method: OECD Test Guideline 201
The details of the toxic effect relate to the nominal concentration.

EC50 (Growth rate) > 320 mg/l (72 h, Desmodesmus subspicatus (Scenedesmus subspicatus))
Method: OECD Test Guideline 201
The details of the toxic effect relate to the nominal concentration.

EC10 (Biomass) 100 - 320 mg/l (72 h, Desmodesmus subspicatus (Scenedesmus subspicatus))
Method: OECD Test Guideline 201
The details of the toxic effect relate to the nominal concentration.

EC20 (Biomass) > 320 mg/l (72 h, Desmodesmus subspicatus (Scenedesmus subspicatus))
Method: OECD Test Guideline 201
The details of the toxic effect relate to the nominal concentration.

EC50 (Biomass) > 320 mg/l (72 h, Desmodesmus subspicatus (Scenedesmus subspicatus))
Method: OECD Test Guideline 201
The details of the toxic effect relate to the nominal concentration.

Bacteria toxicity:
EC10 > 10 g/l (3 h, activated sludge, domestic)
Method: OECD Test Guideline 209
The details of the toxic effect relate to the nominal concentration.

EC50 > 10 g/l (3 h, activated sludge, domestic)
Method: OECD Test Guideline 209
The details of the toxic effect relate to the nominal concentration.

NOEC 10 g/l (3 h, activated sludge, domestic)
Method: OECD Test Guideline 209
The details of the toxic effect relate to the nominal concentration.

Remarks:
The product should not be allowed to enter drains, water courses or the soil.

Section 13 - Disposal considerations

Waste disposal information:
Dispose of spilled or waste product, contaminated soil and other contaminated materials in licensed landfill or treatment facility in accordance with all local, state, and federal regulations.

RCRA hazardous waste:
No -- Not as sold.

Section 14 - Transport information

DOT	not restricted
IATA	not restricted
IMDG	not restricted

Section 15 - Regulatory Information

TSCA Status:
All components of this product are listed on the TSCA Inventory. ✓

SARA (section 311/312):

Reactive hazard:	no
Pressure hazard:	no
Fire hazard:	no
Immediate/acute:	no
Delayed/chronic:	no

SARA 313 Information:
This product does not contain any toxic chemical listed under Section 313 of the Emergency Planning and Community Right-To-Know Act of 1986.

Clean Water Act:
Contains no known priority pollutants at concentrations greater than 0.1%.

FDA:

Permitted for Use per Section:	21 CFR 178.3770, 21 CFR 172.210
	Subject to limitations, this product may be used in compliance with the Federal Food, Drug, and Cosmetic Act and all applicable food additive regulations.

Section 16 - Other information

Other precautions:

Handle with care. Organic dusts have the potential to be explosive with static spark or flame initiation.

Label information:

CAUTION!

Product dust may be irritating to eyes, skin and respiratory system. Avoid generating dust; fine dust dispersed in air in sufficient concentrations, and in the presence of an ignition source is a potential dust explosion hazard.

Avoid contact with skin, eyes and clothing. Wash thoroughly after handling. Use with adequate ventilation or appropriate respiratory protection. Keep container closed when not in use.

In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Call a physician if irritation develops or persists. In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention immediately if irritation develops and persists. If inhaled, remove to fresh air. If breathing is difficult, give oxygen. Call a physician. If swallowed, DO NOT induce vomiting. Get medical attention. Never give anything by mouth to an unconscious person.

BASF
The Chemical Company

112*14297

TSCA STATUS
On / Exempt 8/15/14
R & D Only
PS / RA

Safety Data Sheet
Irganox® 1010 ED

100% 6683-19-8
Confirmed by matt Fender 10/12/12

Not listed on new SDS bk non-haz - see attached for product info

1. Identification

Product identifier used on the label

Irganox® 1010 ED

Recommended use of the chemical and restriction on use
Unsuitable for use: This material is not intended for use in products for which prolonged contact with mucous membranes, body fluids or abraded skin, or implantation within the human body, is specifically intended, unless the finished product has been tested in accordance with nationally and internationally applicable safety testing requirements. Because of the wide range of such potential uses, we are not able to recommend this material as safe and effective for such uses and assume no liability for such uses.
Recommended use*: Antioxidant / Stabilizer

* The "Recommended use" identified for this product is provided solely to comply with a US Federal requirement and is not part of the seller's published specification. The terms of this Safety Data Sheet (SDS) do not create or infer any warranty, express or implied, including by incorporation into or reference in the seller's sales agreement.

Details of the supplier of the safety data sheet

Company:
BASF CORPORATION
100 Park Avenue
Florham Park, NJ 07932, USA

Telephone: +1 973 245-6000

Emergency telephone number

CHEMTREC: 1-800-424-9300
BASF HOTLINE: 1-800-832-HELP (4357)

Other means of identification
Synonyms: Sterically hindered phenol

2. Hazards Identification

According to Regulation 2012 OSHA Hazard Communication Standard; 29 CFR Part 1910.1200

Classification of the product

06081355

No need for classification according to GHS criteria for this product.

New Martinsville
Texin / Polyol units

Label elements

The product does not require a hazard warning label in accordance with GHS criteria.

Hazards not otherwise classified

The product is under certain conditions capable of dust explosion.

Labeling of special preparations (GHS):
This product is not combustible in the form in which it is shipped by the manufacturer, but may form a combustible dust through downstream activities (e.g. grinding, pulverizing) that reduce its particle size.

According to Regulation 1994 OSHA Hazard Communication Standard; 29 CFR Part 1910.1200

Emergency overview

NOTICE:
May cause mechanical irritation to eyes, skin and respiratory system.
AVOID CREATING DUST.
Take precautionary measures against static discharges.
Use NIOSH approved respirator as needed to mitigate exposure.

3. Composition / Information on Ingredients

According to Regulation 2012 OSHA Hazard Communication Standard; 29 CFR Part 1910.1200

This product does not contain any components classified as hazardous under the referenced regulation.

4. First-Aid Measures

Description of first aid measures

General advice:
Remove contaminated clothing.

If inhaled:
If difficulties occur after dust has been inhaled, remove to fresh air and seek medical attention.

If on skin:
Wash thoroughly with soap and water.

If irritation develops, seek medical attention.

If in eyes:
Wash affected eyes for at least 15 minutes under running water with eyelids held open.

If irritation develops, seek medical attention.

If swallowed:
Rinse mouth and then drink plenty of water. Do not induce vomiting. Immediate medical attention required.

Most important symptoms and effects, both acute and delayed

Symptoms: The most important known symptoms and effects are described in the labelling (see section 2) and/or in section 11.
Further important symptoms and effects are so far not known.

Indication of any immediate medical attention and special treatment needed

Note to physician

Treatment:	Treat according to symptoms (decontamination, vital functions), no known specific antidote.

5. Fire-Fighting Measures

Extinguishing media

Suitable extinguishing media:
dry powder, carbon dioxide, alcohol-resistant foam

Unsuitable extinguishing media for safety reasons:
water jet

Special hazards arising from the substance or mixture

Hazards during fire-fighting:
harmful vapours
Evolution of fumes/fog. The substances/groups of substances mentioned can be released in case of fire.

Advice for fire-fighters

Protective equipment for fire-fighting:
Firefighters should be equipped with self-contained breathing apparatus and turn-out gear.

Further information:
Dusty conditions may ignite explosively in the presence of an ignition source causing flash fire.

Impact Sensitivity:

Number of positive reactions:	0
Assessment:	not shock-sensitive

6. Accidental release measures

Further accidental release measures:
Avoid dispersal of dust in the air (i.e., clearing dust surfaces with compressed air). Avoid the formation and build-up of dust - danger of dust explosion. Dust in sufficient concentration can result in an explosive mixture in air. Handle to minimize dusting and eliminate open flame and other sources of ignition.

Personal precautions, protective equipment and emergency procedures

Avoid dust formation. Use personal protective clothing.

Environmental precautions

Contain contaminated water/firefighting water. Do not discharge into drains/surface waters/groundwater.

Methods and material for containment and cleaning up
Nonsparking tools should be used.

7. Handling and Storage

Precautions for safe handling
Breathing must be protected when large quantities are decanted without local exhaust ventilation.

Closed containers should only be opened in well-ventilated areas. Avoid dust formation. Do not use any sparking tools.

Protection against fire and explosion:
Avoid dust formation. Dust in sufficient concentration can result in an explosive mixture in air. Handle to minimize dusting and eliminate open flame and other sources of ignition. Routine housekeeping should be instituted to ensure that dusts do not accumulate on surfaces. Dry powders can build static electricity charges when subjected to the friction of transfer and mixing operations. Provide adequate precautions, such as electrical grounding and bonding, or inert atmospheres. Refer to NFPA 654, Standard for the Prevention of Fire and Dust Explosions from the Manufacturing, Processing, and Handling of Combustible Particulate Solids (2013 Edition) for safe handling.

Dust explosion class: Dust explosion class 2 (Kst-value 200 up to 300 bar m s-1).

Conditions for safe storage, including any incompatibilities
The product in undamaged packing need not be stored separately.

Further information on storage conditions: Keep container tightly closed and dry; store in a cool place.

8. Exposure Controls/Personal Protection

Advice on system design:
It is recommended that all dust control equipment such as local exhaust ventilation and material transport systems involved in handling of this product contain explosion relief vents or an explosion suppression system or an oxygen deficient environment. Ensure that dust-handling systems (such as exhaust ducts, dust collectors, vessels, and processing equipment) are designed in a manner to prevent the escape of dust into the work area (i.e., there is no leakage from the equipment). Use only appropriately classified electrical equipment and powered industrial trucks.

Personal protective equipment

Respiratory protection:
Respiratory protection may not be required under normal operating conditions if adequate ventilation is provided.

Hand protection:
Wear chemical resistant protective gloves.

Eye protection:
Safety glasses with side-shields.

Body protection:
Body protection must be chosen based on level of activity and exposure.

General safety and hygiene measures:
Wear protective clothing as necessary to minimize contact. Handle in accordance with good industrial hygiene and safety practice. Handle in accordance with good industrial hygiene and safety practice.

9. Physical and Chemical Properties

Form:	pellets	
Odour:	odourless	
Odour threshold:		No applicable information available.
Colour:	white to light green	
pH value:	5.9	(20 °C)
Melting temperature:	117.1 °C	(approx. 1,013 hPa) (measured)
boiling temperature:	281 °C	(1,013 hPa) (OECD Guideline 103)
Sublimation point:		No applicable information available.
Flash point:		not relevant
Flammability:	not flammable	(Directive 92/69/EEC, A.10)
Lower explosion limit:		For solids not relevant for classification and labelling.
Upper explosion limit:		For solids not relevant for classification and labelling.
Autoignition:		(See user defined text.) not applicable
Vapour pressure:	0.0133322 hPa	(20 °C) (measured)
Density:	1,116 g/cm3	(20 °C)
Bulk density:	500 - 650 kg/m3	
Partitioning coefficient n-octanol/water (log Pow):	> 8	(25 °C) (Calculation Hansch/Leo)
Self-ignition temperature:		not relevant
Thermal decomposition:	> 350 °C	
Viscosity, dynamic:		not relevant
Solubility in water:	< 0.1 mg/l	(20 °C)
Evaporation rate:		The product is a non-volatile solid.
Other Information:	If necessary, information on other physical and chemical parameters is indicated in this section.	

10. Stability and Reactivity

Reactivity
No hazardous reactions if stored and handled as prescribed/indicated.

Corrosion to metals:
No corrosive effect on metal.

Oxidizing properties:
Based on its structural properties the product is not classified as oxidizing.

Dust explosion class:
Dust explosion class 2 (Kst-value 200 up to 300 bar m s-1) (St 2)

Chemical stability
The product is stable if stored and handled as prescribed/indicated.

Possibility of hazardous reactions
In spite of the dedusting carried out for reasons of industrial health the product resp. the fine dust of the product is capable of dust explosion.

Conditions to avoid
Avoid dust formation. Avoid deposition of dust. Avoid all sources of ignition: heat, sparks, open flame. Avoid electro-static charge.

Incompatible materials
strong acids, strong bases, strong oxidizing agents

Hazardous decomposition products

Decomposition products:
No hazardous decomposition products if stored and handled as prescribed/indicated.

Thermal decomposition:
> 350 °C

11. Toxicological information

Primary routes of exposure

Routes of entry for solids and liquids are ingestion and inhalation, but may include eye or skin contact. Routes of entry for gases include inhalation and eye contact. Skin contact may be a route of entry for liquefied gases.

Acute Toxicity/Effects

Acute toxicity
Assessment of acute toxicity: Virtually nontoxic after a single ingestion. Virtually nontoxic by inhalation. Virtually nontoxic after a single skin contact.

Oral
Type of value: LD50
Species: rat
Value: > 5,000 mg/kg

Inhalation
Type of value: LC0
Species: rat
Value: > 46 mg/l
Exposure time: 1 h

Dermal
Type of value: LD50
Species: rat
Value: > 2,000 mg/kg

Assessment other acute effects
Assessment of STOT single:
Based on the available information there is no specific target organ toxicity to be expected after a single exposure.

