

April 2018

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

PUBLIC REPORT

Isocyanate prepolymer in HR-66-7666

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 and Energy.

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**Director
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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/2027	PPG Industries Australia Pty Ltd	Isocyanate prepolymer in HR-66-7666	Yes	≤ 40 tonnes per annum	Component of industrial and automotive coatings

CONCLUSIONS AND REGULATORY OBLIGATIONS

Hazard classification

The notified polymer contains reactive isocyanate groups. Based on Safe Work Australia *Guide to Handling Isocyanates* (SWA, 2015b), the notified polymer is recommended for hazard classification according to the *Globally Harmonised System of Classification and Labelling of Chemicals* (GHS), as adopted for industrial chemicals in Australia. The recommended hazard classification is presented in the following table.

<i>Hazard classification</i>	<i>Hazard statement</i>
Skin irritation (Category 2)	H315 – Causes skin irritation
Eye irritation (Category 2)	H319 – Causes serious eye irritation
Respiratory sensitisation (Category 1)	H334 – May cause allergy or asthma symptoms or breathing difficulties if inhaled
Skin sensitisation (Category 1)	H317 – May cause an allergic skin reaction
Specific target organ toxicity – single exposure (Category 3)	H335 – May cause respiratory irritation

Human health risk assessment

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

On the basis of the reported 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:
 - Skin irritation (Category 2): H315 – Causes skin irritation.
 - Eye irritation (Category 2): H319 – Causes serious eye irritation.
 - Respiratory sensitisation (Category 1): H334 – May cause allergy or asthma symptoms or breathing difficulties if inhaled.
 - Skin sensitisation (Category 1): H317 – May cause an allergic skin reaction.
 - Specific target organ toxicity – single exposure (Category 3): H335 – May cause respiratory irritation.

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.

Health Surveillance

- As the notified polymer is a respiratory and skin 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 or other allergic reactions.

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:
 - Spray booth during spray application
 - Local exhaust ventilation during equipment cleaning and maintenance
- 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:
 - Avoid contact with skin and eyes
 - Avoid inhalation of aerosols or mists
- 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:
 - Impervious gloves
 - Protective clothing
 - Eye protection
 - Respiratory protection

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

- Spray applications should be carried out in accordance with the Safe Work Australia Code of Practice for *Spray Painting and Powder Coating* (SWA, 2015a) or relevant State or Territory Code of Practice.
- Atmospheric monitoring should be conducted to measure workplace concentrations of isocyanates during use of products containing the notified polymer. Users of the products should ensure that the exposure standard for isocyanates, listed by Safe Work Australia in the *Hazardous Chemical Information System (HCIS)*, is not exceeded for all areas where the notified polymer is present.
- A copy of the 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 of 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

- Where reuse or recycling are not appropriate, dispose of the notified polymer in an environmentally sound manner in accordance with relevant Commonwealth, state, territory and local government legislation.

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 physical containment, collection and subsequent safe disposal.

Transport and Packaging

- The notified polymer contains reactive isocyanate groups. Introducers of products containing the notified polymer should consider their obligations under *Australian Code for the Transport of Dangerous Goods by Road and Rail* (ADG code) (NTC, 2017).

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 1,000 g/mol;
 - the polymer is intended to be used in products available to the public;or
- (2) Under Section 64(2) of the Act; if
 - the function or use of the polymer has changed from component of industrial and automotive coatings, 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.

Safety Data Sheet

The SDS of the product containing the notified polymer provided by the notifier was reviewed by NICNAS. The accuracy of the information on the 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)
14-20 McNaughton Road,
CLAYTON VIC 3169

NOTIFICATION CATEGORY

Limited: Synthetic polymer with $M_n \geq 1,000$ g/mol

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, use details and import volume.

VARIATION OF DATA REQUIREMENTS (SECTION 24 OF THE ACT)

Variation of the scheduled data requirements is claimed for all physical and chemical properties.

PREVIOUS NOTIFICATION IN AUSTRALIA BY APPLICANT(S)

None

NOTIFICATION IN OTHER COUNTRIES

Canada (1991)
USA (2017)
Philippines (2000)
China (2013)
Japan (2012)
South Korea (2016)
New Zealand (2006)

2. IDENTITY OF CHEMICAL

MARKETING NAME(S)

HR-66-7666 (imported product containing the notified polymer at $\leq 60\%$ concentration).

MOLECULAR WEIGHT

Number Average Molecular Weight (M_n) is $> 1,000$ g/mol.

ANALYTICAL DATA

Reference IR and GPC spectra were provided.

