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**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME
(NICNAS)**

FULL PUBLIC REPORT

Alkylamine initiated, alkylene oxide polymer

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Director

Chemicals Notification and Assessment

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FULL PUBLIC REPORT

Alkylamine initiated, alkylene oxide polymer

1. APPLICANT AND NOTIFICATION DETAILS

APPLICANT(S)

Dow Chemical (Australia) Limited (ABN 72 000 264 979)

Kororoit Creek Road

Altona Victoria 3018

NOTIFICATION CATEGORY

Limited: Polymer with NAMW ≥ 1000 (more than 1 tonne per year)

EXEMPT INFORMATION (SECTION 75 OF THE ACT)

Data items and details claimed exempt from publication:

Chemical identity;

Impurities;

Spectral data;

Exact import volume;

Specific use

VARIATION OF DATA REQUIREMENTS (SECTION 24 OF THE ACT)

No variation to the schedule of data requirements is claimed.

PREVIOUS NOTIFICATION IN AUSTRALIA BY APPLICANT(S)

None

NOTIFICATION IN OTHER COUNTRIES

USA and Canada

2. IDENTITY OF CHEMICAL

OTHER NAME(S)

XUS 94815.00 Experimental Polyol

MARKETING NAME(S)

Alkylamine initiated, alkylene oxide polymer

3. COMPOSITION

DEGREE OF PURITY

High

DEGRADATION PRODUCTS

Polymer fragments, carbon monoxide and carbon dioxide at elevated temperature.

LOSS OF MONOMERS, OTHER REACTANTS, ADDITIVES, IMPURITIES

None

4. INTRODUCTION AND USE INFORMATION

MODE OF INTRODUCTION OF NOTIFIED CHEMICAL (100%) OVER NEXT 5 YEARS

The notified polymer will not be manufactured in Australia. It will be imported neat and subsequently formulated into a new polyol blend within the notifier's site. The formulated polyol will be sold to foam manufacturers for the manufacture of polyurethane parts. The moulded polyurethane parts will contain 5-10% notified polymer.

MAXIMUM INTRODUCTION VOLUME OF NOTIFIED CHEMICAL (100%) OVER NEXT 5 YEARS

<i>Year</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>
<i>Tonnes</i>	<1000	<1000	<1000	<1000	<1000

USE

The notified polymer will be used as a component of a polyol formulation for the manufacture of polyurethane foam, either slabstock or moulded components principally for the furniture, bedding and automotive markets.

5. PROCESS AND RELEASE INFORMATION

5.1. Distribution, Transport and Storage

PORT OF ENTRY

Melbourne, VIC

IDENTITY OF MANUFACTURER/RECIPIENTS

Dow Chemical (Australia) Limited
Kororoit Creek Road
Altona Victoria 3018

TRANSPORTATION AND PACKAGING

The notified polymer will be imported neat in 205 L drums or 1000 L mini bulk containers. Prior to distribution, the notified polymer will be formulated into a new polyol blend at the notifier's site. The formulated polyol will be distributed by road to polyurethane foam manufacturers Australia wide in 205 L drums or in a bulk tanker (approx 20,000 kg).

5.2. Operation Description

The imported polyol is first formulated with other components to produce one part of a system for the manufacture of polyurethane foam. The 1000 L mini bulk containers of the notified polymer are unloaded via pump or gravity feed to a blending vessel together with other additives and blended to form the required polyol formulation. Alternatively, the contents of the drums are transferred to a blending vat using a pipe inserted into the bung hole of the drum. A batch size of 20 tonne is anticipated. Prior to drumming off, a small proportion of the formulated polyol containing the notified polymer is periodically sampled by running small quantity into a drum, turning off the sample valve and collecting the residual product in the pipeline in sample jars for quality testing. The polyol formulation is drummed off into 205 L drums or is pumped into a bulk tanker (approx 20,000 kg) for transport to polyurethane foam manufacturers.