Irritation / corrosion

Assessment of irritating effects: Not irritating to eyes and skin.

Skin
Species: rabbit
Result: non-irritant

Eye
Species: rabbit
Result: non-irritant

Sensitization
Assessment of sensitization: Skin sensitizing effects were not observed in animal studies.

other
Species: guinea pig
Result: Non-sensitizing.

Patch-Test
Species: human
No sensitizing effect.

Aspiration Hazard
No aspiration hazard expected.

Chronic Toxicity/Effects

Repeated dose toxicity
Assessment of repeated dose toxicity: No substance-specific organtoxicity was observed after repeated administration to animals.
Repeated oral uptake of the substance did not cause substance-related effects.

Genetic toxicity
Assessment of mutagenicity: The substance was not mutagenic in bacteria. The substance was not mutagenic in studies with mammals.
The substance was not genotoxic in a test with mammals.

Genetic toxicity in vitro: Ames-test Salmonella typhimurium:with and without metabolic activation negative

Carcinogenicity
Assessment of carcinogenicity: None of the components in this product at concentrations greater than 0.1% are listed by IARC; NTP, OSHA or ACGIH as a carcinogen. No carcinogenic effects reported.
In long-term studies in rats and mice in which the substance was given by feed, a carcinogenic effect was not observed.

Reproductive toxicity
Assessment of reproduction toxicity: The results of animal studies gave no indication of a fertility impairing effect.

Teratogenicity
Assessment of teratogenicity: No indications of a developmental toxic / teratogenic effect were seen in animal studies.

Symptoms of Exposure

The most important known symptoms and effects are described in the labelling (see section 2) and/or in section 11.

Further important symptoms and effects are so far not known.

12. Ecological Information

Toxicity

Aquatic toxicity
Assessment of aquatic toxicity:
No toxic effects occur within the range of solubility.

Toxicity to fish
LC50 (96 h) > 100 mg/l, Brachydanio rerio (OECD Guideline 203)

Aquatic invertebrates
EC50 (24 h) > 86 mg/l, Daphnia magna (OECD Guideline 202, part 1)
Tested above maximum solubility.

Aquatic plants
EC50 (72 h) > 100 mg/l, Scenedesmus sp. (Guideline 92/69/EEC, C.3)

Chronic toxicity to fish
No data available regarding toxicity to fish.

Chronic toxicity to aquatic invertebrates
No observed effect concentration (21 d) >= 2 mg/l, Daphnia magna (OECD Guideline 211, semistatic)
The product has low solubility in the test medium. A saturated solution has been tested. Limit concentration test only (LIMIT test). The details of the toxic effect relate to the nominal concentration. No toxic effects occur within the range of solubility.

Assessment of terrestrial toxicity
No data available concerning terrestrial toxicity.

Microorganisms/Effect on activated sludge

Toxicity to microorganisms
OECD Guideline 209 activated sludge/EC50 (3 h): > 100 mg/l

Persistence and degradability

Assessment biodegradation and elimination (H2O)
The product is virtually insoluble in water and can thus be separated from water mechanically in suitable effluent treatment plants.

Elimination information

45 % (28 d) (OECD 303A; ISO 11733; 92/69 EEC,V, C.10) Moderately/partially eliminated from water.

5 % (28 d) (OECD 301B; ISO 9439; 92/69/EEC, C.4-C) Not readily biodegradable (by OECD criteria).

Assessment of stability in water
Study technically not feasible.

Information on Stability in Water (Hydrolysis)

approx. $t_{1/2}$ 2.06 a (25 °C), (pH7)
In contact with water the substance will hydrolyse slowly.

Assessment photodegration
After evaporation or exposure to the air, the product will be rapidly degraded by photochemical processes.

Bioaccumulative potential

Bioaccumulation potential
Bioconcentration factor: < 2.3 (OECD Guideline 305 C)

Mobility in soil

Assessment transport between environmental compartments
The substance will not evaporate into the atmosphere from the water surface.
Adsorption to solid soil phase is expected.

Additional information

Other ecotoxicological advice:
Do not discharge product into the environment without control.

13. Disposal considerations

Waste disposal of substance:
Do not discharge into drains/surface waters/groundwater. Dispose of in accordance with national, state and local regulations.

Container disposal:
Dispose of in accordance with national, state and local regulations. Recommend crushing, puncturing or other means to prevent unauthorized use of used containers.

14. Transport Information

Land transport
USDOT

Not classified as a dangerous good under transport regulations

Sea transport
IMDG

Not classified as a dangerous good under transport regulations

Air transport
IATA/ICAO

Not classified as a dangerous good under transport regulations

15. Regulatory Information

Federal Regulations

Registration status:

Chemical	TSCA, US	released / listed
Cosmetic	TSCA, US	released / exempt

EPCRA 311/312 (Hazard categories): Not hazardous;

NFPA Hazard codes:
Health : 1 Fire: 1 Reactivity: 0 Special:

HMIS III rating
Health: 1 Flammability: 1 Physical hazard: 0

16. Other Information

SDS Prepared by:
BASF NA Product Regulations
SDS Prepared on: 2014/07/23

We support worldwide Responsible Care® initiatives. We value the health and safety of our employees, customers, suppliers and neighbors, and the protection of the environment. Our commitment to Responsible Care is integral to conducting our business and operating our facilities in a safe and environmentally responsible fashion, supporting our customers and suppliers in ensuring the safe and environmentally sound handling of our products, and minimizing the impact of our operations on society and the environment during production, storage, transport, use and disposal of our products.

END OF DATA SHEET

TSCA STATUS
On / Exempt 7-8-10
PS / RA MBeumson

MATERIAL SAFETY DATA SHEET
AMERICAN CHEMICAL SERVICE, INC.

Section 1 – Company and Product Identification

Product Name: EPOXOL 9-5
Chemical Name: Epoxidized Linseed Oil

Manufacturer: American Chemical Service, Inc.
420 South Colfax Avenue
Griffith, IN 46319
219-924-4359

Emergency Contact
219-924-4370
(8:00am –4:30pm CST M-F)
Chemtrec: 800-424-9300
(24 hours every day)

Section 2 – Information on Ingredients

Chemical Name	CAS Number
Epoxidized Linseed Oil	8016-11-3

Section 3 – Hazard Identification

Skin Contact: Prolonged skin contact may cause skin irritation.
Eye Contact: May cause eye irritation of susceptible persons.
Ingestion: Effects unknown.
Inhalation: May cause dizziness.

Section 4 – First Aid Measures

Skin Contact: Wash with soap and plenty of water.
Eye Contact: Flush with large amounts of water for at least 15 minutes. If irritation persists contact a physician.
Ingestion: Rinse mouth and seek medical attention.
Inhalation: Move individual to fresh air.

Section 5 – Fire Fighting Measures

Extinguishing Media: Carbon Dioxide, Dry Chemical, Water Fog
Special Fire Fighting Procedures: A MSHA/NIOSH approved self contained breathing apparatus should be worn. Use water spray to cool fire-exposed containers.
Unusual Fire and Explosion Hazards: Water may cause spattering and frothing.
Thermal Decomposition Products: Oxides of carbon.

Section 6 – Accidental Release Measures

Steps to be taken in case material is released or spilled:
Prevent material from entering sewers and bodies of water. Dike and contain spills with inert material and transfer to containers for disposal.

Section 7 – Handling and Storage

Handling Precautions: Do not get in eyes, on skin, or clothing. Do not take internally. Wash thoroughly after handling. Avoid breathing mist or vapor. Use only with adequate ventilation. Keep away from open flame and fire.

Storage Requirements: Containers should be kept tightly closed and stored in cool, dry, well-ventilated area.

Section 8 – Personal Protection

Hand Protection: Gloves resistant to chemical penetration.
Respiratory Protection: None required in normal use.
Eye Protection: Splash goggles, eye wash facility in work area.

Ventilation: Local exhaust should suffice. Direct exhaust when material becomes heated or fumes are given off.

Section 9 – Physical and Chemical Properties

Boiling Point:	Greater than 315°C (600°F)	**Specific Gravity:**	1.03
Flash Point (PMCC):	224°C (435°F)	**Evaporation Rate:**	Negligible
Vapor Density:	>10 (Air =1)	**Solubility in Water:**	<0.1%
Vapor Pressure (25°C):	<0.1 mm Hg	**pH:**	Not Applicable

Appearance / Odor: Viscous light yellow liquid, mild odor.

Section 10 – Stability and Reactivity

Stability: Stable under normal conditions.
Conditions to Avoid: High temperatures, strong oxidizing agents.
Hazardous Polymerization: Will not occur under normal circumstances.

Section 11 – Toxicological Information

No toxicological information available at this time.

Section 12 – Ecological Information

No ecological information available at this time.

Section 13 – Disposal Considerations

Waste Disposal Methods: Material should be disposed of in accordance with local, state and federal regulations.

Section 14 – Transportation Information

Material is not classified as hazardous according to the Department of Transportation.

Section 15 – Regulatory Information

Toxic Substance Control Act (TOSCA): Tthis product are on the TSCA inventory.

Domestic Substance List (DSL): This product is listed on the DSL inventory of Canada.

Australia (AICS): This product is listed on the AICS inventory of Australia.

Europe (EINECS): This product is listed on the EINECS inventory of Europe.

Superfund Amendments and Reauthorization Act (SARA):

This product has the following hazards as defined in Section 311/312 of 40 CFR part 372:
Hazards: None

This product contains the following chemicals subject to the reporting requirements of Section 313 or Title III of SARA and 40 CFR Part 372:
Ingredients: None

California Proposition 65: This product contains the following substances listed as per the Safe Drinking Water and Toxic Enforcement Act of 1986.
Ingredients: None

Canadian Environmental Control Act (CEPA):

This product contains the following chemicals listed as toxic.
Ingredients: None

Section 16 – Other Information

Prepared By: GRM

Revision Date: 4/07/10
Supersedes: 10/27/08

SAFETY DATA SHEET

1. Identification

Covestro LLC
1 Covestro Circle
Pittsburgh, PA 15205
USA

TRANSPORTATION EMERGENCY

CALL CHEMTREC:	(800) 424-9300
INTERNATIONAL:	(703) 527-3887

NON-TRANSPORTATION

Emergency Phone:	Call Chemtrec
Information Phone:	(844) 646-0545

Product Name:	TEXIN 1049 000000
Material Number:	852063
Chemical Family:	Aromatic thermoplastic polyurethane
Use:	Production of molded plastic articles

2. Hazards Identification

GHS Classification
This product is not hazardous in the form in which it is shipped by the manufacturer.

GHS Label Elements

Signal word:	Warning
Hazard statements:	If fine particles are generated during further processing, handling or by other means, product may form combustible dust concentrations in air.

3. Composition/Information on Ingredients

Hazardous Components

There are no hazardous components above the relevant concentration limits according to OSHA HazCom 2012.

4. First Aid Measures

Most Important Symptom(s)/Effect(s)

Acute: Contact with heated material can cause thermal burns., Causes a slipping hazard if spilled., Vapors released from thermal decomposition may cause eye irritation with symptoms of burning and tearing, as well as respiratory tract irritation.

Eye Contact
In case of contact, flush eyes with plenty of lukewarm water. Get medical attention if irritation develops.

Skin Contact
Get medical attention if thermal burn occurs.

Inhalation
If inhaled, remove to fresh air.

Ingestion
Get medical attention.

Notes to Physician
In the event of possible diisocyanate exposure: Eyes: Stain for evidence of corneal injury. If cornea is burned, instill antibiotic/steroid preparation as needed. Workplace vapors could produce reversible corneal epithelial edema impairing vision. Skin: Treat symptomatically as for thermal burn. Ingestion: Treat symptomatically. Inhalation: Treatment is essentially symptomatic. An individual having a pulmonary sensitization reaction to this material should be removed from further exposure to any diisocyanate.

5. Firefighting Measures

Suitable Extinguishing Media: Water, Foam, Dry chemical

Unsuitable Extinguishing Media: High Pressure Water Streams

Fire Fighting Procedure
Firefighters should be equipped with self-contained breathing apparatus to protect against potentially toxic and irritating fumes.

Hazardous Decomposition Products
By Fire and Thermal Decomposition: Carbon Dioxidehydrogen cyanide4,4'-Diphenylmethane Diisocyanate (MDI) Aldehydes, Carbon monoxide, Amines, Nitriles, Nitrogen oxides (NOx), Hydrocarbons

Unusual Fire/Explosion Hazards
Toxic and irritating gases/fumes may be given off during burning or thermal decomposition. Avoid generating dust; fine dust dispersed in air in sufficient concentrations, and in the presence of an ignition source is a potential dust explosion hazard.

6. Accidental Release Measures

Spill and Leak Procedures
If molten, allow material to cool and place into an appropriate marked container for disposal. Sweep up and shovel into suitable containers for disposal. Dust deposits should not be allowed to accumulate on surfaces, as these may form an explosive mixture as they are released into the atmosphere in sufficient concentrations. Avoid dispersal of dust in the air (e.g., cleaning dust from surfaces with compressed air).

