

File No: LTD/1405

May 2009

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

FULL PUBLIC REPORT

Suprasec 2535

This Assessment has been compiled in accordance with the provisions of the *Industrial Chemicals (Notification and Assessment) Act 1989* (Cwlth) (the Act) and Regulations. This legislation is an Act of the Commonwealth of Australia. The National Industrial Chemicals Notification and Assessment Scheme (NICNAS) is administered by the Department of Health and Ageing, and conducts the risk assessment for public health and occupational health and safety. The assessment of environmental risk is conducted by the Department of the Environment, Water, Heritage and the Arts.

For the purposes of subsection 78(1) of the Act, this Full Public Report may be inspected at our NICNAS office by appointment only at 334-336 Illawarra Road, Marrickville NSW 2204.

This Full Public Report is also available for viewing and downloading from the NICNAS website or available on request, free of charge, by contacting NICNAS. For requests and enquiries please contact the NICNAS Administration Coordinator at:

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**Director
NICNAS**

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FULL PUBLIC REPORT**Suprsec 2535****1. APPLICANT AND NOTIFICATION DETAILS**

APPLICANT(S)

Huntsman Polyurethanes (Australia) Pty Ltd (ABN 40 090 446 165)
Gate 3, Ballarat Rd
Deer Park, VIC, 3023

NOTIFICATION CATEGORY

Limited: Synthetic polymer with $M_n \geq 1000$ Da.

EXEMPT INFORMATION (SECTION 75 OF THE ACT)

Data items and details claimed exempt from publication: chemical name, other names, CAS number, molecular and structural formulae, spectral data, means of identification, purity, molecular weight, charge density, polymer constituents, residual monomers and impurities, import volume and details of use.

VARIATION OF DATA REQUIREMENTS (SECTION 24 OF THE ACT)

Variation to the schedule of data requirements is claimed as follows: melting point, boiling point, density, vapour pressure, water solubility, hydrolysis as a function of pH, partition coefficient, adsorption/desorption, dissociation constant, particle size, flash point, flammability limits, autoignition temperature and explosive properties.

PREVIOUS NOTIFICATION IN AUSTRALIA BY APPLICANT(S)

None

NOTIFICATION IN OTHER COUNTRIES

None

2. IDENTITY OF CHEMICAL

MARKETING NAME(S)

Suprsec 2535

MOLECULAR WEIGHT

$M_n > 10000$ Da

ANALYTICAL DATA

Reference IR and GPC spectra were provided.

3. COMPOSITION

DEGREE OF PURITY $\geq 70\%$

HAZARDOUS IMPURITIES/RESIDUAL MONOMERS

The notified polymer contains residual isocyanate monomer (crude MDI) that is greater than the cut off for classification.

NON HAZARDOUS IMPURITIES/RESIDUAL MONOMERS (>1% by weight) None

ADDITIVES/ADJUVANTS None

LOSS OF MONOMERS, OTHER REACTANTS, ADDITIVES, IMPURITIES

The notified polymer is in liquid form and potentially all of the residual monomer content ($\leq 30\%$) is available for release.

DEGRADATION PRODUCTS

Stable under normal conditions of use.

4. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE AT 20°C AND 101.3 kPa: Brown liquid

Property	Value	Data Source/Justification
Melting Point/Freezing Point	Not determined	The notified polymer is a liquid at room temperature.
Boiling Point	Not determined	Decomposes at temperatures $> 300^\circ\text{C}$
Density	1100 kg/m^3	MSDS
Vapour Pressure	$< 1.3 \times 10^{-9} \text{ kPa}$	Estimated based on the NAMW $> 1,000 \text{ Da}$ (US EPA, 2007)
Water Solubility	Not determined	The notified polymer contains functional groups that are expected to react with water to form a cross-linked and insoluble mass
Hydrolysis as a Function of pH	Not determined	The notified polymer contains functional groups that are expected to react with water
Partition Coefficient (n-octanol/water)	Not determined	The notified polymer contains functional groups that are expected to react with water
Adsorption/Desorption	Not determined	The notified polymer contains functional groups that are expected to react with water forming a crosslinked mass which is expected to be relatively immobile in soil
Dissociation Constant	Not determined	The notified polymer contains functional groups that are expected to react with water
Flash Point	230°C	MSDS
Flammability	Not determined	Based on its flash point, the notified polymer would be expected to have limited flammability.
Autoignition Temperature	$> 600^\circ\text{C}$	MSDS
Explosive Properties	Not expected to be explosive	The structural formula contains no explosives.