At the foam manufacturers site, the formulated polyol is decanted to a tank connected to the foam-manufacturing machine. The isocyanate component of the system is fed to a mixer together with the polyol blend and the reaction product is moulded as required. The polyol is consumed in the reaction.

5.3. Occupational Exposure

Number and Category of Workers

<i>Category of Worker</i>	<i>Number</i>	<i>Exposure Duration</i>	<i>Exposure Frequency</i>
Polyol formulation workers	1	max 2 hours/day	Max 150 days per year
QC testing	1	0.5 hours/day	Max 150 days per year
Foam manufacturing workers	2-4	1 hour/day	Max 150 days per year
Transport and storage	1-2	2 hours/day	Max 20 days per year

Exposure Details

Formulation of polyol

Exposure to residues on equipment and minor spills during polyol formulation is mainly dermal. Some exposure to wash water from spills, and from cleaning of scrubbers and equipment may be expected. Protective clothing, chemical goggles and gloves are normally worn by blending personnel. Any aerosols are removed by local exhaust ventilation, scrubbers and vented to the atmosphere.

QC testing is carried out in a laboratory and staff normally wears laboratory coats, gloves and eye protection during testing.

Manufacture of polyurethane foam

At the foam manufacturers site the polyol will be transferred to a tank attached to the foam moulding equipment. The polyol is consumed in the reaction and workers would not be exposed during machine cleaning and maintenance. Again some spillage and residues in lines and drums offer potential dermal exposure. Exposure to workers is expected to be low due to the reduced level of polymer in the polyol blend. Similar PPE applies to that recommended in the formulation of polyol.

5.4. Release

RELEASE OF CHEMICAL AT FORMULATION SITES

Environmental release is unlikely during importation, storage and transportation, and spillage during a transport accident the most likely reason for environmental release. Individual container capacity (mainly 205 L drums) and container specifications would limit the extent of release.

Release from the reformulation facilities is anticipated to be limited given the concentration of the substance in the formulation, and engineering controls on emissions. Residues in lines at the polyol blending site (30-40 kg/batch) would either be recycled or removed by a waste disposal company for incineration or landfill. Any spills would be contained within existing bunding and removed by a waste disposal company to landfill. Oversize drums are kept on site to contain any leaking drums and any materials used in clean up (rags etc.) would be incinerated. Residues in drums (1 kg per 210 kg drum) would also be removed by a waste disposal company for incineration or landfill. Potentially contaminated washwater from spill clean-up, scrubbers and equipment cleaning would be discharged into a site wastewater treatment plant, estimated at approximately 400 kg per batch. After treatment, water is discharged to the sewer as industrial wastewater. Since the compound is not volatile, release to the air is only possible by formation of an aerosol. As all blending operations are contained, release of this nature is only likely to occur during the batching or drumming procedures. Smoke tests and air velocity measurements reveal the adjustable fume hoods at the manufacturing site to be quite efficient. Scrubbers would remove some of this material, left-over airborne material would be exhausted to the atmosphere, where it is expected to either become substantially diluted or fall to ground in low concentrations around the plant.

RELEASE OF CHEMICAL FROM USE

Polyurethane manufacturers will blend the formulation containing the notified polymer with other components into a range of polyurethane foam products at their facilities. Release from the reformulation facilities is anticipated to be limited given the much lower concentration of the notified polymer in the formulation mixture and engineering controls on emissions. The formulated polyol will be reacted with an isocyanate to form polyurethane. The polyol will completely react with the isocyanate by crosslinking, leaving no residual material. Substantial losses to the environment from the reaction or end product are not anticipated. Residues in drums (0.2 kg per 210 kg drum), spills absorbed with sand and spills due to transfer (3-4 kg per batch), would be collected by a waste disposal company for incineration or landfill. Residues in lines would either be recycled or removed

by a waste disposal company for incineration or landfill

5.5. Disposal

Residues in drums, contaminated sand from clean up and residues from transfer will be recycled or collected by a waste disposal company for incineration or landfill. The notifier indicates that the preferred waste management option for unused, uncontaminated, unformulated, or not otherwise altered material is to send to an approved recycler, reclaimer or incinerator. The formulation has a shelf life of 6 months from date of manufacture. The notifier recommends the same waste management options for used or contaminated material, although additional evaluation of these parameters is required.