3. COMPOSITION

DEGREE OF PURITY

$> 98\%$

DEGRADATION PRODUCTS

None expected under normal conditions of use.

4. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE AT 20 °C AND 101.3 kPa: Liquid*

Property	Value	Data Source/Justification
Melting Point/Freezing Point	Not determined	Imported as a component of a solution.
Boiling Point	> 37.78 °C*	SDS
Density	$1,090$ kg/m ³ at 20 °C*	SDS
Vapour Pressure	Not determined	Expected to be low based on the high molecular

Water Solubility	Not determined	weight. Not expected to be water soluble due to hydrophobic functionality and high molecular weight, but cannot be determined due to presence of end group that readily reacts with water.
Hydrolysis as a Function of pH	Not determined	Terminal groups expected to rapidly hydrolyse in water.
Partition Coefficient (n-octanol/water)	Not determined	Cannot be readily determined due to reactivity with water.
Adsorption/Desorption	Not determined	Cannot be readily determined due to reactivity with water, forming a cross-linked solid mass.
Dissociation Constant	Not determined	Does not contain any dissociable functional groups, and hence is not expected to dissociate under environmental conditions (with pH range of 4 – 9).
Particle Size	Not determined	Imported as a component of a solution.
Flash Point	215.56 °C (closed cup)*	SDS
Flammability	Not determined	Not expected to form flammable vapours based on high molecular weight and flash point.
Autoignition Temperature	Not determined	Not expected to undergo autoignition
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 imported product HR-66-7666 containing the notified polymer at $\leq 60\%$ concentration.

DISCUSSION OF PROPERTIES

The notified polymer is imported as a component of a solution from which it will not be isolated.

Reactivity

The notified polymer contains reactive isocyanate groups and is expected to undergo reaction in contact with water to form a cross-linked solid mass and release carbon dioxide.

Physical hazard classification

Based on the limited physico-chemical data submitted, the notified polymer cannot be classified according to the *Globally Harmonised System of 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 not be manufactured in Australia. The notified polymer will be imported as a component of a finished coating system at $\leq 60\%$ concentration and will be used without any local reformulation or repackaging.

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

Year	1	2	3	4	5
Tonnes	≤ 40	≤ 40	≤ 40	≤ 40	≤ 40

PORT OF ENTRY

Melbourne and Sydney

IDENTITY OF RECIPIENTS

PPG Industries Australia Pty Ltd

TRANSPORTATION AND PACKAGING

The notified polymer (at $\leq 60\%$ concentration) will be imported as a component of a two-part coating system in 20 L cans or 205 L drums and transported by road and rail to end users.

The notified polymer contains reactive isocyanate groups. Introducers of products containing the notified polymer should consider their obligations under *Australian Code for the Transport of Dangerous Goods by Road and Rail* (ADG code) (NTC, 2017).

USE

The notified polymer will be used as a component of a two-part coating system at concentrations of $\leq 60\%$ for aftermarket vehicle body repairs.

OPERATION DESCRIPTION

Manufacture, reformulation and repackaging of the notified polymer or products containing the notified polymer will not occur in Australia.

End Use

The two-part coating system (containing the notified polymer at $\leq 60\%$ concentration) will be applied using specialised spray painting equipment, where the two parts of the coating are mixed in-line at the application nozzle before the coating is sprayed onto a surface. The spray equipment has been designed to mix and dispense the two-part coating systems at the correct ratio, temperature and pressure.

In a typical use scenario, professional painters will manually pour the coating containing the notified polymer into the spray equipment. For larger volumes, the coating will be transferred from 205 L drums directly to the spray equipment. Spray painting applications will be performed in spray booths fitted with ventilation and directional air flow (down draft) to capture and filter any mists and overspray. After the spray operation is completed, the equipment will be cleaned using purpose-built enclosed cabinets. A suitable solvent is forced through the gun under pressure whilst the trigger unit is maintained in an open position. A clean cloth dampened with an appropriate solvent will be used to remove coating drips and splashes from exterior surfaces. Wastes will be collected for disposal.

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 and storage	1 – 2	2 – 4
Spray painting	4 – 12	10 – 50

EXPOSURE DETAILS

Transport and Storage

Transport and storage workers may come into contact with the notified polymer (at $\leq 60\%$ concentration) only in the event of an accident where the containers are breached.

Paint Application

The coating containing the notified polymer will be used at automotive repair shops for aftermarket vehicle body repairs. Dermal and ocular exposure of workers to the notified polymer at $\leq 60\%$ concentration may occur during opening cans of the coating and manually pouring the contents into spray equipment. In addition, exposure can occur during connecting and disconnecting transfer hoses. If leakages happen, workers may also be potentially exposed to the notified polymer at $\leq 60\%$ concentration.

