File No: LTD/1765

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NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME (NICNAS)

PUBLIC REPORT

Polymer in CONATHANE® DPEG-30581 Part A Urethane Prepolymer

This Assessment has been compiled in accordance with the provisions of the *Industrial Chemicals (Notification and Assessment) Act 1989* (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 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.

For the purposes of subsection 78(1) of the Act, this Public Report may be inspected at our NICNAS office by appointment only at Level 7, 260 Elizabeth Street, Surry Hills NSW 2010.

This 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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SUMMARY

The following details will be published in the NICNAS *Chemical Gazette:*

ASSESSMENT REFERENCE	APPLICANT(S)	CHEMICAL OR TRADE NAME	HAZARDOUS CHEMICAL	INTRODUCTION VOLUME	USE
LTD/1765	Cytec Australia Holdings Pty Ltd	Polymer in CONATHANE® DPEG-30581 Part A Urethane Prepolymer	Yes	≤ 100 tonnes per annum	Component of a two-part polyurethane system used for cable protection/insulation

CONCLUSIONS AND REGULATORY OBLIGATIONS

Hazard classification
As no toxicity data were provided, the notified polymer cannot be classified according to the *Globally Harmonised System for the Classification and Labelling of Chemicals* (GHS), as adopted for industrial chemicals in Australia.

Based on the available information, the notified polymer is recommended for hazard classification according to the *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 2004) with the following risk phrase:

R42: May cause sensitisation by inhalation

Human health risk assessment
Provided that the recommended controls are being adhered to, under the conditions of the occupational setting, the notified polymer is not considered to pose an unreasonable risk to the health of workers.

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

Environmental risk assessment
Based on its expected low hazard and assessed use pattern, the notified polymer is not considered to pose an unreasonable risk to the environment.

Recommendations

REGULATORY CONTROLS

Hazard Classification and Labelling

- The notified polymer should be classified as follows:
  - R42: May cause sensitisation by inhalation

  The above should be used for products/mixtures containing the notified polymer, if applicable, based on the concentration of the notified polymer present and the intended use/exposure scenario.

- Due to the sensitisation properties of the notified polymer, the notifier should consider their obligations under the Australian Dangerous Goods Code.

Health Surveillance

- As the notified polymer is a skin/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 sensitisation.

CONTROL MEASURES

Occupational Health and Safety

- A person conducting a business or undertaking at a workplace should implement the following engineering controls to minimise occupational exposure to the notified polymer as introduced:
  - Enclose and automated systems
  - Local and general exhaust ventilation

- A person conducting a business or undertaking at a workplace should implement the following safe work practices to minimise occupational exposure during handling of the notified polymer as introduced:
  - Avoid skin and eye contact during operations
  - Clean any spills promptly and appropriately

- A person conducting a business or undertaking at a workplace should ensure that the following personal protective equipment is used by workers to minimise occupational exposure to the notified polymer as introduced:
  - Coveralls
  - Safety goggles
  - Impervious gloves
  - Respirators

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

- A copy of the (M)SDS should be easily accessible to employees.

- If products and mixtures containing the notified polymer are classified as hazardous to health in accordance with the *Globally Harmonised System for the Classification and Labelling of Chemicals (GHS)* as adopted for industrial chemicals in Australia, workplace practices and control procedures consistent with provisions of State and Territory hazardous substances legislation should be in operation.

Disposal

- The notified polymer should be disposed of to landfill.

Storage

- The handling and storage of the notified polymer should be in accordance with the Safe Work Australia Code of Practice for *Managing Risks of Hazardous Chemicals in the Workplace* (SWA, 2012) or relevant State or Territory Code of Practice.

Emergency procedures

- Spills or accidental release of the notified polymer should be handled by containment, physical 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 polymer 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 polymer has changed from a component of a two-part polyurethane system used for cable protection/insulation, or is likely to change significantly;
- the amount of polymer being introduced has increased, or is likely to increase, significantly;
- the polymer has begun to be manufactured in Australia;
- additional information has become available to the person as to an adverse effect of the polymer 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 (M)SDS of the product containing the notified polymer provided by the notifier was reviewed by NICNAS. The accuracy of the information on the (M)SDS remains the responsibility of the applicant.

ASSESSMENT DETAILS

1. APPLICANT AND NOTIFICATION DETAILS

APPLICANT(S)
Cytec Australia Holdings Pty Ltd (ABN: 45 081 148 629)
Suite 1, Level 1, Norwest Quay, 21 Solent Circuit
Norwest Business Park
BAULKHAM HILLS NSW 2153

NOTIFICATION CATEGORY
Limited: Synthetic polymer with Mn ≥ 1,000 Da.