Wastewater from spills, scrubbers and cleaning will be treated on-site. The notified polymer will partition mainly to the sludge which will be disposed of by landfill. The wastewater is discharged to sewer and subsequently treated by filtration and aeration at a sewerage treatment plant. The notifier recommends that any disposal of contaminated packagings and washings must be in accordance with State, Territory and/or local government regulations. After a container has been cleaned and labelling has been removed, empty containers can be sent for recycling or disposal. The notifier recommends that if an emptied container is to be reconditioned, the reconditioning company should be made aware of the nature of the original content

The majority of polyurethane foam wastes containing the notified polymer will be sent to landfill for disposal.

5.6. Public exposure

Exposure to the public during transport, storage, reformulation and manufacture of polyurethane is expected to be low, except in the event of an accidental spill.

Public exposure will occur from dermal contact with damaged articles with exposed polyurethane foam. However, the notified polymer will be crosslinked in the matrix and will not be bioavailable.

6. PHYSICAL AND CHEMICAL PROPERTIES

Appearance at 20°C and 101.3 kPa		Colourless to light straw liquid
Boiling Point		Not determined
Density		1030 kg/m ³ at 20°C
Remarks	Test report not provided.	
Vapour Pressure		Not determined
Remarks	Based on the polymer structure and quaternary form at environmental pH, the polymer is not likely to be volatile.	
Water Solubility		29.1 g/L at 20 °C (pH range 4.82-6.45) 47.4±0.9 g/L at 11 °C Miscible in water >650 g/L at pH 1 (20 °C) 49.0±0.5 g/L at pH 7 (20 °C) 48.1.0±0.4 g/L at pH 10 (20 °C)
METHOD	OECD TG 105 Water Solubility (Shake-flask).	
Remarks	Analytical Method: Size exclusion chromatography. Initial concentration of substance 50 g/L. Mixed continually for 72 hours at 30 °C before equilibrating for 24 hours at 20 °C. In a second test, the substance was mixed at 30 °C for 134 hours and then equilibrated at 11 °C for 7.5 hours. Additional tests were performed at pH 1, 7, and 10 (at 20 °C).	
CONCLUSION	Highly soluble in water, and the degree of solubility is dependent upon both temperature and pH.	

TEST FACILITY Environmental Chemistry Research Laboratory (2002a).

Hydrolysis as a Function of pH Not determined

Remarks No hydrolysable groups present.

Partition Coefficient (n-octanol/water) Not determined

METHOD OECD TG 107 Partition Coefficient (n-octanol/water) Shake flask Method.

Remarks The results of the tests performed indicated that the OECD Method was not suitable for determining the Log Pow of this material. The polymer structure, along with its foaming behaviour in aqueous solutions indicates that the material may contain surface-active properties. Octanol:water mixtures containing 69 g/L of the substance in the octanol phase exhibited a thin white film of the material at the interface of the two phases. The notified polymer has a much higher affinity for octanol than water (48 g/L at pH 10) as the material is essentially miscible with octanol (solubility >692 g/L).

Log Pow was estimated using the ACD Laboratory Log D Suite (v 4.56) software (ACD, 2000) based on structural fragments, and includes corrections for inter- and intra-molecular bonding interactions which can affect the log Pow of large molecules. The predicted value of log Pow is 7.55 ± 1.02 for the unprotonated species existing at pH >11. Using the same software, the predicted log Pow at pH 7.0 is 5.12. Based on measured and predicted properties, the material is expected to concentrate at the interfaces of hydrophobic substituents in the aquatic environment.

TEST FACILITY Environmental Chemistry Research Laboratory (2002b).