Spray applications will be performed within spray booths. Workers may be exposed to the notified polymer at $\leq 60\%$ concentration by inhalation of the aerosolised coating during spray applications. Inhalation is expected to be minimal as the coating is applied in ventilated spray booths and workers are expected to use appropriate personal protective equipment (PPE), including full-face self-contained breathing apparatuses, disposable overalls, impervious gloves and safety boots.

Dermal, ocular and inhalation exposure to the notified polymer at $\leq 60\%$ concentration can also occur during the cleaning of the spray equipment. This operation takes place within purpose-built enclosed cabinets and operators

are expected to wear appropriate PPE including overalls, safety glasses or goggles, impervious gloves and respirators during the cleaning procedure.

6.1.2. Public Exposure

The products containing the notified polymer will only be used by professional spray painters and will not be sold to the public for do-it-yourself (DIY) use.

Once applied to automobile body parts, the coating containing the notified polymer will be cured and the notified polymer is expected to be trapped within the inert coating matrix. It is not expected to be available for exposure after curing.

6.2. Human Health Effects Assessment

No toxicological data were submitted for the notified polymer.

The notified polymer is not expected to be readily absorbed across biological membranes, based on the high molecular weight ($> 1,000$ g/mol) with limited amounts of low molecular weight species ($< 2\%$ with molecular weight < 500 g/mol and $< 10\%$ with molecular weight $< 1,000$ g/mol).

The notified polymer contains isocyanate functional groups which are of concern for irritation, dermal and respiratory sensitisation and pulmonary toxicity (Barrett, 1994; US EPA, 2010; Howe-grant, 1995). The main exposure related concerns include respiratory sensitisation in the form of asthma, causing difficulty in breathing, tightness of the chest, coughing, wheezing and shortness of breath (SWA, 2015b). Most isocyanates have a strong irritating effect on the respiratory tract. Skin contact with isocyanates may also contribute to the development of respiratory sensitisation (Bello et al, 2007).

The notified polymer is a partially polymerised prepolymer which is expected to be less volatile than unpolymerised isocyanates. As only limited amounts of low molecular weight species are present in the notified polymer (with $< 10\%$ having molecular weight $< 1,000$ g/mol), the irritancy and skin sensitisation potential of the polymer is therefore expected to be limited. However, the UK Employment Medical Advisory Service states polymeric isocyanate aerosols are capable of causing 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 could cause adverse respiratory effects (SWA, 2013).

Based on the information in the Safe Work Australia *Guide to Handling Isocyanates* (SWA, 2015b), some isocyanates are classifiable according to the GHS criteria as Carcinogenicity Category 2 (suspected of causing cancer). As no toxicological information is available for the notified polymer for the assessment, the potential for carcinogenicity of the polymer cannot be completely ruled out.

Health hazard classification

The notified polymer contains reactive isocyanate groups. Based on Safe Work Australia *Guide to Handling Isocyanates* (SWA, 2015b), the notified polymer is recommended for hazard classification according to the *Globally Harmonised System of Classification and Labelling of Chemicals* (GHS), as adopted for industrial chemicals in Australia. The recommended hazard classification is presented in the following table.

<i>Hazard classification</i>	<i>Hazard statement</i>
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Respiratory sensitisation (Category 1)	H334 – May cause allergy or asthma symptoms or breathing difficulties if inhaled
Skin sensitisation (Category 1)	H317 – May cause an allergic skin reaction
Specific target organ toxicity – single exposure (Category 3)	H335 – May cause respiratory irritation

6.3. Human Health Risk Characterisation

6.3.1. Occupational Health and Safety

The notified polymer contains reactive isocyanate groups. Hence, the known hazards of isocyanates (SWA, 2015b) have been considered in this assessment. The main concerns posed by isocyanates include

respiratory sensitisation in the form of asthma, as well as skin and eye irritations, skin sensitisation, decreased respiratory function with the possibility of interstitial fibrosis and pulmonary oedema (Tillman, 2007).

Based on Safe Work Australia *Hazardous Chemical Information System (HCIS)*, isocyanates have exposure standards of 0.02 mg/m³ time-weighted average (TWA) and 0.07 mg/m³ short-term exposure limit (STEL).