DISCUSSION OF PROPERTIES

For full details of tests on physical and chemical properties, refer to Appendix A.

Reactivity

The polymer can react with water and may undergo cross-linking at temperatures $> 50^\circ\text{C}$.

5. 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 under the marketing name Suprasec 2535 and subsequently reformulated at the notifier's site.

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>	10-100	10-100	10-100	10-100	10-100

PORT OF ENTRY

Melbourne

IDENTITY OF MANUFACTURER/RECIPIENTS

Huntsman Polyurethanes (Australia) Pty Ltd

Gate 3, Ballarat Rd

Deer Park VIC 3023

TRANSPORTATION AND PACKAGING

Due to the residual monomer the product containing the notified polymer is classified as 6.1 Toxic Substances according to the Australian Dangerous Goods Code (NTC, 2007). Therefore the products will be packaged and transported according to Dangerous Goods requirements. The notified polymer will be imported neat in 205 L drums or 1000 L mini bulk containers. Prior to distribution to customers, the notified polymer will be reformulated into a blend at the notifier's site. The reformulated product, containing 5-10% of the notified polymer will be distributed by road to polyurethane foam manufacturers Australia wide in 205 L drums or by bulk tanker (approx 20,000 kg).

USE

The notified polymer will be used in polyurethane foam manufacture.

OPERATION DESCRIPTION

The notified polymer will not be manufactured within Australia. The neat imported product will be reformulated (5-10% notified polymer) with other components to produce one part of a system for the manufacture of polyurethane foam. The 1000 L mini bulk containers will be unloaded via pump or gravity feed into a 10,000 L blending vessel. The contents of the drums will be transferred via piping to the blending vessel. Prior to drumming off, a small proportion of the formulated product containing the notified polymer will be 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 reformulated product, containing 5 - 10% of the notified polymer will be drummed off into 205 L drums or pumped into a bulk tanker (approx 20,000 kg) for transport to polyurethane foam manufacturers for the production of polyurethane parts.

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

6. HUMAN HEALTH IMPLICATIONS**6.1 Exposure assessment****6.1.1 Occupational exposure**

NUMBER AND CATEGORY OF WORKERS

<i>Category of Worker</i>	<i>Number</i>	<i>Exposure Duration (hours/day)</i>	<i>Exposure Frequency (days/year)</i>
Product formulation workers	4	2 hours/day	150 days per year
QC Testing	2	1.5 hours/day	150 days per year
Foam manufacturing workers	10	1 hours/day	150 days per year
Transport and storage	2	2 hours/day	50 days per year

EXPOSURE DETAILS

Transport & Warehousing

Potential for dermal and ocular exposure to workers during transport and warehousing will be limited to the event of an accident involving breach of imported containers.

Reformulation

Workers may experience accidental dermal and ocular exposure to the notified polymer from spills, drips and splashes when connecting and disconnecting pump lines, drumming off formulated isocyanate and during maintenance of equipment or when taking samples for quality control analysis. However, the transfer of the notified polymer from import containers to the blending vessel and the transfer of the notified polymer from the blending vessel to product containers is expected to occur via sealed pipes using automated controls. Reformulation workers are expected to wear impervious gloves, protective clothing and safety goggles to minimise dermal and ocular exposure. Inhalation exposure is expected to be limited by general and local exhaust ventilation.

Foam Manufacture

The manufacture of polyurethane foam containing the notified polymer will be automated. Exposure to the notified polymer (5-10%) will be limited to dermal contact when connecting and disconnecting the transfer lines to the foam-manufacture machine. Workers will wear protective clothing, safety goggles and gloves commensurate with the risk of working with isocyanates. Where exposure to MDI is possible, self-contained breathing protection or organic respirators will be used. Local exhaust ventilation will be used during polyurethane foam manufacture.