EXEMPT INFORMATION (SECTION 75 OF THE ACT)
Data items and details claimed exempt from publication: chemical name, CAS number, molecular and structural formulae, molecular weight, analytical data, polymer constituents, residual monomers, impurities, additives/adjuvants, use details and import volume.

VARIATION OF DATA REQUIREMENTS (SECTION 24 OF THE ACT)
Variation to the schedule of data requirements is claimed as follows: all physico-chemical endpoints.

PREVIOUS NOTIFICATION IN AUSTRALIA BY APPLICANT(S)
None

NOTIFICATION IN OTHER COUNTRIES
None

2. IDENTITY OF CHEMICAL

MARKETING NAME(S)
CONATHANE® DPEG-30581 Part A Urethane Prepolymer (product containing ≤ 30% notified polymer)

MOLECULAR WEIGHT
> 1,000 Da

ANALYTICAL DATA
Reference IR and HPSEC spectra were provided.

3. COMPOSITION

DEGREE OF PURITY
> 99%

4. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE AT 20 °C AND 101.3 kPa: clear amber viscous liquid (product containing ≤ 30% notified polymer)

Property	Value	Data Source/Justification
Melting Point/Freezing Point	Not determined	Estimated to be < 0 °C
Boiling Point*	> 37.8 °C	MSDS of the product
Density*	1,000 kg/m^3	MSDS of the product
Vapour Pressure	4.44×10^{-25} kPa at 25 °C	Calculated using US EPA MPBPVP (v1.43) (US PEA 2011a)
Water Solubility	Not determined	The notified polymer contains groups that readily react with water to form carbon dioxide and insoluble high molecular weight polymers
Hydrolysis as a Function of pH	Not determined	The notified polymer contains groups that readily react with water to form carbon dioxide and insoluble polymeric masses.

Partition Coefficient (n-octanol/water)	Not determined	Expected to react with water and octanol to form carbon dioxide and insoluble polymeric masses.
Adsorption/Desorption	Not determined	The notified polymer contains groups that readily react with water to form carbon dioxide and insoluble polymeric masses.
Dissociation Constant	Not determined	The notified polymer contains potentially dissociable functionalities. However, it is not expected to be significantly dissociated at the environmental pH range of 4 – 9.
Flash Point*	> 100 °C (closed cup)	MSDS of the product
Autoignition Temperature*	Not determined	Expected to be relatively high based on the flash point of the product.
Explosive Properties	Not determined	Contains no functional groups that would imply explosive properties
Oxidising Properties	Not determined	Contains no functional groups that would imply oxidative properties

* Properties of the product containing ≤ 30% notified polymer

DISCUSSION OF PROPERTIES

Reactivity
The notified polymer contains reactive isocyanate functional groups that readily react with water (or moisture in the air) to undergo cross-linking. The notified polymer also contains unsaturated double bonds and allyl groups which may have certain reactivity in the cross-linking processes.

Based on the (M)SDS provided for the product containing the notified polymer, decomposition of the product may generate hazardous carbon dioxide, oxides of nitrogen and isocyanate vapours.

Physical hazard classification
Based on the limited physico-chemical data depicted in the above table, the notified polymer cannot be considered for hazard classification according to the *Globally Harmonised System for the Classification and Labelling of Chemicals (GHS),* as adopted for industrial chemicals in Australia.

However, according to the (M)SDS provided for the product containing ≤ 30% notified polymer, the product is classified as C1 combustible liquid.

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 as a component of a formulation at a concentration ≤ 30%.

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

Year	*1*	*2*	*3*	*4*	*5*
Tonnes	≤ 100	≤ 100	≤ 100	≤ 100	≤ 100

PORT OF ENTRY
Sydney

TRANSPORTATION AND PACKAGING
The notified polymer will be imported as a component of a formulated product, CONATHANE® DPEG-30581 Part A Urethane Prepolymer, packed in 205 L drums. The product contains ≤ 30% notified polymer and is classified as Dangerous Goods Class 9, UN 3082 and C1 combustible liquid. The imported product will be transported and stored in accordance with Australian Dangerous Goods Code.

USE
The formulated product containing the notified polymer, CONATHANE® DPEG-30581 Part A Urethane Prepolymer, will be used for encapsulation of marine cables. The notified polymer is a component of a two part

polyurethane system used to form a protective/insulation layer between the inner metal core and the outer jacket of the cable.

