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

PUBLIC REPORT

Polymer in PR 1592 BLK Part B

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 Sustainability, Environment, Water, Population and Communities.

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:

Street Address:	Level 7, 260 Elizabeth Street, SURRY HILLS NSW 2010, AUSTRALIA.
Postal Address:	GPO Box 58, SYDNEY NSW 2001, AUSTRALIA.
TEL:	+ 61 2 8577 8800
FAX	+ 61 2 8577 8888
Website:	www.nicnas.gov.au

**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/1652	PPG Industries Australia Pty Ltd	Polymer in PR 1592 BLK Part B	Yes	≤1 tonne per annum	Component of a two part sealant for the aerospace industry

CONCLUSIONS AND REGULATORY OBLIGATIONS

Hazard classification

Based on the presence of the isocyanate functional group in the notified polymer, the notified polymer is recommended for hazard classification according to the *Globally Harmonised System for the Classification and Labelling of Chemicals (GHS)*, as adopted for industrial chemicals in Australia. The recommended hazard classification is presented in the table below.

<i>Hazard classification</i>	<i>Hazard statement</i>
Respiratory Sensitisation (Category 1)	H334 – May cause allergy or asthma symptoms or breathing difficulties if inhaled

Based on the presence of the isocyanate functional group in the notified polymer, the notified polymer is recommended for hazard classification according to the Approved Criteria for Classifying Hazardous Substances (NOHSC, 2004) with the following risk phrase:

Xn; R42 May cause sensitisation by inhalation

Human health risk assessment

Provided the adequate controls are in place, under the conditions of the occupational settings described, 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 the 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:
 - Respiratory Sensitisation (Category 1): H334 – May cause allergy or asthma symptoms or breathing difficulties if inhaled
- The following should be used for products/mixtures containing the notified polymer:
 - Conc. ≥1%: H334

Health Surveillance

- As the notified polymer contains isocyanate functional groups, employers should carry out health surveillance for any worker who has been identified in the workplace risk assessment as having a

history of isocyanate sensitivity, asthma or other pulmonary condition and who may be adversely affected by isocyanate exposure.

CONTROL MEASURES

Occupational Health and Safety

- Employers should implement the following engineering controls to minimise occupational exposure to the notified polymer during handling and use:
 - Good general ventilation including exhaust ventilation if necessary
- Employers should implement the following safe work practices to minimise occupational exposure during handling and use of products containing the notified polymer:
 - Avoid inhalation of vapours
 - Avoid contact with skin and eyes
- Employers should ensure that the following personal protective equipment is used by workers to minimise occupational exposure to the notified polymer during use of the products containing the notified polymer:
 - Isocyanate resistant gloves
 - Coveralls
 - Safety glasses
 - Appropriate respiratory protection where inhalation exposure may occur

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

- Atmospheric monitoring should be conducted to measure workplace concentrations of isocyanates during use of products containing the notified polymer. Employers should ensure that the exposure standard for isocyanates [NOHSC: 1003(1995)] is not exceeded for all areas where the notified polymer will be handled.
- 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.

Emergency procedures

- Spills or accidental release of the notified polymer 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 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;
 - products containing the notified polymer are to be sprayed.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 sealant, or is likely to change significantly;
 - the amount of polymer being introduced has increased from 1 tonne per annum, 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)

PPG Industries Australia Pty Ltd (ABN 82 055 500 939)
McNaughton Road
Clayton VIC 3168

NOTIFICATION CATEGORY

Limited: Synthetic polymer with Mn \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, molecular weight, analytical data, degree of purity, 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)

Polymer in PR 1592 BLK Part B

MOLECULAR WEIGHT

>1,000 Da

ANALYTICAL DATA

Reference FTIR and GPC spectra were provided.

3. COMPOSITION

DEGREE OF PURITY >95%

HAZARDOUS IMPURITIES/RESIDUAL MONOMERS

One hazardous residual isocyanate monomer is present at a level above the concentration cut-off for classification. The residual monomer is present at a concentration of >1% and may result in carcinogenicity, acute inhalation toxicity and skin and respiratory sensitisation (HSIS classification: R40, R23, R42/43).

DEGRADATION PRODUCTS

The notified polymer is stable under normal conditions.

4. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE AT 20 °C AND 101.3 kPa: clear liquid

Property	Value	Data Source/Justification
Melting Point/Freezing Point	Not determined	Expected to be ~0°C
Boiling Point	>37.8°C	(M)SDS
Density	1060 kg/m ³ at 20°C	(M)SDS
Vapour Pressure	Not determined	Expected to be low based on molecular weight
Water Solubility	Not determined	Not tested due to the presence of end-groups that readily react with water to form carbon dioxide and insoluble high molecular weight polymers
Hydrolysis as a Function of pH	Not determined	Not tested due to the presence of end-groups that readily react with water to form carbon dioxide and insoluble high molecular weight polymers
Partition Coefficient (n-octanol/water)	Not determined	Expected to react with water and octanol to form carbon dioxide and insoluble high molecular weight polymers
Adsorption/Desorption	Not determined	Not tested due to hydrolytic instability. Reaction products are expected to associate in soil/sediment.
Dissociation Constant	Not determined	Contains no functional groups with the potential to dissociate at environmental pH
Flash Point	Not determined	Not expected to flash based on expected low vapour pressure
Flammability	Not determined	Not classified as flammable on (M)SDS
Autoignition Temperature	Not determined	Not expected to autoignite
Explosive Properties	Predicted negative	Contains no functional groups that would infer explosive properties
Oxidising Properties	Predicted negative	Contains no functional groups that would infer oxidising properties

DISCUSSION OF PROPERTIES

Reactivity

It is not practical to measure the physico-chemical properties of the notified polymer due to its reactivity with water.

The notified polymer is expected to remain stable until after mixing with the second component of the sealant product.

Physical hazard classification

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

5. INTRODUCTION AND USE INFORMATION

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

The notified polymer will be imported at 60-100% concentration.

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>	≤1	≤1	≤1	≤1	≤1

PORT OF ENTRY

Sydney, Melbourne, Brisbane and Perth.

IDENTITY OF RECIPIENT

PPG Industries Australia Pty Ltd

TRANSPORTATION AND PACKAGING

The notified polymer (60-100% concentration) will be imported in 20L containers and transported by road or rail.

USE

The notified polymer will be used as a component of one product of a two-part sealant system at 60-100% concentration. The product will be mixed in a 2:1 ratio with the second product and the final sealant (containing 40-67% notified chemical) will be used in the aerospace industry, to provide a protective coating to electronic components.

OPERATION DESCRIPTION

No manufacture or reformulation of the notified polymer will occur in Australia.

Repackaging

Lids will be removed from the import containers, and transfer of the notified polymer (60-100% concentration) to a hopper will be performed using either a drum pump or a drum lift (for the 20L containers). The sealant product containing the notified polymer will then be extruded into two-compartment plastic applicator tubes. The tube compartment containing the notified polymer will then be manually joined to the compartment containing the other part and placed within a Mylar foil bag (heat-sealed, nitrogen-filled and airtight). The tubes will then be packaged into cardboard boxes and may be stored on-site prior to distribution to customers.

Application

At the customer sites, prior to application of the sealant, the two parts of the sealant product will be injected and mixed within the plastic applicator. The final sealant (40-67% concentration) will be applied to aerospace components by using a ready-to-use nozzle system. The sealants may also be mixed and applied manually by pouring the sealant into various moulding or encapsulation systems or by using a spatula. Following application the equipment may be cleaned to remove any excess sealant.

6. HUMAN HEALTH IMPLICATIONS

6.1. Exposure Assessment

6.1.1. Occupational Exposure

CATEGORY OF WORKERS

<i>Category of Worker</i>	<i>Exposure Duration (hours/day)</i>	<i>Exposure Frequency (days/year)</i>
Transport	2-3	10-15
Application	6	260

EXPOSURE DETAILS

When repackaging the notified polymer into the two-compartment plastic applicator tubes workers may experience accidental dermal or ocular exposure (60-100% concentration). Significant exposure is expected to be limited by the mainly automated nature of the process and the use of appropriate personal protective equipment (PPE) such as coveralls, isocyanate resistant gloves and eye protection.

Exposure is expected to be low when using the nozzle system but dermal and ocular exposure to the notified polymer may occur when pouring or manually applying the sealant by spatula. Inhalation of vapours is likely to be low based on the high molecular weight of the notified polymer although inhalation exposure to low molecular weight impurities may occur. Exposure will be further minimised by the use of PPE (including coveralls, impermeable gloves, eye protection), and exhaust ventilation and respiratory equipment (when deemed necessary). Once cured, the notified polymer will be trapped in an inert polymer matrix and will be unavailable for exposure.

6.1.2. Public Exposure

The product containing the notified polymer (60-100% concentration) will not be available to the general public. Although unlikely, the public may be exposed to cured coatings (40-67% notified polymer). However, once cured, the notified polymer will be trapped in an inert polymer matrix and will be unavailable for exposure.

6.2. Human Health Effects Assessment

No toxicity data were submitted. The notified polymer is not expected to cross biological membranes to a significant extent, based on its high molecular weight ($M_n > 1000$ Da).

The notified polymer contains isocyanate functional groups that are of concern for irritation, dermal and respiratory sensitisation, and pulmonary toxicity (Barratt, 1994; Kirk-Othmer, 1995; NOHSC, 1990; US EPA 2010).

The US EPA specifies that structures with isocyanate equivalent weights of $\geq 5,000$ Da are not presumed to pose a hazard under any conditions. Concerns are generally confined to species with molecular weights $< 1,000$ Da. The isocyanate functional group equivalent weight of the notified polymer is $< 5,000$ Da, although its number average molecular weight is $> 1,000$ Da and it only contains a small proportion of low molecular weight species.