7. Handling and Storage

Handling/Storage Precautions
Handle in accordance with good industrial hygiene and safety practices. Wash thoroughly after handling. Avoid breathing dust. Containers should be kept tightly closed to prevent contamination. Material is hygroscopic and may absorb small amounts of atmospheric moisture. Minimize dust generation and accumulation. Routine housekeeping should be instituted to ensure that dust does not accumulate on surfaces. Solid particulate can generate electrical charging during operations such as unloading from containers and pneumatic transfer. Provide adequate precautions, such as electrical grounding and bonding, where conductive equipment is involved.

Storage Period:
Not Established

Storage Temperature
Maximum: 30 °C (86 °F)

Substances to Avoid
None known.

8. Exposure Controls/Personal Protection

Exposure Limits

Thermoplastic Polyurethane (TPU) is generally non-hazardous under ambient conditions., The following exposure limits do not apply to the product in its supplied form; however, when the product is heated (i.e, during processing or thermal decomposition conditions), there is a potential for the release of 4,4'-diphenylmethane diisocyanate (MDI) vapors.

4,4'-Diphenylmethane Diisocyanate (MDI) (101-68-8)
US. ACGIH Threshold Limit Values
Time Weighted Average (TWA): 0.005 ppm

US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)
Ceiling Limit Value: 0.02 ppm, 0.2 mg/m3

Any component which is listed in section 3 and is not listed in this section does not have a known ACGIH TLV, OSHA PEL or supplier recommended occupational exposure limit.

Industrial Hygiene/Ventilation Measures
During normal processing, use general dilution and local exhaust as necessary to control airborne vapors, mists, dusts and thermal decomposition products below appropriate airborne concentration standards/guidelines. Special ventilation and personal protective equipment (PPE) is required to control exposure to potentially harmful decomposition products whenever a TPU is heated to temperatures above its decomposition temperature. Examples would include hot knife cutting, grinding, or sawing.

Respiratory Protection
In the absence of sufficient general dilution or local exhaust ventilation a NIOSH approved air-supplied respirator may be needed during die cleaning, high temperature processing, purging or when thermal decomposition is suspected.

Hand Protection
Wear heat resistant gloves when handling molten material.

Eye Protection
Safety glasses with side-shields

Skin Protection
No special skin protection requirements during normal handling and use.

Additional Protective Measures
Employees should wash their hands and face before eating, drinking, or using tobacco products. Educate and train employees in the safe use and handling of this product. Purgings should be collected as small flat thin shapes or thin strands to allow for rapid cooling.

9. Physical and Chemical Properties

State of Matter:	solid
Appearance:	pellets
Color:	Natural
Odor:	Odorless
Odor Threshold:	No Data Available
pH:	No Data Available
Melting Point:	220 °C (428 °F)
Boiling Point:	No Data Available
Flash Point:	250 °C (482 °F)
Evaporation Rate:	No Data Available
Flammability:	No Data Available
Lower Explosion Limit:	No Data Available
Upper Explosion Limit:	No Data Available
Vapor Pressure:	No Data Available
Vapor Density:	No Data Available
Density:	No Data Available
Relative Vapor Density:	No Data Available
Specific Gravity:	1.1
Solubility in Water:	insoluble
Partition Coefficient: n-octanol/water:	No Data Available
Auto-ignition Temperature:	> 210 °C (> 410 °F)
Decomposition Temperature:	Decomposition begins at 230 °C.
Softening point:	180 °C (356 °F)
Dynamic Viscosity:	No Data Available
Kinematic Viscosity:	No Data Available
Bulk Density:	500 - 700 kg/m3
Self Ignition:	not applicable

10. Stability and Reactivity

Hazardous Reactions
Hazardous polymerisation does not occur.

Stability
Stable

Materials to Avoid
None known.

Conditions to Avoid
Generation of dust clouds.

Hazardous Decomposition Products
By Fire and Thermal Decomposition: Carbon Dioxide; hydrogen cyanide; 4,4'-Diphenylmethane Diisocyanate (MDI); Aldehydes, Carbon monoxide, Amines, Nitriles, Nitrogen oxides (NOx), Hydrocarbons

11. Toxicological Information

Likely Routes of Exposure: Inhalation
Skin Contact
Eye Contact

Health Effects and Symptoms

Acute: Contact with heated material can cause thermal burns., Causes a slipping hazard if spilled., Vapors released from thermal decomposition may cause eye irritation with symptoms of burning and tearing, as well as respiratory tract irritation.

Toxicity Data for: TEXIN 1049 000000

In the event of material decomposition due to exceeding the decomposition temperature of this product, release of MDI may occur.

Acute Inhalation:
The following effects reflect the potential health hazards associated with overexposure to MDI. Diisocyanate vapors or mist at concentrations above the TLV or PEL 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 or PEL with similar symptoms as well as asthma attack or asthma-like symptoms. Exposure well above the TLV or PEL may lead to bronchitis, bronchial spasm and pulmonary edema (fluid in lungs). Chemical or hypersensitivity pneumonitis, with flu-like symptoms (e.g., fever, chills), has also been reported. These symptoms can be delayed up to several hours after exposure. These effects are usually reversible.

Chronic Inhalation:
As a result of previous repeated overexposures or a single large dose, certain individuals may develop sensitization to diisocyanates (asthma or asthma-like symptoms) that may cause them to react to a later exposure to diisocyanates at levels well below the TLV or PEL. 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. Extreme asthmatic reactions can be life threatening. 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. Sensitization can be permanent. Chronic overexposure to diisocyanates has also been reported to cause lung damage (including fibrosis, decrease in lung function) that may be permanent.

Carcinogenicity:

No carcinogenic substances as defined by IARC, NTP and/or OSHA

12. Ecological Information

Ecological Data for: TEXIN 1049 000000

No data available for this product.

13. Disposal Considerations

Waste Disposal Method
Waste disposal should be in accordance with existing federal, state and local environmental control laws.

14. Transportation Information

Land transport (DOT)
Non-Regulated

Sea transport (IMDG)
Non-Regulated

Air transport (ICAO/IATA)
Non-Regulated

15. Regulatory Information

United States Federal Regulations
US. Toxic Substances Control Act: Listed on the TSCA Inventory.

No substances are subject to TSCA 12(b) export notification requirements.

US. EPA CERCLA Hazardous Substances (40 CFR 302) Components:
None

SARA Section 311/312 Hazard Categories:
Non-hazardous under Section 311/312

US. EPA Emergency Planning and Community Right-To-Know Act (EPCRA) SARA Title III Section 302 Extremely Hazardous Substance (40 CFR 355, Appendix A) Components:
None

US. EPA Emergency Planning and Community Right-To-Know Act (EPCRA) SARA Title III Section 313 Toxic Chemicals (40 CFR 372.65) - Supplier Notification Required Components:
None

US. EPA Resource Conservation and Recovery Act (RCRA) Composite List of Hazardous Wastes and Appendix VIII Hazardous Constituents (40 CFR 261):
Under RCRA, it is the responsibility of the person who generates a solid waste, as defined in 40 CFR 261.2, to determine if that waste is a hazardous waste.

State Right-To-Know Information

The following chemicals are specifically listed by individual states; other product specific health and safety data in other sections of the SDS may also be applicable for state requirements. For details on your regulatory requirements you should contact the appropriate agency in your state.

Massachusetts, New Jersey or Pennsylvania Right to Know Substance Lists:

Weight percent	Components	CAS-No.
>=1%	Polyurethane Polyether Elastomer	9018-04-6

California Prop. 65:
To the best of our knowledge, this product does not contain any of the listed chemicals, which the state of California has found to cause cancer, birth defects or other reproductive harm.

Based on information provided by our suppliers, this product is considered "DRC Conflict Free" as defined by the SEC Conflict Minerals Final Rule (Release No. 34-67716; File No. S7-40-10; Date: 2012-08-22).

16. Other Information

The method of hazard communication for Covestro LLC is comprised of Product Labels and Safety Data Sheets.

Contact:	Product Safety Department
Telephone:	(412) 413-2835
SDS Number:	112000032578
Version Date:	01/16/2016
SDS Version:	2.2

This information is furnished without warranty, express or implied. This information is believed to be accurate to the best knowledge of Covestro LLC. The information in this SDS relates only to the specific material designated herein. Covestro LLC assumes no legal responsibility for use of or reliance upon the information in this SDS.

‖ Changes since the last version are highlighted in the margin. This version replaces all previous versions.

SAFETY DATA SHEET

1. Identification

Covestro LLC
1 Covestro Circle
Pittsburgh, PA 15205
USA

TRANSPORTATION EMERGENCY

CALL CHEMTREC:	(800) 424-9300
INTERNATIONAL:	(703) 527-3887

NON-TRANSPORTATION

Emergency Phone:	Call Chemtrec
Information Phone:	(844) 646-0545

Product Name:	TEXIN 990 000000
Material Number:	857278
Chemical Family:	Aromatic thermoplastic polyurethane
Use:	Production of molded plastic articles

2. Hazards Identification

GHS Classification
This product is not hazardous in the form in which it is shipped by the manufacturer.

GHS Label Elements

Signal word:	Warning
Hazard statements:	If fine particles are generated during further processing, handling or by other means, product may form combustible dust concentrations in air.

3. Composition/Information on Ingredients

Hazardous Components

There are no hazardous components above the relevant concentration limits according to OSHA HazCom 2012.

4. First Aid Measures

Most Important Symptom(s)/Effect(s)

Acute: Contact with heated material can cause thermal burns., Causes a slipping hazard if spilled., Vapors released from thermal decomposition may cause eye irritation with symptoms of burning and

tearing, as well as respiratory tract irritation.

Eye Contact
In case of contact, flush eyes with plenty of lukewarm water. Get medical attention if irritation develops.

Skin Contact
Get medical attention if thermal burn occurs.

Inhalation
If inhaled, remove to fresh air.

Ingestion
Get medical attention.

Notes to Physician
In the event of possible diisocyanate exposure: Eyes: Stain for evidence of corneal injury. If cornea is burned, instill antibiotic/steroid preparation as needed. Workplace vapors could produce reversible corneal epithelial edema impairing vision. Skin: Treat symptomatically as for thermal burn. Ingestion: Treat symptomatically. Inhalation: Treatment is essentially symptomatic. An individual having a pulmonary sensitization reaction to this material should be removed from further exposure to any diisocyanate.

5. Firefighting Measures

Suitable Extinguishing Media: Water, Foam, Dry chemical

Unsuitable Extinguishing Media: High Pressure Water Streams

Fire Fighting Procedure
Firefighters should be equipped with self-contained breathing apparatus to protect against potentially toxic and irritating fumes.

Hazardous Decomposition Products
By Fire and Thermal Decomposition: ; Carbon Dioxide; hydrogen cyanide; 4,4'-Diphenylmethane Diisocyanate (MDI) Aldehydes, Carbon monoxide, Amines, Nitriles, Nitrogen oxides (NOx), Hydrocarbons

Unusual Fire/Explosion Hazards
Toxic and irritating gases/fumes may be given off during burning or thermal decomposition. Avoid generating dust; fine dust dispersed in air in sufficient concentrations, and in the presence of an ignition source is a potential dust explosion hazard.

6. Accidental Release Measures

Spill and Leak Procedures
If molten, allow material to cool and place into an appropriate marked container for disposal. Sweep up and shovel into suitable containers for disposal. Dust deposits should not be allowed to accumulate on surfaces, as these may form an explosive mixture as they are released into the atmosphere in sufficient concentrations. Avoid dispersal of dust in the air (e.g., cleaning dust from surfaces with compressed air).

7. Handling and Storage

Handling/Storage Precautions
Handle in accordance with good industrial hygiene and safety practices. Wash thoroughly after handling. Avoid breathing dust. Containers should be kept tightly closed to prevent contamination. Material is hygroscopic and may absorb small amounts of atmospheric moisture. Minimize dust generation and accumulation. Routine housekeeping should be instituted to ensure that dust does not accumulate on surfaces. Solid particulate can generate electrical charging during operations such as unloading from containers and pneumatic transfer. Provide adequate precautions, such as electrical grounding and bonding, where conductive equipment is involved.

Storage Period:
Not Established

Storage Temperature
Maximum: 30 °C (86 °F)

Substances to Avoid
None known.

8. Exposure Controls/Personal Protection

Exposure Limits
Thermoplastic Polyurethane (TPU) is generally non-hazardous under ambient conditions., The following exposure limits do not apply to the product in its supplied form; however, when the product is heated (i.e, during processing or thermal decomposition conditions), there is a potential for the release of 4,4'-diphenylmethane diisocyanate (MDI) vapors.

4,4'-Diphenylmethane Diisocyanate (MDI)
US. ACGIH Threshold Limit Values
Time Weighted Average (TWA): 0.005 ppm

US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)
Ceiling Limit Value: 0.02 ppm, 0.2 mg/m3

Any component which is listed in section 3 and is not listed in this section does not have a known ACGIH TLV, OSHA PEL or supplier recommended occupational exposure limit.