Surface Tension Not determined

Remarks Considered a surface active substance based on polymer structure and foaming behaviour in aqueous solutions during solubility and Log P_{ow} tests (Environmental Chemistry Research Laboratory, 2002a & b).

Adsorption/Desorption Not determined

Remarks The notified polymer will adhere to mineral particles of soils and sediments.

Dissociation Constant pKa for amino groups = 5.6 to 9.3

METHOD Estimated using ACD Labs Log D Suite software (ACD, 2000).
Remarks Test report not provided.

Viscosity 1080 mPa.s at 25°C

Remarks Test report not provided.

Flash Point >200°C

Remarks Test report not provided.

Flammability Limits Not determined

Remarks The MSDS states that the polyol is combustible liquid.

Reactivity

Remarks Stable under normal use conditions.

7. TOXICOLOGICAL INVESTIGATIONS

Acute oral toxicity and acute dermal irritation studies were submitted for the notified polymer. These studies are presented below.

<i>Endpoint and Result</i>	<i>Assessment Conclusion</i>
Rat, acute oral LD50 >2000 mg/kg bw	low toxicity
Rabbit, skin irritation	slightly irritating

7.1. Acute toxicity – oral

TEST SUBSTANCE	Notified polymer.
METHOD	OECD TG 423 Acute Oral Toxicity – Acute Toxic Class Method. EC Directive 92/69/EEC B.1 Acute Toxicity (Oral) – Limit Test.
Species/Strain	Rat/Fisher 344
Vehicle	None.

RESULTS

<i>Group</i>	<i>Number and Sex of Animals</i>	<i>Dose mg/kg bw</i>	<i>Mortality</i>
1	3/sex	2000	0
LD50	>2000 mg/kg bw		
Signs of Toxicity	Non-specific observation such as soft stool.		
Effects in Organs	Foci on the thymus in each female and a herniated diaphragm in one male, all judged to be non-specific.		

CONCLUSION The notified polymer is of low toxicity via the oral route.

TEST FACILITY Springborn Laboratories (2002a).

7.2. Irritation – skin

TEST SUBSTANCE	Notified polymer
METHOD	OECD TG 404 Acute Dermal Irritation/Corrosion. EC Directive 92/69/EEC B.4 Acute Toxicity (Skin Irritation).
Species/Strain	Rabbit/New Zealand White
Number of Animals	3 males
Vehicle	None
Observation Period	72 hours
Type of Dressing	Semi-occlusive
Remarks - Method	No significant protocol deviations.

RESULTS

<i>Lesion</i>	<i>Mean Score* Animal No.</i>			<i>Maximum Value</i>	<i>Maximum Duration of Any Effect</i>	<i>Maximum Value at End of Observation Period</i>
	1	2	3			
<i>Erythema/Eschar</i>	0.33	0.66	0.66	1	48	0
<i>Oedema</i>	0	0	0	0	0	0

*Calculated on the basis of the scores at 24, 48, and 72 hours for EACH animal.

Remarks - Results Very slight erythema was seen in all animals at the 1 and 24 hour observations and persisted up to 48 hours in 2 animals. Treated skin sites of all animals appeared normal at the 72-hour observation.

CONCLUSION The notified polymer is slightly irritating to skin.

TEST FACILITY SafePharm Laboratories (2001a)

8. ENVIRONMENT

8.1. Environmental fate

8.1.1. Ready biodegradability

TEST SUBSTANCE Notified polymer

METHOD OECD TG 301 F Ready Biodegradability: Manometric Respirometry Test.
Inoculum Activated sludge from municipal plant
Exposure Period 28 days
Auxiliary Solvent None
Analytical Monitoring Gas phase monitoring of O₂ and CO₂ by Columbus MicroOxymax[®] respirometer system (calibrated before and after). Dissolved organic carbon (DOC) measured in aqueous samples using Shimadzu Model TOC-V analyser with ASI-V autosampler. Nitrite and nitrate in filtered reaction solutions analysed using a Dionex Model DX-120 ion chromatograph.
Remarks - Method Incubated in dark at 22±1 °C at a concentration of 38 mg/L, stirred at 150 rpm over the 28 d test period. Toxicity control was benzoate. Biologically inhibited control was mercuric chloride (HgCl₂).