Workers will also be exposed to foam products containing the notified polymer. However, the notified polymer will be bound in an inert polyurethane matrix and will not be bioavailable.

6.1.2. Public exposure

The products containing the notified polymer will not be sold to the public. Therefore the public will only be exposed to the notified polymer in the event of accidental spill during transportation. The public will come into contact with the foam containing the notified polymer (5-10%). However, since the notified polymer will not be bioavailable, as it will be bound in an inert polyurethane matrix.

6.2. Human health effects assessment

No toxicological data were submitted for the notified polymer. In the absence of toxicological data on the notified polymer, the known hazards of isocyanates have been considered (ASCC).

Toxicokinetics, metabolism and distribution.

The notified polymer is not expected to be absorbed across biological membranes, based on the high molecular weight (> 10,000 Da).

Irritation and Sensitisation.

Isocyanates are known to be hazardous to human health. The main hazards posed by isocyanates include respiratory sensitisation in the form of asthma, as well as decreased respiratory function with the possibility of interstitial fibrosis and pulmonary oedema (Tillman, 2007). The UK Employment Medical Advisory Service believes polymeric isocyanate aerosols are capable of causing respiratory sensitisation similar to monomer vapours (ASCC). Isocyanates may also cause respiratory sensitisation by skin contact (US EPA, 2002).

Other adverse health effects of isocyanates may include skin and eye irritation, and skin sensitisation from repeated or prolonged exposure (Kirk-Othmer, 1995). Although the potential for these effects is likely to be reduced due to the high molecular weight of the notified polymer these effects cannot be ruled out.

Health hazard classification

Based on the presence of unreacted isocyanate groups, the notified polymer is classified as hazardous according to *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 2004) with the following risk phrase:

Xn: R42 May cause sensitisation by inhalation.

6.3. Human health risk characterisation

6.3.1. Occupational health and safety

Dermal and ocular exposure to the notified polymer by workers may occur during reformulation and foam manufacture. The level of exposure during foam manufacture will be reduced due to the lower concentrations

(5-10%) of the notified polymer. Based on the known effects of isocyanates the potential for skin sensitisation as well as skin and eye irritation cannot be ruled out. The notifier has classified the imported product (which contains up to 30% residual isocyanate monomer as an impurity) as hazardous with the potential to cause sensitisation by inhalation and skin contact as well as the potential for irritation to the eyes, respiratory system and skin as well as being harmful by inhalation. As such, good hygiene practices should be maintained and exposure to the skin and eyes minimised by the use of impervious gloves, safety glasses and protective clothing. Employers should also ensure workers who are likely to handle the notified polymer are made aware of all the potential hazards via inhalation, dermal and ocular exposure.

Occupational exposure to the notified polymer may occur via inhalation of aerosols generated during reformulation and foam manufacture processes. Inhalation of aerosols containing the notified polymer may cause respiratory sensitisation in some workers. The short term exposure limit (STEL) of 0.07 mg/m³ and long term time-weighted-average (TWA) exposure limit of 0.02 mg/m³ is set for the airborne concentration of all isocyanates in the workplace [NOHSC: 1003(1995)]. Therefore, as a minimum, employers should ensure adequate local exhaust ventilation is in place and provide organic vapour respirators to minimise inhalation exposure to aerosols of the notified polymer and excess isocyanate monomers.

Given the risk of causing skin and respiratory sensitisation, and skin and eye irritation, the risk to workers is likely to only be acceptable when used under highly controlled conditions, and with the appropriate PPE.

6.3.2. Public health

Members of the public will only be exposed to foam containing the notified polymer (5-10%). However, the notified polymer will not be bioavailable, as it will be bound in an inert polyurethane matrix. Therefore, the risk to public health is considered to be low, due to the expected negligible exposure.