Throughout end-use workers may be exposed to the notified polymer at $\leq 60\%$ concentration when handling products containing the notified polymer and during spray applications. Workers may also be potentially exposed to the notified polymer at $\leq 60\%$ concentration if leakages occur. The potential exposure routes are expected to be inhalation, dermal and ocular. Systemic absorption of the notified polymer through dermal exposure is expected to be limited due to its relatively high molecular weight. The proposed use of engineering controls including enclosed systems (spray booths) and appropriate PPE including respirators, impervious gloves and safety glasses, will reduce the potential for exposure during the operations, and reduce the risk of possible adverse effects.

Provided that the work place controls are being adhered to, under the conditions of the occupational settings described, the notified polymer is not considered to pose an unreasonable risk to the health of workers.

6.3.2. Public Health

Products containing the notified polymer will only be used by workers within enclosed systems and in areas which will not be accessible to the general public. Members of the public may come into contact with articles coated with products containing the notified polymer. However, the notified polymer is expected to be cured and cross-linked to form an inert matrix and will not be available for further exposure.

When used in the proposed manner, 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, reformulated or repackaged in Australia. Release during transport is not expected to be significant, with spills to be absorbed onto inert material, collected and disposed of to landfill.

RELEASE OF CHEMICAL FROM USE

Release during use is expected to be insignificant, as the notified polymer will be sprayed onto vehicle parts within a specialised spray booth. Application of products containing the notified polymer will be by industrial or professional users only, with no DIY use. The majority of the release during use is likely to result from overspray, which the notifier estimates will be 20% of the import volume. The overspray will be collected within the vent system and trapped onto filters, which will be disposed of to landfill. Solvent wastes from equipment cleaning will be collected and disposed of via a licensed waste contractor to a liquid waste facility.

RELEASE OF CHEMICAL FROM DISPOSAL

Discarded end use articles containing the notified polymer within the inert coating matrix will be disposed of to landfill or recycled for metal reclamation, which involves thermal decomposition of the coating to form water vapour and oxides of carbon and nitrogen. In landfill, the notified polymer in the cross-linked form is not expected to be mobile nor bioavailable, and is expected to slowly degrade via abiotic and biotic processes. The notified polymer is not expected to bioaccumulate due to its high molecular weight and no significant release to the aquatic compartment is expected.

The notifier estimates that residues in coating containers are expected to account for up to 2% of the import volume of the notified polymer. The residues would be allowed to dry within the containers prior to disposal to landfill along with the containers.

7.1.2. Environmental Fate

No environmental fate data were submitted for the notified polymer. The notified polymer will become irreversibly bound to form part of the coating during the curing process. The notified polymer will share the fate of the coated automotive parts, which will eventually be disposed of to landfill or thermally decomposed during metal recycling. Once the coating is cured, the notified polymer is not expected to be bioavailable.

The notified polymer is not expected to persist in water due to its hydrolytic instability. It is expected to cross-link and solidify on reaction with water. In the unlikely event that the notified polymer is released to the aquatic compartment, it is not likely to be bioavailable. Therefore, the notified polymer is expected to be of low concern to the aquatic environment. Bioaccumulation of the notified polymer before the coating is cured is unlikely and it is not expected to cross biological membranes due to its high molecular weight.

Most of the residue of the notified polymer generated during the spray application process is expected to be captured in the spray application area, which will take place in purpose-built spray booths. None of the waste generated is expected to be discharged to the sewer because overspray will be contained and rinsate from cleaning spray guns is expected to be collected and disposed of to landfill. 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)

The predicted environmental concentration (PEC) has not been calculated for the notified polymer, as ecotoxicologically significant quantities are not expected to be released to the aquatic environment based on its reported use pattern.

7.2. Environmental Effects Assessment

No ecotoxicity data were submitted. Terminal isocyanates are expected to react with water forming a cross-linked solid mass. This solid mass does not have significant ionic functionality and hence is of low concern to the environment.

7.2.1. Predicted No-Effect Concentration

A predicted no-effect concentration (PNEC) has not been calculated for the notified polymer, as ecotoxicologically significant quantities are not expected to be released to the aquatic environment based on its reported use pattern.

7.3. Environmental Risk Assessment

The risk quotient ($Q = \text{PEC}/\text{PNEC}$) has not been calculated for the notified polymer as release to the aquatic environment in ecotoxicologically significant quantities is not expected, based on its reported use pattern as a component in protective coating for vehicle parts. The majority of the environmental release of the notified polymer will be via disposal of the cured paints to landfill and by thermal decomposition during metal reclamation processes. In cured paints the notified polymer is bound within the inert paint matrix and is unlikely to leach or be bioavailable. Thermal decomposition of the notified polymer will produce water and oxides of carbon and nitrogen. On the basis of the limited aquatic exposure and assessed use pattern, the notified polymer is not expected to pose an unreasonable risk to the environment.

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