RESULTS

<i>Test substance</i>		<i>Toxicity Control Benzoate</i>		<i>Positive Control Mercuric chloride</i>	
<i>Day</i>	<i>% degradation</i>	<i>Day</i>	<i>% degradation</i>	<i>Day</i>	<i>% degradation</i>
10	0	10	81	10	52.8
28	0	28	84.9	28	56.1

Remarks - Results The test material did not inhibit the ability of the microbial inoculum to biodegrade benzoate. The O₂ consumption and CO₂ production observed in the reaction mixtures containing the test material was solely due to biological activity.

CONCLUSION Not readily biodegradable under the test conditions.

TEST FACILITY Environmental Chemistry Research Laboratory (2002c).

8.1.2. Bioaccumulation

REMARKS Log Pow could not be determined experimentally for the notified polymer due to surface activity. It was estimated using the ACD Laboratory Log D Suite (v 4.56) software (ACD, 2000) with the predicted log Pow at pH 7.0 of 5.12. However, because of the high molecular weight of the notified polymer, it is not expected to bioaccumulate in aquatic organisms.

8.2. Ecotoxicological investigations

8.2.1. Acute toxicity to fish

TEST SUBSTANCE Notified polymer

METHOD OECD TG 203 Fish, Acute Toxicity Test - Flow through conditions.
Species Rainbow trout *Orcorhynchus mykiss*
Exposure Period 96 h
Auxiliary Solvent None

Water Hardness	55-60 mg CaCO ₃ /L
Analytical Monitoring	Only nominal concentrations were recorded. Dissolved oxygen, pH, temperature were monitored at 0, 24, 48, 72 and 96 h.
Remarks – Method	Fish 14-day acclimation. No feeding 48 h prior to test or during test. Food analysed for pesticides, PCBs and toxic metals, with none detected. Fish mean wet weight 0.47 g (range 0.34-0.72 g) and mean length 37 mm (range 34-42 mm). Test conditions: pH 7.3. 180 µmhos/cm. 12-13±1 °C. Photoperiod 8 h dark 16 h light. Dissolved oxygen 8.6-10.2 mg/L.

RESULTS

Concentration mg/L		Number of Fish	Mortality				
Nominal	Actual		0 h	24 h	48 h	72 h	96 h
0	0	20	0	0	0	0	0
13	Not analysed	20	0	0	0	0	0
22	Not analysed	20	0	0	0	0	0
36	Not analysed	20	0	0	0	0	0
60	Not analysed	20	0	0	0	0	0
100	Not analysed	20	0	0	0	0	0

LC50	>100 mg/L at 96 hours.
NOEC	100 mg/L at 96 hours.

CONCLUSION Practically non-toxic to fish

TEST FACILITY Springborn Laboratories (2002b)

8.2.2. Acute toxicity to aquatic invertebrates

TEST SUBSTANCE Notified polymer

METHOD OECD TG 202 *Daphnia* sp. Acute Immobilisation Test and Reproduction Test - static and EC Directive 92/69/EEC C.2 Acute Toxicity for *Daphnia* - static.

Species *Daphnia magna*

Exposure Period 48 hours

Auxiliary Solvent None

Water Hardness 250 mg/L as CaCO₃

Remarks - Method Ist instar *Daphnia*. Test conditions: 21 °C, Photoperiod 16 h light: 8 h dark. pH 7.9-8.0. Dissolved oxygen 8.2-8.5 mg/L. EC50 calculated using ToxCalc v. 5.0.23C (probit method) (Finney, 1971).