7. ENVIRONMENTAL IMPLICATIONS

7.1. Environmental Exposure & Fate Assessment

7.1.1 Environmental Exposure

RELEASE OF CHEMICAL AT SITE

The notified polymer will be imported into Australia as a liquid concentrate in 205 L drums or 1000 L mini bulk containers. Environmental release is unlikely during importation, storage and transportation, and spillage during a transport accident will be the most likely reason for environmental release.

Releases from the reformulation facilities are anticipated to be limited given the use of enclosed and automated systems. Residues in lines at the product blending site (up to 0.2%) will either be recycled or be disposed of to landfill. Any spills will be contained within existing bunding and removed for landfill disposal. Residues in drums (approximately 0.5%) will also be removed for landfill disposal. Potentially contaminated washwater from spill clean-up, scrubbers and equipment cleaning will be discharged into a site wastewater treatment plant, estimated to contain approximately 0.2% of the imported notified polymer. After on-site treatment, water will be discharged to the sewer as industrial wastewater. The isocyanate functionality in the notified polymer would be expected to react with water, forming water-insoluble cross-linked polymer masses, which will partition to the solid fraction in the on-site treatment plant. These solids will be removed and disposed of to landfill.

RELEASE OF CHEMICAL FROM USE

Polyurethane foam manufacturers will blend the formulation containing the notified polymer with other components into a range of polyurethane foam products at their facilities. Releases from the foam manufacturing facilities are anticipated to be limited given the use of fully automated systems. The notified polymer will be completely reacted and cross-linked within the foam as part of the manufacturing process. Wastes from residues in drums and spills will be disposed of to landfill. Significant losses to the environment from the manufacture of foam articles are not anticipated.

RELEASE OF CHEMICAL FROM DISPOSAL

Residues in drums, contaminated sand from clean up, and residues from transfer of liquids will be collected by a waste disposal company for landfill disposal.

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 to landfill. The wastewater is discharged to sewer and subsequently treated by filtration and aeration at a sewage treatment plant.

Most of the notified polymer will be incorporated into foam products and end up in landfill at the end of their useful lives.

7.1.2 Environmental fate

No environmental fate data were submitted. The major proportion of the imported quantity of the notified polymer will eventually be sent to landfill in the form of cross-linked masses present in foam articles. Leaching of the notified polymer in landfill is not expected given the high molecular weight and the irreversible combination of the notified polymer with other components of the foam. The notified polymer will not bioaccumulate based on its molecular weight and tendency to form high molecular weight cross-linked masses which will not be bioavailable. It will undergo slow degradation processes via biotic and abiotic pathways, eventually forming water and oxides of carbon and nitrogen.

7.1.3 Predicted Environmental Concentration (PEC)

The PEC was not calculated as very limited aquatic exposure is expected based on the reported use pattern.

7.2. Environmental effects assessment

No ecotoxicity data were submitted. The notified polymer will form an inert mass via crosslinking of isocyanate groups on exposure to water. Therefore, the notified polymer is not expected to be bio-available in the unlikely event that it is released to aquatic ecosystems.

7.2.1 Predicted No-Effect Concentration

As no suitable ecotoxicity data are available for the notified polymer, no PNEC can be calculated.

7.3. Environmental risk assessment

The Risk Quotient, Q ($= PEC/PNEC$), has not been calculated since neither a PEC nor a PNEC is available. The notified polymer contains functional groups that may be toxic to aquatic life, however, these would react with water (once encountered) forming inert cross-linked structures that would not be bioavailable. In addition, very limited release of the notified polymer to aquatic ecosystems is expected from the proposed use pattern.

Based on the reported use pattern and the tendency to cross-link, the notified polymer is not expected to pose a risk to the environment.

8. CONCLUSIONS AND REGULATORY OBLIGATIONS

Hazard classification

Based on the presence of unreacted isocyanate groups, the notified polymer is classified as hazardous according to *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 2004) with the following risk phrase:

Xn; R42 May cause sensitisation by inhalation.

and

Due to the lack of toxicological data the classification of the notified polymer using the Globally Harmonised System for the Classification and Labelling of Chemicals (GHS) (United Nations 2003) was not carried out.

Human health risk assessment

Under the conditions of the occupational settings described, the notified polymer is not considered to pose an unacceptable risk to the health of workers.