Industrial Hygiene/Ventilation Measures
During normal processing, use general dilution and local exhaust as necessary to control airborne vapors, mists, dusts and thermal decomposition products below appropriate airborne concentration standards/guidelines. Special ventilation and personal protective equipment (PPE) is required to control exposure to potentially harmful decomposition products whenever a TPU is heated to temperatures above its decomposition temperature. Examples would include hot knife cutting, grinding, or sawing.

Respiratory Protection
In the absence of sufficient general dilution or local exhaust ventilation a NIOSH approved air-supplied respirator may be needed during die cleaning, high temperature processing, purging or when thermal decomposition is suspected.

Hand Protection
Wear heat resistant gloves when handling molten material.

Eye Protection
Safety glasses with side-shields

Skin Protection
No special skin protection requirements during normal handling and use.

Additional Protective Measures
Employees should wash their hands and face before eating, drinking, or using tobacco products. Educate and train employees in the safe use and handling of this product. Purgings should be collected as small flat thin shapes or thin strands to allow for rapid cooling.

9. Physical and Chemical Properties

State of Matter:	solid
Appearance:	pellets
Color:	Natural
Odor:	Odorless
Odor Threshold:	No Data Available
pH:	No Data Available
Melting Point:	220 °C (428 °F)
Boiling Point:	No Data Available
Flash Point:	250 °C (482 °F)
Evaporation Rate:	No Data Available
Flammability:	No Data Available
Lower Explosion Limit:	No Data Available
Upper Explosion Limit:	No Data Available
Vapor Pressure:	No Data Available
Vapor Density:	No Data Available
Density:	No Data Available
Relative Vapor Density:	No Data Available
Specific Gravity:	1.1
Solubility in Water:	insoluble
Partition Coefficient: n-octanol/water:	No Data Available
Auto-ignition Temperature:	> 210 °C (> 410 °F)
Decomposition Temperature:	Decomposition begins at 230 °C.
Softening point:	180 °C (356 °F)
Dynamic Viscosity:	No Data Available
Kinematic Viscosity:	No Data Available
Bulk Density:	500 - 700 kg/m3
Self Ignition:	not applicable

10. Stability and Reactivity

Hazardous Reactions
Hazardous polymerisation does not occur.

Stability
Stable

Materials to Avoid
None known.

Conditions to Avoid
Generation of dust clouds.

Hazardous Decomposition Products
By Fire and Thermal Decomposition: Carbon Dioxide; hydrogen cyanide; 4,4'-Diphenylmethane Diisocyanate (MDI); Aldehydes, Carbon monoxide, Amines, Nitriles, Nitrogen oxides (NOx), Hydrocarbons

11. Toxicological Information

Likely Routes of Exposure: Inhalation
Skin Contact
Eye Contact

Health Effects and Symptoms

Acute: Contact with heated material can cause thermal burns., Causes a slipping hazard if spilled., Vapors released from thermal decomposition may cause eye irritation with symptoms of burning and tearing, as well as respiratory tract irritation.

Toxicity Data for: TEXIN 990 000000

In the event of material decomposition due to exceeding the decomposition temperature of this product, release of MDI may occur.

Acute Inhalation:
The following effects reflect the potential health hazards associated with overexposure to MDI. Diisocyanate vapors or mist at concentrations above the TLV or PEL 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 or PEL with similar symptoms as well as asthma attack or asthma-like symptoms. Exposure well above the TLV or PEL may lead to bronchitis, bronchial spasm and pulmonary edema (fluid in lungs). Chemical or hypersensitivity pneumonitis, with flu-like symptoms (e.g., fever, chills), has also been reported. These symptoms can be delayed up to several hours after exposure. These effects are usually reversible.

Chronic Inhalation:
As a result of previous repeated overexposures or a single large dose, certain individuals may develop sensitization to diisocyanates (asthma or asthma-like symptoms) that may cause them to react to a later exposure to diisocyanates at levels well below the TLV or PEL. 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. Extreme asthmatic reactions can be life threatening. 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. Sensitization can be permanent. Chronic overexposure to diisocyanates has also been reported to cause lung damage (including fibrosis, decrease in lung function) that may be permanent.

Carcinogenicity:
No carcinogenic substances as defined by IARC, NTP and/or OSHA

12. Ecological Information

Ecological Data for: TEXIN 990 000000

No data available for this product.

13. Disposal Considerations

Waste Disposal Method
Waste disposal should be in accordance with existing federal, state and local environmental control laws.

14. Transportation Information

Land transport (DOT)
Non-Regulated

Sea transport (IMDG)
Non-Regulated

Air transport (ICAO/IATA)
Non-Regulated

15. Regulatory Information

United States Federal Regulations
US. Toxic Substances Control Act: Listed on the TSCA Inventory.

No substances are subject to TSCA 12(b) export notification requirements.

US. EPA CERCLA Hazardous Substances (40 CFR 302) Components:
None

SARA Section 311/312 Hazard Categories:
Non-hazardous under Section 311/312

US. EPA Emergency Planning and Community Right-To-Know Act (EPCRA) SARA Title III Section 302 Extremely Hazardous Substance (40 CFR 355, Appendix A) Components:
None

US. EPA Emergency Planning and Community Right-To-Know Act (EPCRA) SARA Title III Section 313 Toxic Chemicals (40 CFR 372.65) - Supplier Notification Required Components:
None

US. EPA Resource Conservation and Recovery Act (RCRA) Composite List of Hazardous Wastes and Appendix VIII Hazardous Constituents (40 CFR 261):
Under RCRA, it is the responsibility of the person who generates a solid waste, as defined in 40 CFR 261.2, to determine if that waste is a hazardous waste.

State Right-To-Know Information

The following chemicals are specifically listed by individual states; other product specific health and safety data in other sections of the SDS may also be applicable for state requirements. For details on your regulatory requirements you should contact the appropriate agency in your state.

Massachusetts, New Jersey or Pennsylvania Right to Know Substance Lists:

Weight percent	Components	CAS-No.
>=1%	Polyurethane Polyether Elastomer	9018-04-6

California Prop. 65:
To the best of our knowledge, this product does not contain any of the listed chemicals, which the state of California has found to cause cancer, birth defects or other reproductive harm.

CFATS (Chemical Facility Anti-Terrorism Standards) Chemicals
To the best of our knowledge, this product does not contain Appendix A Chemicals of Interest (COI), at or above the Screening Threshold Quantity (STQ), as defined by the Department of Homeland Security Chemical Facility Anti-terrorism Standard (CFATS, 6 CFR Part 27.

Based on information provided by our suppliers, this product is considered "DRC Conflict Free" as defined by the SEC Conflict Minerals Final Rule (Release No. 34-67716; File No. S7-40-10; Date: 2012-08-22).

16. Other Information

The method of hazard communication for Covestro LLC is comprised of product labels and safety data sheets. Safety data sheets for all of our products and general product declarations are available for download at www.productsafetyfirst.covestro.com.

Contact:	Product Safety Department
Telephone:	(412) 413-2835
SDS Number:	112000024104
Version Date:	02/23/2016
SDS Version:	2.1

This information is furnished without warranty, express or implied. This information is believed to be accurate to the best knowledge of Covestro LLC. The information in this SDS relates only to the specific material designated herein. Covestro LLC assumes no legal responsibility for use of or reliance upon the information in this SDS.

|| Changes since the last version are highlighted in the margin. This version replaces all previous versions.

SAFETY DATA SHEET

1. Identification

Covestro LLC
formerly Bayer MaterialScience LLC
1 Covestro Circle
Pittsburgh, PA 15205
USA

TRANSPORTATION EMERGENCY

CALL CHEMTREC:	(800) 424-9300
INTERNATIONAL:	(703) 527-3887

NON-TRANSPORTATION

Emergency Phone:	Call Chemtrec
Information Phone:	(844) 646-0545

Product Name:	TEXIN 990 R 000000
Material Number:	516276
Chemical Family:	Aromatic thermoplastic polyurethane
Use:	Production of molded plastic articles

2. Hazards Identification

GHS Classification
This product is not hazardous in the form in which it is shipped by the manufacturer.

GHS Label Elements

Signal word:	Warning
Hazard statements:	If fine particles are generated during further processing, handling or by other means, product may form combustible dust concentrations in air.

3. Composition/Information on Ingredients

Hazardous Components

There are no hazardous components above the relevant concentration limits according to OSHA HazCom 2012.

4. First Aid Measures

Most Important Symptom(s)/Effect(s)

Acute: Contact with heated material can cause thermal burns., Causes a slipping hazard if spilled., Vapors released from thermal decomposition may cause eye irritation with symptoms of burning and tearing, as well as respiratory tract irritation.

Eye Contact
In case of contact, flush eyes with plenty of lukewarm water. Get medical attention if irritation develops.

Skin Contact
Get medical attention if thermal burn occurs.

Inhalation
If inhaled, remove to fresh air.

Ingestion
Get medical attention.

Notes to Physician
In the event of possible diisocyanate exposure: Eyes: Stain for evidence of corneal injury. If cornea is burned, instill antibiotic/steroid preparation as needed. Workplace vapors could produce reversible corneal epithelial edema impairing vision. Skin: Treat symptomatically as for thermal burn. Ingestion: Treat symptomatically. Inhalation: Treatment is essentially symptomatic. An individual having a pulmonary sensitization reaction to this material should be removed from further exposure to any diisocyanate.

5. Firefighting Measures

Suitable Extinguishing Media: Water, Foam, Dry chemical

Unsuitable Extinguishing Media: High Pressure Water Streams

Fire Fighting Procedure
Firefighters should be equipped with self-contained breathing apparatus to protect against potentially toxic and irritating fumes.

Hazardous Decomposition Products
By Fire and Thermal Decomposition: Carbon Dioxidehydrogen cyanide4,4'-Diphenylmethane Diisocyanate (MDI) Aldehydes, Carbon monoxide, Amines, Nitriles, Nitrogen oxides (NOx), Hydrocarbons

Unusual Fire/Explosion Hazards
Toxic and irritating gases/fumes may be given off during burning or thermal decomposition. Avoid generating dust; fine dust dispersed in air in sufficient concentrations, and in the presence of an ignition source is a potential dust explosion hazard.

6. Accidental Release Measures

Spill and Leak Procedures
If molten, allow material to cool and place into an appropriate marked container for disposal. Sweep up and shovel into suitable containers for disposal. Dust deposits should not be allowed to accumulate on surfaces, as these may form an explosive mixture as they are released into the atmosphere in sufficient concentrations. Avoid dispersal of dust in the air (e.g., cleaning dust from surfaces with compressed air).

7. Handling and Storage

Handling/Storage Precautions
Handle in accordance with good industrial hygiene and safety practices. Wash thoroughly after handling. Avoid breathing dust. Containers should be kept tightly closed to prevent contamination. Material is hygroscopic and may absorb small amounts of atmospheric moisture. Minimize dust generation and accumulation. Routine housekeeping should be instituted to ensure that dust does not accumulate on surfaces. Solid particulate can generate electrical charging during operations such as unloading from containers and pneumatic transfer. Provide adequate precautions, such as electrical grounding and bonding, where conductive equipment is involved.

Storage Period:
Not Established

Storage Temperature
Maximum: 30 °C (86 °F)

Substances to Avoid
None known.

8. Exposure Controls/Personal Protection

Exposure Limits

Thermoplastic Polyurethane (TPU) is generally non-hazardous under ambient conditions., The following exposure limits do not apply to the product in its supplied form; however, when the product is heated (i.e, during processing or thermal decomposition conditions), there is a potential for the release of 4,4'-diphenylmethane diisocyanate (MDI) vapors.

4,4'-Diphenylmethane Diisocyanate (MDI) (101-68-8)
US. ACGIH Threshold Limit Values
Time Weighted Average (TWA): 0.005 ppm

US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)
Ceiling Limit Value: 0.02 ppm, 0.2 mg/m3

Any component which is listed in section 3 and is not listed in this section does not have a known ACGIH TLV, OSHA PEL or supplier recommended occupational exposure limit.

Industrial Hygiene/Ventilation Measures
During normal processing, use general dilution and local exhaust as necessary to control airborne vapors, mists, dusts and thermal decomposition products below appropriate airborne concentration standards/guidelines. Special ventilation and personal protective equipment (PPE) is required to control exposure to potentially harmful decomposition products whenever a TPU is heated to temperatures above its decomposition temperature. Examples would include hot knife cutting, grinding, or sawing.

Respiratory Protection
In the absence of sufficient general dilution or local exhaust ventilation a NIOSH approved air-supplied respirator may be needed during die cleaning, high temperature processing, purging or when thermal decomposition is suspected.

Hand Protection
Wear heat resistant gloves when handling molten material.

Eye Protection
Safety glasses with side-shields

Skin Protection
No special skin protection requirements during normal handling and use.

Additional Protective Measures
Employees should wash their hands and face before eating, drinking, or using tobacco products. Educate and train employees in the safe use and handling of this product. Purgings should be collected as small flat thin shapes or thin strands to allow for rapid cooling.