As there is presently not a reliable animal model for testing diisocyanates for potential respiratory sensitisation, the US EPA assume that all diisocyanates may be potential human respiratory sensitizers. It has also been reported that isocyanates may cause respiratory sensitisation by skin contact (US EPA, 2010).

Carcinogenicity is of concern for a hazardous residual isocyanate monomer that is classified as R40 Limited evidence of carcinogenic effect.

Health hazard classification

Based on the presence of the isocyanate functional group in the notified polymer, the notified polymer should 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. The recommended hazard classification is presented in the table below.

<i>Hazard classification</i>	<i>Hazard statement</i>
Respiratory Sensitisation (Category 1)	H334 – May cause allergy or asthma symptoms or breathing difficulties if inhaled

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. Thus, the notified polymer is recommended for hazard classification according to the Approved Criteria 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

Toxicological data was not supplied for the notified polymer. Based on the presence of isocyanate functional groups, the notified polymer may cause irritation, dermal and respiratory sensitisation, and pulmonary toxicity.

The potential for dermal and ocular exposure to the notified polymer during repackaging and sealant application is expected to be minimised by the use of PPE such as coveralls, impermeable gloves, eye protection and respiratory protection as required. Local exhaust ventilation will further minimise exposure.

The potential for inhalation exposure to the notified polymer is expected to be low based on the estimated low vapour pressure of the notified polymer. Additionally, exhaust ventilation and respiratory protection where necessary will further minimise exposure and reduce the risk of respiratory sensitisation or pulmonary toxicity.

It is noted that a hazardous isocyanate monomer is present in the notified polymer at a level classified for limited evidence of carcinogenic effect. Isocyanates have a Time Weighted Average (TWA) of 0.02 mg/m³ and a Short Term Exposure Limit (STEL) of 0.07 mg/m³. The potential for carcinogenic effect is mitigated by: the relatively low concentration of this impurity in the unreacted polymer product, which is further reduced in the sealant; the expected low exposure to the product containing the notified polymer and to the final sealant product; and the use of respiratory protection and local exhaust ventilation.

Overall, provided that adequate engineering control measures and PPE are in place to minimise exposure to the notified polymer during repackaging and application of sealant products containing it, the risk to workers is not considered to be unreasonable.

6.3.2. Public Health

The notified polymer is intended for professional use only and the public is not expected to be exposed to uncured notified polymer. Therefore, the risk to public health is not considered to be unreasonable.

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 and therefore, no release of the notified polymer to the environment is expected from this activity. The import containers are designed to minimise the release of the notified polymer to the environment during importation, storage and transport. If release does occur as a result of an accident, it is expected to be contained, collected and disposed of to landfill. Release of the notified polymer to the environment during repacking may occur only in the event of an accident; any spilt notified polymer is expected to be contained and collected for reuse or disposal to landfill.

RELEASE OF CHEMICAL FROM USE

It is estimated that up to 0.5% of the total annual import volume of the notified polymer may be released to the environment as a result of spills during the application of the sealant products. Spilt notified polymer is expected to be collected with inert material and disposed of to landfill.

RELEASE OF CHEMICAL FROM DISPOSAL

The majority of the notified polymer will be incorporated in an inert polymer matrix adhering to the substrates after application. It is expected to share the fate of the substrates to which it is applied and be disposed of to landfill or be subjected to metal recycling processes. Residual notified polymer in empty containers (< 1%) is expected to be disposed of in accordance with local regulations.

7.1.2. Environmental Fate

No environmental fate data were submitted. The majority of the notified polymer is expected to be irreversibly cross-linked into an inert polymer matrix as part of its use pattern and is therefore not expected to be mobile, bioavailable nor readily biodegradable in this form. Notified polymer disposed of to landfill is not expected to be mobile given that it readily reacts with water to form insoluble polymeric masses. Bioaccumulation of the uncured polymer is unlikely as it is not expected to cross biological membranes due to its high molecular weight and limited potential for aquatic exposure. The notified polymer will eventually degrade in landfill, or by thermal decomposition during metal reclamation processes, to form water and oxides of carbon and nitrogen.

7.1.3. Predicted Environmental Concentration (PEC)

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. Further, the notified polymer will never be isolated from sealant products containing the polymer, which rapidly reacts with water to form insoluble, non-bioavailable, high molecular weight solids. 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 will never be isolated from the sealant, which reacts with 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.

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 ($Q = \text{PEC}/\text{PNEC}$) 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 sealants. The majority of the notified polymer will be disposed of to landfill as cured sealant. In the cured sealant, the notified polymer will be irreversibly bound in an inert polymer matrix, and is unlikely to be bioavailable or mobile in this form. Therefore, based on the assessed use pattern, the notified polymer is not considered to pose an unreasonable risk to the environment.

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