OPERATION DESCRIPTION

The imported CONATHANE® DPEG-30581 Part A Urethane Prepolymer containing the notified polymer up to 30% in concentration will not be repackaged or reformulated. It will be used as a part of the two part polyurethane system for the manufacture of marine cables. The cable production lines use operations that are mostly enclosed and automated. The product containing the notified polymer will be pumped from the imported 205 L drum to a mixing head where the two parts of the polyurethane system will be mixed in a 1 to 1 ratio. The mixture containing the notified polymer at ≤ 15% concentration will then be coated onto the cable core in a continuous manner and rapidly cured. The curing process will be followed by a vulcanisation process to encase the cable with an outer jacket. The manufactured cables will then be collected onto spools and transported to end-use locations.

6. HUMAN HEALTH IMPLICATIONS

6.1. Exposure Assessment

6.1.1. Occupational Exposure

CATEGORY OF WORKERS

Category of Worker	*Exposure Duration (hours/day)*	*Exposure Frequency (days/year)*
Transport and storage	2-4	12
Cable manufacturing	8	300
Maintenance	8	300

EXPOSURE DETAILS

Transport and storage workers are not expected to be exposed to the notified polymer unless accidental release occurs. The notifier stated that workers will wear impervious gloves, coveralls, hard hat and safety boots when handling the product containing the notified polymer.

The imported CONATHANE® DPEG-30581 Part A Urethane Prepolymer, which contains ≤ 30% of the notified polymer, is a viscous liquid. Cable manufacturing and maintenance workers may come into contact with the notified polymer when handling the imported product, primarily during opening of drums and connecting / disconnecting the pumping equipment. The main routes of exposure are expected to be dermal and ocular. Based on the molecular weight and calculated vapour pressure, inhalation exposure of the notified polymer is unlikely unless aerosols of the notified polymer are formed during the applications. The notifier stated that cable manufacturing and maintenance workers will wear coveralls, goggles, impervious gloves and respirators during the operations. Local and general exhaust ventilation systems will also be used to minimise possible inhalation exposure.

Once the urethane prepolymer mixture containing the notified polymer at ≤ 15% concentration is cured after the cables are manufactured, the notified polymer is expected to be polymerised into the matrix of the cable insulation and will not be bioavailable for further exposure.

6.1.2. Public Exposure

The notified polymer will not be available for exposure to the public unless accidental release occurs during transport of the product containing uncured notified polymer.

6.2. Human Health Effects Assessment

No toxicity data were provided for the notified polymer. However, it is a polymer derived from MDI and contains reactive isocyanate/diisocyanate functional groups which are known to be hazardous. Diisocyanates are well known dermal and inhalation sensitisers in the workplace and have been documented to cause asthma, lung damage, and in severe cases, fatal reactions (US EPA 2011b). Apart from the concern for irritation and pulmonary toxicity (Barrett 1994, US EPA 2010, Kirk-Othmer 1995), isocyanates may also cause respiratory sensitisation by skin contact (US EPA, 2010).

As in the case of the notified polymer, polymeric isocyanates tend to be non-volatile and are therefore expected to be less of an inhalation hazard compared to non-polymeric isocyanates. However, aerosols of polymeric isocyanates may cause respiratory sensitisation similar to monomer vapours, and reports have shown that inhalation of relatively non-volatile isocyanates in the form of dusts and spray mists may cause adverse respiratory effects (HSIS, 2008).

Health hazard classification
As no toxicity data were provided, the notified polymer cannot be classified according to the *Globally Harmonised System for the Classification and Labelling of Chemicals* (GHS), as adopted for industrial chemicals in Australia.

The notified polymer contains isocyanate functional groups. According to the *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 2004), substances containing isocyanate functional groups should be classified as hazardous if there is no evidence to indicate that the substance does not cause respiratory hypersensitivity. Therefore, the following risk phrase should apply to the notified polymer:

R42: May cause sensitisation by inhalation

Although not considered in this assessment, it is acknowledgeable that, based on the MSDS provided, the imported CONATHANE® DPEG-30581 Part A Urethane Prepolymer, containing ≤ 30% notified polymer, carries the following risk phrases due to the presence of other hazardous ingredients:

R40 – limited evidence of a carcinogenic
R64 – May cause harm to breastfed babies
R66 – Repeated exposure may cause skin dryness or cracking
R36/37/38 – Irritating to eyes, respiratory system and skin
R42/43 – may cause sensitisation by inhalation and skin contact
R50/53 – Very toxic to aquatic organisms, may cause long-term adverse effects in aquatic environment

6.3. Human Health Risk Characterisation

6.3.1. Occupational Health and Safety
The notified polymer contains reactive isocyanate functional groups which are known to be hazardous and cause potential irritation and sensitisation to the skin and respiratory system. Control measures are required to mitigate possible adverse health effects to the workers who may come into contact with the notified polymer.