When used in the proposed manner, the notified polymer is not considered to pose an unacceptable risk to public health.

Environmental risk assessment

On the basis of the reported use pattern, the notified polymer is not considered to pose a risk to the environment.

Recommendations

REGULATORY CONTROLS

Hazard Classification and Labelling

- Use the following risk phrases for products/mixtures containing the notified chemical:
 - Conc \geq 1%: R42
- The following safety phrases should appear on the MSDS and label for the notified polymer:
 - S23 Do not breathe vapour or spray
 - S45 In case of accident or if you feel unwell seek medical advice immediately (and show the label where possible)

Exposure Standard

- A short term exposure limit (STEL) of 0.07 mg/m³ and long term time-weighted-average (TWA) exposure limit of 0.02 mg/m³ applies for the airborne concentration of all isocyanates in the workplace (NOHSC, 1995).

Health Surveillance

- As the notified polymer is a respiratory sensitiser, employers should carry out health surveillance for any worker who has been identified in the workplace risk assessment as having a significant risk of asthma.

CONTROL MEASURES

Occupational Health and Safety

- Employers should ensure that the facilities are equipped such that operations involving the notified polymer are performed in a highly controlled manner. The following isolation and engineering controls should be in place to minimise occupational exposure to the notified polymer:
 - Automated processes
 - Local exhaust ventilation
 - Sealed equipment
- Employers should implement the following safe work practices to minimise occupational exposure during handling of the notified polymer:
 - Avoid inhalation of vapours, mists and aerosols
 - Avoid contact with skin and eyes
 - Clean spills immediately, taking care to avoid inhalation
- Employers should ensure that the following personal protective equipment is used by workers to minimise occupational exposure to the notified polymer as introduced:
 - Organic vapour respirator (as needed)
 - Gloves, overalls and goggles or face-shield

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 chemical are classified as hazardous to health in accordance with the *Approved Criteria for Classifying Hazardous Substances* [NOHSC:1008(2004)]

workplace practices and control procedures consistent with provisions of State and Territory hazardous substances legislation must be in operation.

Disposal

- The notified chemical should be disposed of to landfill.

Storage

- The following precautions should be taken regarding storage of the notified chemical:
 - Due to the presence of $\leq 30\%$ low molecular weight residual isocyanate species present in the notified polymer the notified polymer will be classified under Australian Dangerous Goods Code (FORS, 1998) as Class 6.1. Thus, the products should be stored according to Dangerous Goods requirements.
 - Containers should be kept closed and stored indoors in a dry, well-ventilated area at temperatures below 50°C.

Emergency procedures

- Spills or accidental release of the notified chemical should be handled by physical containment, collection and subsequent safe disposal.

Regulatory Obligations

Secondary Notification

This risk assessment is based on the information available at the time of notification. The Director may call for the reassessment of the chemical under secondary notification provisions based on changes in certain circumstances. Under Section 64 of the *Industrial Chemicals (Notification and Assessment) Act (1989)* the notifier, as well as any other importer or manufacturer of the notified chemical, have post-assessment regulatory obligations to notify NICNAS when any of these circumstances change. These obligations apply even when the notified chemical is listed on the Australian Inventory of Chemical Substances (AICS).

Therefore, the Director of NICNAS must be notified in writing within 28 days by the notifier, other importer or manufacturer:

- (1) Under Section 64(1) of the Act; if
 - the polymer has a number-average molecular weight of less than 1000.
- or
- (2) Under Section 64(2) of the Act; if
 - the function or use of the chemical has changed from polyurethane foam manufacture, or is likely to change significantly;
 - the amount of chemical being introduced has increased from 100 tonnes, or is likely to increase, significantly;
 - the chemical has begun to be manufactured in Australia;
 - additional information has become available to the person as to an adverse effect of the chemical on occupational health and safety, public health, or the environment.

The Director will then decide whether a reassessment (i.e. a secondary notification and assessment) is required.

Material Safety Data Sheet

The MSDS of the notified chemical provided by the notifier was reviewed by NICNAS. The accuracy of the information on the MSDS remains the responsibility of the applicant.

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