RESULTS

Concentration mg/L		Number of <i>D. magna</i>	Number Immobilised	
Nominal	Actual		24 h	48 h
0	Not analysed	2 replicates of 10	0	0
1.0	Not analysed	2 replicates of 10	0	0
1.8	Not analysed	2 replicates of 10	0	0
3.2	Not analysed	2 replicates of 10	0	0
5.6	Not analysed	2 replicates of 10	0	0
10	Not analysed	2 replicates of 10	0	4
18	Not analysed	2 replicates of 10	0	14
32	Not analysed	2 replicates of 10	0	18
56	Not analysed	2 replicates of 10	3	20
100	Not analysed	2 replicates of 10	13	20

EC50 (immobilisation) 86 mg/L (95% CI 72-100 mg/L) at 24 hours

15 mg/L (95% CI 13-18 mg/L) at 48 hours

NOEC 5.6 mg/L at 48 hours

Remarks - Results The range finding test indicated 24-48 h EC50 in the range 10-100 mg/L. Microscopic examination of test daphnids throughout the definitive study showed no undissolved test material adhering to the antennae or thoracic appendages, indicating physical effects are unlikely to be a factor in the observed toxicity in the test.

CONCLUSION Toxic to aquatic crustaceans (water fleas *Daphnia magna*).

TEST FACILITY SafePharm Laboratories (2001b)

8.2.3. Chronic toxicity to aquatic invertebrates

TEST SUBSTANCE Notified polymer

METHOD OECD TG 211 *Daphnia magna* Reproduction Test (3 day renewal).
Species *Daphnia magna*
Exposure Period 21 days
Auxiliary Solvent None.
Water Hardness 256-313 mg CaCO₃/L
Analytical Monitoring None for notified polymer.
Remarks – Method *Daphnia* fed during study. Control/Test Conditions: Dissolved oxygen 8.1-8.8 mg O₂/L, pH 7.8-8.1, temperature 21 °C.

RESULTS

Concentration mg/L		No. of live young		No. of Dead Young		No. of Unhatched eggs	
Nominal	% Survival of P ₁	Total	Per female (cumulative)	Total	Per female (cumulative)	Total	Per female (cumulative)
0	100	1002	100	0	0	0	0
1.0	100	1012	101	0	0	0	0

LOEC >1.0 mg/L after 21 days
NOEC 1.0 mg/L after 21 days
Remarks - Results Validation criteria were met during the test.

CONCLUSION Reproductive toxicity unable to be quantified on the basis of the single test concentration used.

TEST FACILITY SafePharm Laboratories (2001c).

8.2.4. Inhibition of microbial activity

No data provided. In a study of ready biodegradability (Environmental Research Laboratory, 2002c), the notified polymer did not inhibit the ability of the microbial inoculum to biodegrade benzoate.

9. RISK ASSESSMENT

9.1. Environment

9.1.1. Environment – exposure assessment

During formulation and use, the notified polymer is unlikely to be released to the environment in significant quantities. Most of these releases should end up in landfill where it should be immobile when bound in a polymer matrix, but persistent due to its low ready biodegradability. Some wastes may be discharged to on-site wastewater treatment plants (WWTP) and/or sewage treatment plant (STP). Using a sewage treatment model and wastewater discharge estimates, treated STP effluent (discharge to one STP only) is unlikely to contain >0.2 µg/L of the notified polymer. This model estimate assumes no on-site treatment by WWTP or partitioning to sludge in WWTP or public STP (but assumes dilution based on total effluent volume), which are likely to have a significant influence on removal of the notified polymer from the aqueous phase.

9.1.2. Environment – effects assessment

The results of ecotoxicological data indicate that the notified polymer is potentially harmful to aquatic organisms. The most sensitive species with measured data was *Daphnia magna*, where the 48 h EC50 was 15 mg/L and the NOEC at 48 hours was 5.6 mg/L. A predicted no effect concentration (PNEC) of 0.015 mg/L (15 µg/L) has been derived by dividing the lowest available EC50 by a safety factor of 1000 (ANZECC/ARMCANZ, 2000). A value of 1000 was used due to the small quantity of data available (ie. no algal test), and due to the small amount of test data available, the PNEC is considered of low reliability.