9. Physical and Chemical Properties

State of Matter:	solid
Appearance:	pellets
Color:	Natural
Odor:	Odorless
Odor Threshold:	No Data Available
pH:	No Data Available
Melting Point:	220 °C (428 °F)
Boiling Point:	No Data Available
Flash Point:	250 °C (482 °F)
Evaporation Rate:	No Data Available
Flammability:	No Data Available
Lower Explosion Limit:	No Data Available
Upper Explosion Limit:	No Data Available
Vapor Pressure:	No Data Available
Vapor Density:	No Data Available
Density:	No Data Available
Relative Vapor Density:	No Data Available
Specific Gravity:	1.1
Solubility in Water:	insoluble
Partition Coefficient: n-octanol/water:	No Data Available
Auto-ignition Temperature:	> 210 °C (> 410 °F)
Decomposition Temperature:	Decomposition begins at 230 °C.
Softening point:	180 °C (356 °F)
Dynamic Viscosity:	No Data Available
Kinematic Viscosity:	No Data Available
Bulk Density:	500 - 700 kg/m3
Self Ignition:	not applicable

10. Stability and Reactivity

Hazardous Reactions
Hazardous polymerisation does not occur.

Stability
Stable

Materials to Avoid
None known.

Conditions to Avoid
Generation of dust clouds.

Hazardous Decomposition Products
By Fire and Thermal Decomposition: Carbon Dioxide; hydrogen cyanide; 4,4'-Diphenylmethane Diisocyanate (MDI); Aldehydes, Carbon monoxide, Amines, Nitriles, Nitrogen oxides (NOx), Hydrocarbons

11. Toxicological Information

Likely Routes of Exposure: Inhalation
Skin Contact
Eye Contact

Health Effects and Symptoms

Acute: Contact with heated material can cause thermal burns., Causes a slipping hazard if spilled., Vapors released from thermal decomposition may cause eye irritation with symptoms of burning and tearing, as well as respiratory tract irritation.

Toxicity Data for: TEXIN 990 R 000000

In the event of material decomposition due to exceeding the decomposition temperature of this product, release of MDI may occur.

Acute Inhalation:
The following effects reflect the potential health hazards associated with overexposure to MDI. Diisocyanate vapors or mist at concentrations above the TLV or PEL 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 or PEL with similar symptoms as well as asthma attack or asthma-like symptoms. Exposure well above the TLV or PEL may lead to bronchitis, bronchial spasm and pulmonary edema (fluid in lungs). Chemical or hypersensitivity pneumonitis, with flu-like symptoms (e.g., fever, chills), has also been reported. These symptoms can be delayed up to several hours after exposure. These effects are usually reversible.

Chronic Inhalation:
As a result of previous repeated overexposures or a single large dose, certain individuals may develop sensitization to diisocyanates (asthma or asthma-like symptoms) that may cause them to react to a later exposure to diisocyanates at levels well below the TLV or PEL. 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. Extreme asthmatic reactions can be life threatening. 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. Sensitization can be permanent. Chronic overexposure to diisocyanates has also been reported to cause lung damage (including fibrosis, decrease in lung function) that may be permanent.

Carcinogenicity:

No carcinogenic substances as defined by IARC, NTP and/or OSHA

12. Ecological Information

Ecological Data for: TEXIN 990 R 000000

No data available for this product.

13. Disposal Considerations

Waste Disposal Method
Waste disposal should be in accordance with existing federal, state and local environmental control laws.

14. Transportation Information

Land transport (DOT)
Non-Regulated

Sea transport (IMDG)
Non-Regulated

Air transport (ICAO/IATA)
Non-Regulated

15. Regulatory Information

United States Federal Regulations
US. Toxic Substances Control Act: Listed on the TSCA Inventory.

No substances are subject to TSCA 12(b) export notification requirements.

US. EPA CERCLA Hazardous Substances (40 CFR 302) Components:
None

SARA Section 311/312 Hazard Categories:
Non-hazardous under Section 311/312

US. EPA Emergency Planning and Community Right-To-Know Act (EPCRA) SARA Title III Section 302 Extremely Hazardous Substance (40 CFR 355, Appendix A) Components:
None

US. EPA Emergency Planning and Community Right-To-Know Act (EPCRA) SARA Title III Section 313 Toxic Chemicals (40 CFR 372.65) - Supplier Notification Required Components:
None

US. EPA Resource Conservation and Recovery Act (RCRA) Composite List of Hazardous Wastes and Appendix VIII Hazardous Constituents (40 CFR 261):
Under RCRA, it is the responsibility of the person who generates a solid waste, as defined in 40 CFR 261.2, to determine if that waste is a hazardous waste.

State Right-To-Know Information

The following chemicals are specifically listed by individual states; other product specific health and safety data in other sections of the SDS may also be applicable for state requirements. For details on your regulatory requirements you should contact the appropriate agency in your state.

Massachusetts, New Jersey or Pennsylvania Right to Know Substance Lists:

Weight percent	Components	CAS-No.
>=1%	Polyurethane Polyether Elastomer	9018-04-6

California Prop. 65:
To the best of our knowledge, this product does not contain any of the listed chemicals, which the state of California has found to cause cancer, birth defects or other reproductive harm.

Based on information provided by our suppliers, this product is considered "DRC Conflict Free" as defined by the SEC Conflict Minerals Final Rule (Release No. 34-67716; File No. S7-40-10; Date: 2012-08-22).

16. Other Information

The method of hazard communication for Covestro LLC is comprised of Product Labels and Safety Data Sheets.

Contact:	Product Safety Department
Telephone:	(412) 413-2835
SDS Number:	112000008860
Version Date:	08/28/2015
SDS Version:	2.0

This information is furnished without warranty, express or implied. This information is believed to be accurate to the best knowledge of Covestro LLC. The information in this SDS relates only to the specific material designated herein. Covestro LLC assumes no legal responsibility for use of or reliance upon the information in this SDS.

|| Changes since the last version are highlighted in the margin. This version replaces all previous versions.

SAFETY DATA SHEET

1. Identification

Covestro LLC
formerly Bayer MaterialScience LLC
1 Covestro Circle
Pittsburgh, PA 15205
USA

TRANSPORTATION EMERGENCY

CALL CHEMTREC:	(800) 424-9300
INTERNATIONAL:	(703) 527-3887

NON-TRANSPORTATION

Emergency Phone:	Call Chemtrec
Information Phone:	(844) 646-0545

Product Name:	TEXIN 950 000000
Material Number:	479079
Chemical Family:	Aromatic thermoplastic polyurethane
Use:	Production of molded plastic articles

2. Hazards Identification

GHS Classification
This product is not hazardous in the form in which it is shipped by the manufacturer.

GHS Label Elements

Signal word:	Warning
Hazard statements:	If fine particles are generated during further processing, handling or by other means, product may form combustible dust concentrations in air.

3. Composition/Information on Ingredients

Hazardous Components

There are no hazardous components above the relevant concentration limits according to OSHA HazCom 2012.

4. First Aid Measures

Most Important Symptom(s)/Effect(s)

Acute: Contact with heated material can cause thermal burns., Causes a slipping hazard if spilled., Vapors released from thermal decomposition may cause eye irritation with symptoms of burning and tearing, as well as respiratory tract irritation.

Eye Contact
In case of contact, flush eyes with plenty of lukewarm water. Get medical attention if irritation develops.

Skin Contact
Get medical attention if thermal burn occurs.

Inhalation
If inhaled, remove to fresh air.

Ingestion
Get medical attention.

Notes to Physician
In the event of possible diisocyanate exposure: Eyes: Stain for evidence of corneal injury. If cornea is burned, instill antibiotic/steroid preparation as needed. Workplace vapors could produce reversible corneal epithelial edema impairing vision. Skin: Treat symptomatically as for thermal burn. Ingestion: Treat symptomatically. Inhalation: Treatment is essentially symptomatic. An individual having a pulmonary sensitization reaction to this material should be removed from further exposure to any diisocyanate.

5. Firefighting Measures

Suitable Extinguishing Media: Water, Foam, Dry chemical

Unsuitable Extinguishing Media: High Pressure Water Streams

Fire Fighting Procedure
Firefighters should be equipped with self-contained breathing apparatus to protect against potentially toxic and irritating fumes.

Hazardous Decomposition Products
By Fire and Thermal Decomposition: Carbon Dioxidehydrogen cyanide4,4'-Diphenylmethane Diisocyanate (MDI) Aldehydes, Carbon monoxide, Amines, Nitriles, Nitrogen oxides (NOx), Hydrocarbons

Unusual Fire/Explosion Hazards
Toxic and irritating gases/fumes may be given off during burning or thermal decomposition. Avoid generating dust; fine dust dispersed in air in sufficient concentrations, and in the presence of an ignition source is a potential dust explosion hazard.

6. Accidental Release Measures

Spill and Leak Procedures
If molten, allow material to cool and place into an appropriate marked container for disposal. Sweep up and shovel into suitable containers for disposal. Dust deposits should not be allowed to accumulate on surfaces, as these may form an explosive mixture as they are released into the atmosphere in sufficient concentrations. Avoid dispersal of dust in the air (e.g., cleaning dust from surfaces with compressed air).

7. Handling and Storage

Handling/Storage Precautions
Handle in accordance with good industrial hygiene and safety practices. Wash thoroughly after handling. Avoid breathing dust. Containers should be kept tightly closed to prevent contamination. Material is hygroscopic and may absorb small amounts of atmospheric moisture. Minimize dust generation and accumulation. Routine housekeeping should be instituted to ensure that dust does not accumulate on surfaces. Solid particulate can generate electrical charging during operations such as unloading from containers and pneumatic transfer. Provide adequate precautions, such as electrical grounding and bonding, where conductive equipment is involved.

Storage Period:
Not Established

Storage Temperature
Maximum: 30 °C (86 °F)

Substances to Avoid
None known.

8. Exposure Controls/Personal Protection

Exposure Limits

Thermoplastic Polyurethane (TPU) is generally non-hazardous under ambient conditions., The following exposure limits do not apply to the product in its supplied form; however, when the product is heated (i.e, during processing or thermal decomposition conditions), there is a potential for the release of 4,4'-diphenylmethane diisocyanate (MDI) vapors.

4,4'-Diphenylmethane Diisocyanate (MDI) (101-68-8)
US. ACGIH Threshold Limit Values
Time Weighted Average (TWA): 0.005 ppm

US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)
Ceiling Limit Value: 0.02 ppm, 0.2 mg/m3

Any component which is listed in section 3 and is not listed in this section does not have a known ACGIH TLV, OSHA PEL or supplier recommended occupational exposure limit.

Industrial Hygiene/Ventilation Measures
During normal processing, use general dilution and local exhaust as necessary to control airborne vapors, mists, dusts and thermal decomposition products below appropriate airborne concentration standards/guidelines. Special ventilation and personal protective equipment (PPE) is required to control exposure to potentially harmful decomposition products whenever a TPU is heated to temperatures above its decomposition temperature. Examples would include hot knife cutting, grinding, or sawing.

Respiratory Protection
In the absence of sufficient general dilution or local exhaust ventilation a NIOSH approved air-supplied respirator may be needed during die cleaning, high temperature processing, purging or when thermal decomposition is suspected.

Hand Protection
Wear heat resistant gloves when handling molten material.

Eye Protection
Safety glasses with side-shields

Skin Protection
No special skin protection requirements during normal handling and use.

Additional Protective Measures
Employees should wash their hands and face before eating, drinking, or using tobacco products. Educate and train employees in the safe use and handling of this product. Purgings should be collected as small flat thin shapes or thin strands to allow for rapid cooling.

9. Physical and Chemical Properties

State of Matter:	solid
Appearance:	pellets
Color:	Natural
Odor:	Odorless
Odor Threshold:	No Data Available
pH:	No Data Available
Melting Point:	220 °C (428 °F)
Boiling Point:	No Data Available
Flash Point:	250 °C (482 °F)
Evaporation Rate:	No Data Available
Flammability:	No Data Available
Lower Explosion Limit:	No Data Available
Upper Explosion Limit:	No Data Available
Vapor Pressure:	No Data Available
Vapor Density:	No Data Available
Density:	No Data Available
Relative Vapor Density:	No Data Available
Specific Gravity:	1.1
Solubility in Water:	insoluble
Partition Coefficient: n-octanol/water:	No Data Available
Auto-ignition Temperature:	> 210 °C (> 410 °F)
Decomposition Temperature:	Decomposition begins at 230 °C.
Softening point:	180 °C (356 °F)
Dynamic Viscosity:	No Data Available
Kinematic Viscosity:	No Data Available
Bulk Density:	500 - 700 kg/m3
Self Ignition:	not applicable

10. Stability and Reactivity

Hazardous Reactions
Hazardous polymerisation does not occur.

Stability
Stable

Materials to Avoid
None known.

Conditions to Avoid
Generation of dust clouds.