According to the MSDS of the product containing ≤ 30% notified polymer, the product is classified as hazardous and dangerous due to the presence of other ingredients. Control measures taken against these hazardous ingredients would also reduce the health risk of the notified polymer posed to the workers. The notifier states that cable manufacturing and maintenance workers will wear coveralls, goggles, impervious gloves and respirators during the operations. Local and general exhaust ventilation systems will also be used to minimise potential inhalation exposure.

Provided that control measures stated by the notifier are in place, the risk to the health of workers from the use of the notified polymer is not considered to be unreasonable.

6.3.2. Public Health
There will be no intentional exposure of products or articles containing the notified polymer to the public. Therefore, the notified polymer is not considered to pose an unreasonable risk to public health.

7. ENVIRONMENTAL IMPLICATIONS

7.1. Environmental Exposure & Fate Assessment

7.1.1. Environmental Exposure

RELEASE OF CHEMICAL AT SITE
The notified polymer will not be manufactured in Australia. Therefore, no release of the notified polymer to the environment is expected from this activity. If release does occur as a result of an accident during transport, it is expected to be contained, collected and disposed of to landfill.

RELEASE OF CHEMICAL FROM USE

The cable factory production lines use high technology operations which are mostly automated. The notified polymer will be pumped from the imported containers to the mixing tank where the two parts of the polyurethane are mixed. The mixed polyurethane is coated into cable core in a continuous manner and is rapidly cured and set. This is followed by continuous cured vulcanization process to encase the cable with the outer jacket. The cable coating process occurs within enclosed and automated machinery.

The notified polymer is expected to be applied to the marine seismic cables by professional operators. It is estimated that up to 2% of the total annual import volume of the notified polymer is expected to be released to the environment due to wastes from spills and leaks. The notified polymer in these wastes is expected to cure to an inert solid on exposure to ambient conditions and the cured mass will be disposed of to landfill.

RELEASE OF CHEMICAL FROM DISPOSAL

The majority of the notified polymer will be incorporated in a polymer matrix and bound to the surface of the cable after application. It is expected to share the fate of the cable and be disposed of to landfill. Residual notified polymer in empty import containers is expected to be cured into an inert solid matrix and be disposed of to landfill along with the empty containers.

7.1.2. Environmental Fate

No environmental fate data were submitted. The majority of the notified polymer is expected to be disposed of to landfill as cured waste, residues in empty containers, and coated articles at the end of their useful life. The notified polymer will be irreversibly cross-linked into a solid polymer matrix as part of its normal use pattern and is therefore not expected to be mobile, bioavailable or readily biodegradable in this form. The notified polymer is expected to eventually degrade biotically or abiotically in landfill into water and oxides of carbon and nitrogen.

7.1.3. Predicted Environmental Concentration (PEC)

The notified polymer rapidly reacts with moisture (water) to form insoluble, non-bioavailable, high molecular weight solids. A predicted environmental concentration (PEC) was not determined because the notified polymer is not expected to persist in the aquatic compartment due to its hydrolytic instability. The notified polymer is never isolated from cable coating products containing the notified polymer. Moreover, very limited aquatic exposure to the notified polymer or its hydrolysis products is expected when the notified polymer is used as proposed.

7.2. Environmental Effects Assessment

No ecotoxicological data were submitted. The notified polymer is not expected to persist in water due to its hydrolytic instability. In addition, the notified polymer, which is never isolated from the cables coatings, reacts with moisture (water) to form insoluble, non-bioavailable, high molecular weight solids. Therefore, the notified polymer is expected to be of low concern to the aquatic environment. The manufactured cables will be used for marine applications. However, the notified polymer will be present in a cured form and will not be available to be released into the marine environment. Furthermore, the outer layer of the cable will provide protection from direct contact with water to the cured notified polymer.

7.2.1. Predicted No-Effect Concentration

The predicted no-effect concentration (PNEC) for the notified polymer has not been calculated as no ecotoxicological data for the polymer were submitted and the notified polymer is expected to be of low concern to the aquatic environment.

7.3. Environmental Risk Assessment

The risk quotient (Q = PEC/PNEC) for the notified polymer has not been calculated as release to the aquatic environment is not expected based on its reported use pattern as a component of cable coating. The majority of the notified polymer will be disposed of to landfill as cured matrix. The notified polymer is irreversibly bound into a solid inert matrix, and is unlikely to be bioavailable or mobile in this form. Therefore, based on its expected low hazard and assessed use pattern, the notified polymer is not considered to pose an unreasonable risk to the environment.

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