9.1.3. Environment – risk characterisation

Much of the wastes generated during formulation and use will be incinerated leading to air emissions of oxides of carbon. The notified polymer in landfilled wastes should be immobile when bound in a polymer matrix and pose a low risk to the environment. In landfill, the notified polymer is expected to associate with co-associated wastes and soil and slowly degraded through biotic and abiotic processes to water and oxides of carbon. Comparing exposure and effects data, the calculated aquatic PEC/PNEC ratio for freshwater ecosystems following STP effluent discharge is <0.01 (0.2/15). This value is less than 1, indicating no immediate concern for the aquatic organisms. The aquatic risk is likely to be very low with the proposed on-site wastewater treatment and expected partitioning to sludge during WWTP and STP treatments.

9.2. Human health

9.2.1. Occupational health and safety – exposure assessment

Formulation of polyol

Since the manufacture of the polyol is largely enclosed and automated, limited dermal exposure to the notified polymer may occur when connecting and disconnecting pump lines, drumming off formulated polyol and during maintenance of equipment. Drips and spills during blending will be collected into drums before being disposed of by licensed disposal contractors. Personal protective equipment (PPE) includes protective clothing, chemical goggles and impermeable gloves. Local exhaust ventilation and scrubbers are in place during the formulation process.

Exposure to laboratory staff is limited because of the small amount of notified polymer handled, and the use of protective equipment, such as laboratory coat, gloves and eye protection during testing.

Manufacture of polyurethane parts

The manufacture of polyurethane parts is fully automated. Exposure to the notified polymer is limited to dermal contact when connecting and disconnecting the transfer lines to the foam-manufacture machine. Workers will wear protective clothing, chemical safety goggles and gloves commensurate with the risk of working with isocyanates. In the case of flexible slabstock foamers, workers will wear protective clothing, gloves and safety glasses. Where exposure to TDI is possible, self-contained breathing protection or organic respirators will be used. Local exhaust ventilation is also in place during polyurethane manufacture.

Transport and storage workers are unlikely to be exposed to the notified polymer except in the event of an accident.

9.2.2. Public health – exposure assessment

It is expected that during transport, storage, reformulation and polyurethane manufacture, exposure of the general public to the notified polymer will be low, except in the event of an accidental spill.

Public exposure to the notified polymer will occur from dermal contact with finished polyurethane articles. Finished polyurethane articles will contain <10% of the notified polymer, and this will be crosslinked in the polyurethane matrix.

9.2.3. Human health - effects assessment

The notified polymer has low acute oral toxicity and is a slight skin irritant, based on the limited toxicity data provided. The Material Safety Data Sheet (MSDS) also states that the notified

polymer may cause slight transient eye irritation.

The notified polymer has high molecular weight and contains very low levels of hazardous impurities and residual monomers. Therefore, the notified polymer is not determined to be a hazardous substance according to the NOHSC *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 1999).

9.2.4. Occupational health and safety – risk characterisation

Overall, the risk of adverse effects arising from exposure to the notified polymer is low due to largely enclosed and automated operations, in the manufacture of polyol and polyurethane foams. However, due to the slight skin irritation and possible temporary eye irritation effects, dermal and ocular exposure should be avoided when handling the notified polymer.

The limited contact to the notified polymer during polyol formulation and polyurethane manufacture, the presence of adequate ventilation in the workplace and the use of recommended PPE would ensure that occupational risk posed by the notified polymer is low when used as specified in the notification.

9.2.5. Public health – risk characterisation

Public exposure to the notified polymer will arise from dermal contact with finished polyurethane as a result of damaged articles with exposed polyurethane foam. The notified polymer will react into the final polyurethane chemical matrix, therefore unlikely to be bioavailable. Consequently the risk from public exposure to the notified polymer throughout all phases of its life cycle is considered to be low.