Hazardous Decomposition Products
By Fire and Thermal Decomposition: Carbon Dioxide; hydrogen cyanide; 4,4'-Diphenylmethane Diisocyanate (MDI); Aldehydes, Carbon monoxide, Amines, Nitriles, Nitrogen oxides (NOx), Hydrocarbons

11. Toxicological Information

Likely Routes of Exposure: Inhalation
Skin Contact
Eye Contact

Health Effects and Symptoms

Acute: Contact with heated material can cause thermal burns., Causes a slipping hazard if spilled., Vapors released from thermal decomposition may cause eye irritation with symptoms of burning and tearing, as well as respiratory tract irritation.

Toxicity Data for: TEXIN 950 000000

In the event of material decomposition due to exceeding the decomposition temperature of this product, release of MDI may occur.

Acute Inhalation:
The following effects reflect the potential health hazards associated with overexposure to MDI. Diisocyanate vapors or mist at concentrations above the TLV or PEL 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 or PEL with similar symptoms as well as asthma attack or asthma-like symptoms. Exposure well above the TLV or PEL may lead to bronchitis, bronchial spasm and pulmonary edema (fluid in lungs). Chemical or hypersensitivity pneumonitis, with flu-like symptoms (e.g., fever, chills), has also been reported. These symptoms can be delayed up to several hours after exposure. These effects are usually reversible.

Chronic Inhalation:
As a result of previous repeated overexposures or a single large dose, certain individuals may develop sensitization to diisocyanates (asthma or asthma-like symptoms) that may cause them to react to a later exposure to diisocyanates at levels well below the TLV or PEL. 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. Extreme asthmatic reactions can be life threatening. 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. Sensitization can be permanent. Chronic overexposure to diisocyanates has also been reported to cause lung damage (including fibrosis, decrease in lung function) that may be permanent.

Carcinogenicity:

No carcinogenic substances as defined by IARC, NTP and/or OSHA

12. Ecological Information

Ecological Data for: TEXIN 950 000000

No data available for this product.

13. Disposal Considerations

Waste Disposal Method
Waste disposal should be in accordance with existing federal, state and local environmental control laws.

14. Transportation Information

Land transport (DOT)
Non-Regulated

Sea transport (IMDG)
Non-Regulated

Air transport (ICAO/IATA)
Non-Regulated

15. Regulatory Information

United States Federal Regulations
US. Toxic Substances Control Act: Listed on the TSCA Inventory.

No substances are subject to TSCA 12(b) export notification requirements.

US. EPA CERCLA Hazardous Substances (40 CFR 302) Components:
None

SARA Section 311/312 Hazard Categories:
Non-hazardous under Section 311/312

US. EPA Emergency Planning and Community Right-To-Know Act (EPCRA) SARA Title III Section 302 Extremely Hazardous Substance (40 CFR 355, Appendix A) Components:
None

US. EPA Emergency Planning and Community Right-To-Know Act (EPCRA) SARA Title III Section 313 Toxic Chemicals (40 CFR 372.65) - Supplier Notification Required Components:
None

US. EPA Resource Conservation and Recovery Act (RCRA) Composite List of Hazardous Wastes and Appendix VIII Hazardous Constituents (40 CFR 261):
Under RCRA, it is the responsibility of the person who generates a solid waste, as defined in 40 CFR 261.2, to determine if that waste is a hazardous waste.

State Right-To-Know Information

The following chemicals are specifically listed by individual states; other product specific health and safety data in other sections of the SDS may also be applicable for state requirements. For details on your regulatory requirements you should contact the appropriate agency in your state.

Massachusetts, New Jersey or Pennsylvania Right to Know Substance Lists:

Weight percent	Components	CAS-No.
>=1%	Polyurethane Polyether Elastomer	9018-04-6

California Prop. 65:
To the best of our knowledge, this product does not contain any of the listed chemicals, which the state of California has found to cause cancer, birth defects or other reproductive harm.

Based on information provided by our suppliers, this product is considered "DRC Conflict Free" as defined by the SEC Conflict Minerals Final Rule (Release No. 34-67716; File No. S7-40-10; Date: 2012-08-22).

16. Other Information

The method of hazard communication for Covestro LLC is comprised of Product Labels and Safety Data Sheets.

Contact:	Product Safety Department
Telephone:	(412) 413-2835
SDS Number:	112000024100
Version Date:	08/28/2015
SDS Version:	2.0

This information is furnished without warranty, express or implied. This information is believed to be accurate to the best knowledge of Covestro LLC. The information in this SDS relates only to the specific material designated herein. Covestro LLC assumes no legal responsibility for use of or reliance upon the information in this SDS.

|| Changes since the last version are highlighted in the margin. This version replaces all previous versions.

SAFETY DATA SHEET

1. Identification

Covestro LLC
formerly Bayer MaterialScience LLC
1 Covestro Circle
Pittsburgh, PA 15205
USA

TRANSPORTATION EMERGENCY

CALL CHEMTREC:	(800) 424-9300
INTERNATIONAL:	(703) 527-3887

NON-TRANSPORTATION

Emergency Phone:	Call Chemtrec
Information Phone:	(844) 646-0545

Product Name:	TEXIN 950LW 000000
Material Number:	953064
Chemical Family:	Aromatic thermoplastic polyurethane
Use:	Production of molded plastic articles

2. Hazards Identification

GHS Classification
This product is not hazardous in the form in which it is shipped by the manufacturer.

GHS Label Elements

Signal word:	Warning
Hazard statements:	If fine particles are generated during further processing, handling or by other means, product may form combustible dust concentrations in air.

3. Composition/Information on Ingredients

Hazardous Components

There are no hazardous components above the relevant concentration limits according to OSHA HazCom 2012.

4. First Aid Measures

Most Important Symptom(s)/Effect(s)

Acute: Contact with heated material can cause thermal burns., Causes a slipping hazard if spilled., Vapors released from thermal decomposition may cause eye irritation with symptoms of burning and tearing, as well as respiratory tract irritation.

Eye Contact
In case of contact, flush eyes with plenty of lukewarm water. Get medical attention if irritation develops.

Skin Contact
Get medical attention if thermal burn occurs.

Inhalation
If inhaled, remove to fresh air.

Ingestion
Get medical attention.

Notes to Physician
In the event of possible diisocyanate exposure: Eyes: Stain for evidence of corneal injury. If cornea is burned, instill antibiotic/steroid preparation as needed. Workplace vapors could produce reversible corneal epithelial edema impairing vision. Skin: Treat symptomatically as for thermal burn. Ingestion: Treat symptomatically. Inhalation: Treatment is essentially symptomatic. An individual having a pulmonary sensitization reaction to this material should be removed from further exposure to any diisocyanate.

5. Firefighting Measures

Suitable Extinguishing Media: Water, Foam, Dry chemical

Unsuitable Extinguishing Media: High Pressure Water Streams

Fire Fighting Procedure
Firefighters should be equipped with self-contained breathing apparatus to protect against potentially toxic and irritating fumes.

Hazardous Decomposition Products
By Fire and Thermal Decomposition: Carbon Dioxidehydrogen cyanide4,4'-Diphenylmethane Diisocyanate (MDI) Aldehydes, Carbon monoxide, Amines, Nitriles, Nitrogen oxides (NOx), Hydrocarbons

Unusual Fire/Explosion Hazards
Toxic and irritating gases/fumes may be given off during burning or thermal decomposition. Avoid generating dust; fine dust dispersed in air in sufficient concentrations, and in the presence of an ignition source is a potential dust explosion hazard.

6. Accidental Release Measures

Spill and Leak Procedures
If molten, allow material to cool and place into an appropriate marked container for disposal. Sweep up and shovel into suitable containers for disposal. Dust deposits should not be allowed to accumulate on surfaces, as these may form an explosive mixture as they are released into the atmosphere in sufficient concentrations. Avoid dispersal of dust in the air (e.g., cleaning dust from surfaces with compressed air).

7. Handling and Storage

Handling/Storage Precautions
Handle in accordance with good industrial hygiene and safety practices. Wash thoroughly after handling. Avoid breathing dust. Containers should be kept tightly closed to prevent contamination. Material is hygroscopic and may absorb small amounts of atmospheric moisture. Minimize dust generation and accumulation. Routine housekeeping should be instituted to ensure that dust does not accumulate on surfaces. Solid particulate can generate electrical charging during operations such as unloading from containers and pneumatic transfer. Provide adequate precautions, such as electrical grounding and bonding, where conductive equipment is involved.

Storage Period:
Not Established

Storage Temperature
Maximum: 30 °C (86 °F)

Substances to Avoid
None known.

8. Exposure Controls/Personal Protection

Exposure Limits

Thermoplastic Polyurethane (TPU) is generally non-hazardous under ambient conditions., The following exposure limits do not apply to the product in its supplied form; however, when the product is heated (i.e, during processing or thermal decomposition conditions), there is a potential for the release of 4,4'-diphenylmethane diisocyanate (MDI) vapors.

4,4'-Diphenylmethane Diisocyanate (MDI) (101-68-8)
US. ACGIH Threshold Limit Values
Time Weighted Average (TWA): 0.005 ppm

US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)
Ceiling Limit Value: 0.02 ppm, 0.2 mg/m3

Any component which is listed in section 3 and is not listed in this section does not have a known ACGIH TLV, OSHA PEL or supplier recommended occupational exposure limit.

Industrial Hygiene/Ventilation Measures
During normal processing, use general dilution and local exhaust as necessary to control airborne vapors, mists, dusts and thermal decomposition products below appropriate airborne concentration standards/guidelines. Special ventilation and personal protective equipment (PPE) is required to control exposure to potentially harmful decomposition products whenever a TPU is heated to temperatures above its decomposition temperature. Examples would include hot knife cutting, grinding, or sawing.

Respiratory Protection
In the absence of sufficient general dilution or local exhaust ventilation a NIOSH approved air-supplied respirator may be needed during die cleaning, high temperature processing, purging or when thermal decomposition is suspected.

Hand Protection
Wear heat resistant gloves when handling molten material.

Eye Protection
Safety glasses with side-shields

Skin Protection
No special skin protection requirements during normal handling and use.

Additional Protective Measures
Employees should wash their hands and face before eating, drinking, or using tobacco products. Educate and train employees in the safe use and handling of this product. Purgings should be collected as small flat thin shapes or thin strands to allow for rapid cooling.

9. Physical and Chemical Properties

State of Matter:	solid
Appearance:	pellets
Color:	Natural
Odor:	Odorless
Odor Threshold:	No Data Available
pH:	No Data Available
Melting Point:	220 °C (428 °F)
Boiling Point:	No Data Available
Flash Point:	250 °C (482 °F)
Evaporation Rate:	No Data Available
Flammability:	No Data Available
Lower Explosion Limit:	No Data Available
Upper Explosion Limit:	No Data Available
Vapor Pressure:	No Data Available
Vapor Density:	No Data Available
Density:	No Data Available
Relative Vapor Density:	No Data Available
Specific Gravity:	1.1
Solubility in Water:	insoluble
Partition Coefficient: n-octanol/water:	No Data Available
Auto-ignition Temperature:	> 210 °C (> 410 °F)
Decomposition Temperature:	Decomposition begins at 230 °C.
Softening point:	180 °C (356 °F)
Dynamic Viscosity:	No Data Available
Kinematic Viscosity:	No Data Available
Bulk Density:	500 - 700 kg/m3
Self Ignition:	not applicable

10. Stability and Reactivity

Hazardous Reactions
Hazardous polymerisation does not occur.

Stability
Stable

Materials to Avoid
None known.

Conditions to Avoid
Generation of dust clouds.

Hazardous Decomposition Products
By Fire and Thermal Decomposition: Carbon Dioxide; hydrogen cyanide; 4,4'-Diphenylmethane Diisocyanate (MDI); Aldehydes, Carbon monoxide, Amines, Nitriles, Nitrogen oxides (NOx), Hydrocarbons

11. Toxicological Information

Likely Routes of Exposure: Inhalation
Skin Contact
Eye Contact

Health Effects and Symptoms

Acute: Contact with heated material can cause thermal burns., Causes a slipping hazard if spilled., Vapors released from thermal decomposition may cause eye irritation with symptoms of burning and tearing, as well as respiratory tract irritation.

Toxicity Data for: TEXIN 950LW 000000

In the event of material decomposition due to exceeding the decomposition temperature of this product, release of MDI may occur.

Acute Inhalation:
The following effects reflect the potential health hazards associated with overexposure to MDI. Diisocyanate vapors or mist at concentrations above the TLV or PEL 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 or PEL with similar symptoms as well as asthma attack or asthma-like symptoms. Exposure well above the TLV or PEL may lead to bronchitis, bronchial spasm and pulmonary edema (fluid in lungs). Chemical or hypersensitivity pneumonitis, with flu-like symptoms (e.g., fever, chills), has also been reported. These symptoms can be delayed up to several hours after exposure. These effects are usually reversible.

Chronic Inhalation:
As a result of previous repeated overexposures or a single large dose, certain individuals may develop sensitization to diisocyanates (asthma or asthma-like symptoms) that may cause them to react to a later exposure to diisocyanates at levels well below the TLV or PEL. 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. Extreme asthmatic reactions can be life threatening. 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. Sensitization can be permanent. Chronic overexposure to diisocyanates has also been reported to cause lung damage (including fibrosis, decrease in lung function) that may be permanent.

Carcinogenicity:

No carcinogenic substances as defined by IARC, NTP and/or OSHA

12. Ecological Information

Ecological Data for: TEXIN 950LW 000000

No data available for this product.

13. Disposal Considerations

Waste Disposal Method
Waste disposal should be in accordance with existing federal, state and local environmental control laws.

14. Transportation Information

Land transport (DOT)
Non-Regulated

Sea transport (IMDG)
Non-Regulated

Air transport (ICAO/IATA)
Non-Regulated

15. Regulatory Information

United States Federal Regulations
US. Toxic Substances Control Act: Listed on the TSCA Inventory.

No substances are subject to TSCA 12(b) export notification requirements.

US. EPA CERCLA Hazardous Substances (40 CFR 302) Components:
None

SARA Section 311/312 Hazard Categories:
Non-hazardous under Section 311/312

US. EPA Emergency Planning and Community Right-To-Know Act (EPCRA) SARA Title III Section 302 Extremely Hazardous Substance (40 CFR 355, Appendix A) Components:
None

US. EPA Emergency Planning and Community Right-To-Know Act (EPCRA) SARA Title III Section 313 Toxic Chemicals (40 CFR 372.65) - Supplier Notification Required Components:
None

US. EPA Resource Conservation and Recovery Act (RCRA) Composite List of Hazardous Wastes and Appendix VIII Hazardous Constituents (40 CFR 261):
Under RCRA, it is the responsibility of the person who generates a solid waste, as defined in 40 CFR 261.2, to determine if that waste is a hazardous waste.

State Right-To-Know Information

The following chemicals are specifically listed by individual states; other product specific health and safety data in other sections of the SDS may also be applicable for state requirements. For details on your regulatory requirements you should contact the appropriate agency in your state.

Massachusetts, New Jersey or Pennsylvania Right to Know Substance Lists:

Weight percent	Components	CAS-No.
>=1%	Polyurethane Polyether Elastomer	9018-04-6

California Prop. 65:
To the best of our knowledge, this product does not contain any of the listed chemicals, which the state of California has found to cause cancer, birth defects or other reproductive harm.

Based on information provided by our suppliers, this product is considered "DRC Conflict Free" as defined by the SEC Conflict Minerals Final Rule (Release No. 34-67716; File No. S7-40-10; Date: 2012-08-22).

16. Other Information

The method of hazard communication for Covestro LLC is comprised of Product Labels and Safety Data Sheets.

Contact:	Product Safety Department
Telephone:	(412) 413-2835
SDS Number:	112000029509
Version Date:	08/28/2015
SDS Version:	2.0

This information is furnished without warranty, express or implied. This information is believed to be accurate to the best knowledge of Covestro LLC. The information in this SDS relates only to the specific material designated herein. Covestro LLC assumes no legal responsibility for use of or reliance upon the information in this SDS.

‖ Changes since the last version are highlighted in the margin. This version replaces all previous versions.

SAFETY DATA SHEET

1. Identification

Covestro LLC
formerly Bayer MaterialScience LLC
1 Covestro Circle
Pittsburgh, PA 15205
USA

TRANSPORTATION EMERGENCY

CALL CHEMTREC:	(800) 424-9300
INTERNATIONAL:	(703) 527-3887

NON-TRANSPORTATION

Emergency Phone:	Call Chemtrec
Information Phone:	(844) 646-0545

Product Name:	TEXIN 985 000000
Material Number:	516217
Chemical Family:	Aromatic thermoplastic polyurethane
Use:	Production of molded plastic articles

2. Hazards Identification

GHS Classification
This product is not hazardous in the form in which it is shipped by the manufacturer.

GHS Label Elements

Signal word:	Warning
Hazard statements:	If fine particles are generated during further processing, handling or by other means, product may form combustible dust concentrations in air.

3. Composition/Information on Ingredients

Hazardous Components

There are no hazardous components above the relevant concentration limits according to OSHA HazCom 2012.

4. First Aid Measures

Most Important Symptom(s)/Effect(s)

Acute: Contact with heated material can cause thermal burns., Causes a slipping hazard if spilled., Vapors released from thermal decomposition may cause eye irritation with symptoms of burning and tearing, as well as respiratory tract irritation.

Eye Contact
In case of contact, flush eyes with plenty of lukewarm water. Get medical attention if irritation develops.

Skin Contact
Get medical attention if thermal burn occurs.

Inhalation
If inhaled, remove to fresh air.

Ingestion
Get medical attention.

Notes to Physician
In the event of possible diisocyanate exposure: Eyes: Stain for evidence of corneal injury. If cornea is burned, instill antibiotic/steroid preparation as needed. Workplace vapors could produce reversible corneal epithelial edema impairing vision. Skin: Treat symptomatically as for thermal burn. Ingestion: Treat symptomatically. Inhalation: Treatment is essentially symptomatic. An individual having a pulmonary sensitization reaction to this material should be removed from further exposure to any diisocyanate.

5. Firefighting Measures

Suitable Extinguishing Media: Water, Foam, Dry chemical

Unsuitable Extinguishing Media: High Pressure Water Streams

Fire Fighting Procedure
Firefighters should be equipped with self-contained breathing apparatus to protect against potentially toxic and irritating fumes.

Hazardous Decomposition Products
By Fire and Thermal Decomposition: Carbon Dioxidehydrogen cyanide4,4'-Diphenylmethane Diisocyanate (MDI) Aldehydes, Carbon monoxide, Amines, Nitriles, Nitrogen oxides (NOx), Hydrocarbons

Unusual Fire/Explosion Hazards
Toxic and irritating gases/fumes may be given off during burning or thermal decomposition. Avoid generating dust; fine dust dispersed in air in sufficient concentrations, and in the presence of an ignition source is a potential dust explosion hazard.

6. Accidental Release Measures

Spill and Leak Procedures
If molten, allow material to cool and place into an appropriate marked container for disposal. Sweep up and shovel into suitable containers for disposal. Dust deposits should not be allowed to accumulate on surfaces, as these may form an explosive mixture as they are released into the atmosphere in sufficient concentrations. Avoid dispersal of dust in the air (e.g., cleaning dust from surfaces with compressed air).

7. Handling and Storage

Handling/Storage Precautions
Handle in accordance with good industrial hygiene and safety practices. Wash thoroughly after handling. Avoid breathing dust. Containers should be kept tightly closed to prevent contamination. Material is hygroscopic and may absorb small amounts of atmospheric moisture. Minimize dust generation and accumulation. Routine housekeeping should be instituted to ensure that dust does not accumulate on surfaces. Solid particulate can generate electrical charging during operations such as unloading from containers and pneumatic transfer. Provide adequate precautions, such as electrical grounding and bonding, where conductive equipment is involved.

Storage Period:
Not Established

Storage Temperature
Maximum: 30 °C (86 °F)

Substances to Avoid
None known.

8. Exposure Controls/Personal Protection

Exposure Limits

Thermoplastic Polyurethane (TPU) is generally non-hazardous under ambient conditions., The following exposure limits do not apply to the product in its supplied form; however, when the product is heated (i.e, during processing or thermal decomposition conditions), there is a potential for the release of 4,4'-diphenylmethane diisocyanate (MDI) vapors.

4,4'-Diphenylmethane Diisocyanate (MDI) (101-68-8)
US. ACGIH Threshold Limit Values
Time Weighted Average (TWA): 0.005 ppm

US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)
Ceiling Limit Value: 0.02 ppm, 0.2 mg/m3

Any component which is listed in section 3 and is not listed in this section does not have a known ACGIH TLV, OSHA PEL or supplier recommended occupational exposure limit.

Industrial Hygiene/Ventilation Measures
During normal processing, use general dilution and local exhaust as necessary to control airborne vapors, mists, dusts and thermal decomposition products below appropriate airborne concentration standards/guidelines. Special ventilation and personal protective equipment (PPE) is required to control exposure to potentially harmful decomposition products whenever a TPU is heated to temperatures above its decomposition temperature. Examples would include hot knife cutting, grinding, or sawing.

Respiratory Protection
In the absence of sufficient general dilution or local exhaust ventilation a NIOSH approved air-supplied respirator may be needed during die cleaning, high temperature processing, purging or when thermal decomposition is suspected.

Hand Protection
Wear heat resistant gloves when handling molten material.

Eye Protection
Safety glasses with side-shields

Skin Protection
No special skin protection requirements during normal handling and use.

Additional Protective Measures
Employees should wash their hands and face before eating, drinking, or using tobacco products. Educate and train employees in the safe use and handling of this product. Purgings should be collected as small flat thin shapes or thin strands to allow for rapid cooling.

9. Physical and Chemical Properties

State of Matter:	solid
Appearance:	pellets
Color:	Natural
Odor:	Odorless
Odor Threshold:	No Data Available
pH:	No Data Available
Melting Point:	220 °C (428 °F)
Boiling Point:	No Data Available
Flash Point:	250 °C (482 °F)
Evaporation Rate:	No Data Available
Flammability:	No Data Available
Lower Explosion Limit:	No Data Available
Upper Explosion Limit:	No Data Available
Vapor Pressure:	No Data Available
Vapor Density:	No Data Available
Density:	No Data Available
Relative Vapor Density:	No Data Available
Specific Gravity:	1.1
Solubility in Water:	insoluble
Partition Coefficient: n-octanol/water:	No Data Available
Auto-ignition Temperature:	> 210 °C (> 410 °F)
Decomposition Temperature:	Decomposition begins at 230 °C.
Softening point:	180 °C (356 °F)
Dynamic Viscosity:	No Data Available
Kinematic Viscosity:	No Data Available
Bulk Density:	500 - 700 kg/m3
Self Ignition:	not applicable

10. Stability and Reactivity

Hazardous Reactions
Hazardous polymerisation does not occur.

Stability
Stable

Materials to Avoid
None known.

Conditions to Avoid
Generation of dust clouds.

Hazardous Decomposition Products
By Fire and Thermal Decomposition: Carbon Dioxide; hydrogen cyanide; 4,4'-Diphenylmethane Diisocyanate (MDI); Aldehydes, Carbon monoxide, Amines, Nitriles, Nitrogen oxides (NOx), Hydrocarbons

11. Toxicological Information

Likely Routes of Exposure: Inhalation
Skin Contact
Eye Contact

Health Effects and Symptoms

Acute: Contact with heated material can cause thermal burns., Causes a slipping hazard if spilled., Vapors released from thermal decomposition may cause eye irritation with symptoms of burning and tearing, as well as respiratory tract irritation.

Toxicity Data for: TEXIN 985 000000

In the event of material decomposition due to exceeding the decomposition temperature of this product, release of MDI may occur.

Acute Inhalation:
The following effects reflect the potential health hazards associated with overexposure to MDI. Diisocyanate vapors or mist at concentrations above the TLV or PEL 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 or PEL with similar symptoms as well as asthma attack or asthma-like symptoms. Exposure well above the TLV or PEL may lead to bronchitis, bronchial spasm and pulmonary edema (fluid in lungs). Chemical or hypersensitivity pneumonitis, with flu-like symptoms (e.g., fever, chills), has also been reported. These symptoms can be delayed up to several hours after exposure. These effects are usually reversible.

Chronic Inhalation:
As a result of previous repeated overexposures or a single large dose, certain individuals may develop sensitization to diisocyanates (asthma or asthma-like symptoms) that may cause them to react to a later exposure to diisocyanates at levels well below the TLV or PEL. 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. Extreme asthmatic reactions can be life threatening. 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. Sensitization can be permanent. Chronic overexposure to diisocyanates has also been reported to cause lung damage (including fibrosis, decrease in lung function) that may be permanent.

Carcinogenicity:

No carcinogenic substances as defined by IARC, NTP and/or OSHA

12. Ecological Information

Ecological Data for: TEXIN 985 000000

No data available for this product.

13. Disposal Considerations

Waste Disposal Method
Waste disposal should be in accordance with existing federal, state and local environmental control laws.

14. Transportation Information

Land transport (DOT)
Non-Regulated

Sea transport (IMDG)
Non-Regulated

Air transport (ICAO/IATA)
Non-Regulated

15. Regulatory Information

United States Federal Regulations
US. Toxic Substances Control Act: Listed on the TSCA Inventory.

No substances are subject to TSCA 12(b) export notification requirements.

US. EPA CERCLA Hazardous Substances (40 CFR 302) Components:
None

SARA Section 311/312 Hazard Categories:
Non-hazardous under Section 311/312

US. EPA Emergency Planning and Community Right-To-Know Act (EPCRA) SARA Title III Section 302 Extremely Hazardous Substance (40 CFR 355, Appendix A) Components:
None

US. EPA Emergency Planning and Community Right-To-Know Act (EPCRA) SARA Title III Section 313 Toxic Chemicals (40 CFR 372.65) - Supplier Notification Required Components:
None

US. EPA Resource Conservation and Recovery Act (RCRA) Composite List of Hazardous Wastes and Appendix VIII Hazardous Constituents (40 CFR 261):
Under RCRA, it is the responsibility of the person who generates a solid waste, as defined in 40 CFR 261.2, to determine if that waste is a hazardous waste.