10. CONCLUSIONS – ASSESSMENT LEVEL OF CONCERN FOR THE ENVIRONMENT AND HUMANS

10.1. Hazard classification

Based on the available data the notified polymer is not classified as hazardous under the NOHSC *Approved Criteria for Classifying Hazardous Substances*.

As a comparison only, the classification of notified polymer using the Globally Harmonised System for the Classification and Labelling of Chemicals (GHS) (United Nations, 2003) is presented below. This system is not mandated in Australia and carries no legal status but is presented for information purposes.

Provisional Hazard Category Chronic 3

Symbol: No symbol used

Signal word: No signal word

Hazard statement: Harmful to aquatic life with long lasting effects

Note: No algal test result is available which may affect the above classification, as these are likely to be most sensitive taxa.

10.2. Environmental risk assessment

On the basis of the PEC/PNEC ratios for aquatic and terrestrial environments and use pattern, the notified polymer is unlikely to pose an unacceptable risk to the environment.

10.3. Human health risk assessment

10.3.1. Occupational health and safety

There is Low Concern to occupational health and safety under the conditions of the occupational settings described.

10.3.2. Public health

There is Negligible Concern to public health when the notified polymer is used in the manufacture of polyurethane foam.

11. MATERIAL SAFETY DATA SHEET

11.1. Material Safety Data Sheet

The MSDS of the notified polymer provided by the notifier was in accordance with the NOHSC *National Code of Practice for the Preparation of Material Safety Data Sheets* (NOHSC, 1994a). It is published here as a matter of public record. The accuracy of the information on the MSDS remains the responsibility of the applicant.

11.2. Label

The label for the notified polymer provided by the notifier was in accordance with the NOHSC *National Code of Practice for the Labelling of Workplace Substances* (NOHSC, 1994b). The accuracy of the information on the label remains the responsibility of the applicant.

12. RECOMMENDATIONS

CONTROL MEASURES

Occupational Health and Safety

- Employers should implement the following engineering controls to minimise occupational exposure to the notified polymer:
 - Exhaust ventilation during mixing, drumming off formulated polyol and transfer of polyurethane into moulding machines
 - Enclosed and automated polyol formulation and manufacture of polyurethane foams
- Employers should implement the following safe work practices to minimise occupational exposure during handling of the notified polymer:
 - During transfer operations and cleaning of equipment, avoid spills and splashing
- Employers should ensure that the following personal protective equipment is used by workers to minimise occupational exposure to the notified polymer:
 - Chemical resistant gloves
 - Protective clothing which protects the body, arms and legs
 - Safety glasses

Guidance in selection of personal protective equipment can be obtained from Australian, Australian/New Zealand or other approved standards.

- A copy of the MSDS should be easily accessible to employees.
- If products and mixtures containing the notified polymer are classified as hazardous to health in accordance with the NOHSC *Approved Criteria for Classifying Hazardous Substances*, workplace practices and control procedures consistent with provisions of State and Territory hazardous substances legislation must be in operation.

Environment

Disposal

- The notified polymer should be disposed of as special waste in compliance with local and state regulations as recommended in the Material Safety Data Sheet (MSDS) and product label.

Emergency procedures

- Spills/releases of the notified polymer should be contained by soaking up with inert

adsorbent material and disposed of as special waste in compliance with local and state regulations as recommended in the Material Safety Data Sheet (MSDS). Use detergents in cleaning up. Do not allow product into any sewers, drains, on the ground or into any body of water.

12.1. Secondary notification

The Director of Chemicals Notification and Assessment must be notified in writing within 28 days by the notifier, other importer or manufacturer:

- (1) Under Section 64(1) of the Act; if
 - proposed use for which greater release to the aquatic environment are expected, test reports and results for an algal test, as well as for vapour pressure and hydrolysis as a function of pH, should be provided
- or
- (2) Under Section 64(2) of the Act:
 - if any of the circumstances listed in the subsection arise.

The Director will then decide whether secondary notification is required.

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