State Right-To-Know Information

The following chemicals are specifically listed by individual states; other product specific health and safety data in other sections of the SDS may also be applicable for state requirements. For details on your regulatory requirements you should contact the appropriate agency in your state.

Massachusetts, New Jersey or Pennsylvania Right to Know Substance Lists:

Weight percent	Components	CAS-No.
>=1%	Polyurethane Polyether Elastomer	9018-04-6

California Prop. 65:
To the best of our knowledge, this product does not contain any of the listed chemicals, which the state of California has found to cause cancer, birth defects or other reproductive harm.

Based on information provided by our suppliers, this product is considered "DRC Conflict Free" as defined by the SEC Conflict Minerals Final Rule (Release No. 34-67716; File No. S7-40-10; Date: 2012-08-22).

16. Other Information

The method of hazard communication for Covestro LLC is comprised of Product Labels and Safety Data Sheets.

Contact:	Product Safety Department
Telephone:	(412) 413-2835
SDS Number:	112000022660
Version Date:	08/28/2015
SDS Version:	2.0

This information is furnished without warranty, express or implied. This information is believed to be accurate to the best knowledge of Covestro LLC. The information in this SDS relates only to the specific material designated herein. Covestro LLC assumes no legal responsibility for use of or reliance upon the information in this SDS.

|| Changes since the last version are highlighted in the margin. This version replaces all previous versions.

ATTACHMENT E
Calculations

CALCULATIONS - PHASE 1

Phase I of the project consists of de-bottlenecking the storage and packaging sections of the process. This will be done by optimizing the pellet transfer system and changing the configuration of the packaging system to reduce packaging time.

The product is a solid and hence, only particulate emissions are emitted from the storage and packaging sections. Since the blower sizes will not increase it is anticipated that this project will not impact particulate emissions. The pellets are constantly recycled though out the system 24 hours per day. Hence, the emissions are dependent on the air handling equipment and not the amount of product flowing through the system. Since the air handling will not increase the emissions will remain unchanged.

CALCULATIONS - PHASE 2

Emissions Baseline

In 2008 Covestro (formerly Bayer) submitted an application for a HAP Synthetic Minor that was subsequently approved by the WVDEP. In that submittal Emissions from Line #1 were calculated and are summarized in the table below. These emissions comprise emissions from the Line #1 extruder plus the associated process equipment (run tanks, hold tanks, etc) Since the associated equipment is shared among the 3 extruders, the emissions have been proportioned among the extruders based on production capacities to represent the total emissions from Line #1. Please Note: The emissions listed do not include emissions from storage tanks, which will be handled separately (See Phase 3 Calculations)

CURRENT ORGANIC EMISSIONS

	lb/hr	lb/yr	TPY
4,4-MDI	0.0105	92.0	0.046
VOCs	0.0267	234.0	0.117
Ethylene Glycol	0.000365	3.2	0.0016
TOTAL HAPS	**0.01087**	**95.2**	**0.0476**
TOTAL VOCs	**0.0376**	**329.2**	**0.1646**

Emissions After Project

Phase 2 of the project will replace the Line #1 extruder with a larger one which will increase the capacity from approximately [redacted]. The organic emissions would increase proportionally.

PROPOSED ORGANIC EMISSIONS

	lb/hr	lb/yr	TPY
4,4-MDI	0.02268	197.8	0.099
VOCs	0.0574	503.1	0.252
Ethylene Glycol	0.000785	6.9	0.00344
TOTAL HAPS	**0.02337**	**204.7**	**0.10234**
TOTAL VOCs	**0.0808**	**707.8**	**0.35389**

Change in Emissions

NET INCREASE IN ORGANIC EMISSIONS

	lb/hr	lb/yr	TPY
4,4-MDI	0.01208	105.8	0.053
VOCs	0.03072	269.1	0.135
Ethylene Glycol	0.00042	3.7	0.00184
TOTAL HAPS	**0.01250**	**109.5**	**0.0547**
TOTAL VOCs	**0.0432**	**378.6**	**0.1893**

CALCULATIONS - PHASE 3

Currently the Resin is stored in a 20,000 gallon storage tank. In order to support the increased production capacity the storage will be shifted to an 80,000 gallon storage tank that is equipped for railcar deliveries. The calculations were performed using Tanks 4.09d. A copy of the output is included in the section.

Emissions Baseline

CURRENT ORGANIC EMISSIONS

	lb/hr	lb/yr	TPY
VOCs	0.0035	31	0.0156
TOTAL HAPS	**0**	**0**	**0**
TOTAL VOCs	**0.0035**	**31**	**0.0156**

Emissions After Project

PROPOSED ORGANIC EMISSIONS

	lb/hr	lb/yr	TPY
VOCs	0.0046	40	0.02
TOTAL HAPS	**0**	**0**	**0**
TOTAL VOCs	**0.0046**	**40**	**0.02**

Change in Emissions

NET INCREASE IN ORGANIC EMISSIONS

	lb/hr	lb/yr	TPY
VOCs	0.011	9	0.0044
TOTAL HAPS	**0**	**0**	**0**
TOTAL VOCs	**0.011**	**9**	**0.0044**

TOTAL CHANGE IN EMISSIONS

The tables below represent the emission changes from the current baseline.

NET INCREASE IN VOC EMISSIONS

	lb/hr	lb/yr	TPY
Phase 1	0	0	0
Phase 2	0.0432	378.6	0.1893
Phase 3	**0.011**	**9**	**0.0044**
TOTAL VOCs	**0.0542**	**387.6**	**0.1937**

NET INCREASE IN HAP EMISSIONS

	lb/hr	lb/yr	TPY
Phase 1	0	0	0
Phase 2	**0.01250**	**109.5**	**0.0547**
Phase 3	**0**	**0**	**0**
TOTAL HAPs	**0.01250**	**109.5**	**0.0547**

This is less than the limits listed in 45 CSR 13.2.17 -

VOCs - < 6 lb/hr, <144 lb/day and < 10 TPY

HAPs - < 2 lb/hr and <5 TPY

As such no Reg 13 permit is required and the Permit Determination Form is the proper paperwork to be filed.

SUGGESTED CHANGES IN TITLE V PERMIT

Covestro is suggesting changing the emission factor listed in Table 8.4.5 to 0.029 lb HAPS/unit produced for Line #1.

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	Polymeg 25K
City:	
State:	
Company:	
Type of Tank:	Vertical Fixed Roof Tank
Description:	

Tank Dimensions

Shell Height (ft):		32.50
Diameter (ft):		11.50
Liquid Height (ft) :		32.50
Avg. Liquid Height (ft):		16.00
Volume (gallons):		25,252.37
Turnovers:		[redacted]
Net Throughput(gal/yr):		[redacted]
Is Tank Heated (y/n):	Y	

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

Roof Characteristics

Type:	Dome	
Height (ft)		2.00
Radius (ft) (Dome Roof)		11.50

Breather Vent Settings

Vacuum Settings (psig):	0.00
Pressure Settings (psig)	0.00

Meterological Data used in Emissions Calculations: Pittsburgh, Pennsylvania (Avg Atmospheric Pressure = 14.11 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

Polymeg 25K - Vertical Fixed Roof Tank

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Polymeg 1000	All	120.00	120.00	120.00	120.00	0.0016	0.0016	0.0016	1,000.0000			1,000.00	

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

Polymeg 25K - Vertical Fixed Roof Tank

Annual Emission Calcaulations	
Standing Losses (lb):	0.0000
Vapor Space Volume (cu ft):	1,821.8947
Vapor Density (lb/cu ft):	0.0003
Vapor Space Expansion Factor:	0.0000
Vented Vapor Saturation Factor:	0.9985
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	1,821.8947
Tank Diameter (ft):	11.5000
Vapor Space Outage (ft):	17.5403
Tank Shell Height (ft):	32.5000
Average Liquid Height (ft):	16.0000
Roof Outage (ft):	1.0403
Roof Outage (Dome Roof)	
Roof Outage (ft):	1.0403
Dome Radius (ft):	11.5000
Shell Radius (ft):	5.7500
Vapor Density	
Vapor Density (lb/cu ft):	0.0003
Vapor Molecular Weight (lb/lb-mole):	1,000.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0016
Daily Avg. Liquid Surface Temp. (deg. R):	579.6700
Daily Average Ambient Temp. (deg. F):	50.3083
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	579.6700
Tank Paint Solar Absorptance (Shell):	0.1700
Tank Paint Solar Absorptance (Roof):	0.1700
Daily Total Solar Insulation Factor (Btu/sqft day):	1,202.9556
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0000
Daily Vapor Temperature Range (deg. R):	0.0000
Daily Vapor Pressure Range (psia):	0.0000
Breather Vent Press. Setting Range(psia):	0.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0016
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0016
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0016
Daily Avg. Liquid Surface Temp. (deg R):	579.6700
Daily Min. Liquid Surface Temp. (deg R):	579.6700
Daily Max. Liquid Surface Temp. (deg R):	579.6700
Daily Ambient Temp. Range (deg. R):	19.1500
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9985
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0016
Vapor Space Outage (ft):	17.5403
Working Losses (lb):	31.0406
Vapor Molecular Weight (lb/lb-mole):	1,000.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0016
Annual Net Throughput (gal/yr.):	[redacted]
Annual Turnovers:	
Turnover Factor:	
Maximum Liquid Volume (gal):	25,252.3686
Maximum Liquid Height (ft):	32.5000

Tank Diameter (ft):	11.5000
Working Loss Product Factor:	1.0000

Total Losses (lb):	31.0406

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

Polymeg 25K - Vertical Fixed Roof Tank

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Polymeg 1000	31.04	0.00	31.04

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	Polymeg 80K
City:	
State:	
Company:	
Type of Tank:	Vertical Fixed Roof Tank
Description:	

Tank Dimensions

Shell Height (ft):	30.00
Diameter (ft):	22.00
Liquid Height (ft) :	30.00
Avg. Liquid Height (ft):	15.00
Volume (gallons):	85,307.99
Turnovers:	[redacted]
Net Throughput(gal/yr):	[redacted]
Is Tank Heated (y/n):	Y

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

Roof Characteristics

Type:	Dome
Height (ft)	2.00
Radius (ft) (Dome Roof)	22.00

Breather Vent Settings

Vacuum Settings (psig):	0.00
Pressure Settings (psig)	0.00

Meterological Data used in Emissions Calculations: Pittsburgh, Pennsylvania (Avg Atmospheric Pressure = 14.11 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

Polymeg 80K - Vertical Fixed Roof Tank

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Polymeg 1000	All	120.00	120.00	120.00	120.00	0.0016	0.0016	0.0016	1,000.0000			1,000.00	

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

Polymeg 80K - Vertical Fixed Roof Tank

Annual Emission Calcaulations	
Standing Losses (lb):	0.0000
Vapor Space Volume (cu ft):	6,086.3122
Vapor Density (lb/cu ft):	0.0003
Vapor Space Expansion Factor:	0.0000
Vented Vapor Saturation Factor:	0.9986
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	6,086.3122
Tank Diameter (ft):	22.0000
Vapor Space Outage (ft):	16.0110
Tank Shell Height (ft):	30.0000
Average Liquid Height (ft):	15.0000
Roof Outage (ft):	1.0110
Roof Outage (Dome Roof)	
Roof Outage (ft):	1.0110
Dome Radius (ft):	22.0000
Shell Radius (ft):	11.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0003
Vapor Molecular Weight (lb/lb-mole):	1,000.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0016
Daily Avg. Liquid Surface Temp. (deg. R):	579.6700
Daily Average Ambient Temp. (deg. F):	50.3083
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	579.6700
Tank Paint Solar Absorptance (Shell):	0.1700
Tank Paint Solar Absorptance (Roof):	0.1700
Daily Total Solar Insulation Factor (Btu/sqft day):	1,202.9556
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0000
Daily Vapor Temperature Range (deg. R):	0.0000
Daily Vapor Pressure Range (psia):	0.0000
Breather Vent Press. Setting Range(psia):	0.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0016
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0016
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0016
Daily Avg. Liquid Surface Temp. (deg R):	579.6700
Daily Min. Liquid Surface Temp. (deg R):	579.6700
Daily Max. Liquid Surface Temp. (deg R):	579.6700
Daily Ambient Temp. Range (deg. R):	19.1500
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9986
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0016
Vapor Space Outage (ft):	16.0110
Working Losses (lb):	39.3181
Vapor Molecular Weight (lb/lb-mole):	1,000.0000

Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0016
Annual Net Throughput (gal/yr.):	[redacted]
Annual Turnovers:	
Turnover Factor:	
Maximum Liquid Volume (gal):	85,307.9870
Maximum Liquid Height (ft):	30.0000
Tank Diameter (ft):	22.0000
Working Loss Product Factor:	1.0000

Total Losses (lb):	39.3181

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

Polymeg 80K - Vertical Fixed Roof Tank

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Polymeg 1000	39.32	0.00	39.32