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

FULL PUBLIC REPORT

Polymer 1 in RK-69376

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 Full Public Report may be inspected at our NICNAS office by appointment only at Level 7, 260 Elizabeth Street, Surry Hills NSW 2010.

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**Polymer 1 in RK-69376****1. APPLICANT AND NOTIFICATION DETAILS**

APPLICANT(S)

DuPont (Australia) Ltd. (ABN 59 000 716 469)

7 Eden Park Drive

Macquarie Park NSW 2113

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, molecular and structural formulae, molecular weight, polymer constituents, residual monomers, impurities, use details, manufacture/import volume, site of manufacture/reformulation and identity of manufacturer/recipients.

VARIATION OF DATA REQUIREMENTS (SECTION 24 OF THE ACT)

Variation to the schedule of data requirements is claimed as follows: melting point, vapour pressure, water solubility, flammability, autoignition temperature.

PREVIOUS NOTIFICATION IN AUSTRALIA BY APPLICANT(S)

None

NOTIFICATION IN OTHER COUNTRIES

None

2. IDENTITY OF CHEMICAL

MARKETING NAME(S)

RC-49465 (containing <70% notified polymer)

RK-69376 (containing <20% notified polymer)

CAS NUMBER

Not assigned

MOLECULAR WEIGHT

 $M_n > 1000$ Da

ANALYTICAL DATA

Reference IR and GPC spectra were provided.

3. COMPOSITION

DEGREE OF PURITY > 90%

ADDITIVES/ADJUVANTS

None

LOSS OF MONOMERS, OTHER REACTANTS, ADDITIVES, IMPURITIES

The notified polymer crosslinks with other ingredients in the product upon curing at elevated temperatures.

DEGRADATION PRODUCTS

The notified polymer is expected to degrade via thermal, biotic or abiotic processes. The degradation would produce the following: CO, CO₂, SiO₂, and small amounts of NO_x when the car body is recycled in a steel smelter at temperatures >1000°C.

4. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE AT 20°C AND 101.3 kPa: Clear slightly opaque white solid.

Property	Value	Data Source/Justification
Boiling Point	>200°C at 101.3 kPa	Estimated
Density	1104 kg/m ³ at 20°C	Calculated
Vapour Pressure	<1.3x10 ⁻⁹ kPa	Estimated based on the NAMW>1000 (US EPA 2007)
Water Solubility	≤ 46.5 × 10 ⁻³ g/L	Measured on an analogue of the notified polymer
Hydrolysis as a Function of pH	Not determined	The notified polymer is expected to hydrolyse on contact with water
Partition Coefficient (n-octanol/water)	Not determined	Hydrolytically unstable, hence a meaningful partition coefficient cannot be determined
Adsorption/Desorption	Not determined	Expected to sorb strongly to soil and sediment based on its predominantly hydrophobic structure
Dissociation Constant	Not determined	Does not contain any readily dissociable functionality
Particle Size	Not determined	The polymer is imported in a resin solution.
Flash Point	Not determined	Expected to have high flash point
Flammability	Not determined	Not expected to be flammable
Autoignition Temperature	>340°C	Estimated based on autoignition temperature of notified polymer
Explosive Properties	Not determined	Based on the structure, the notified polymer is not expected to be explosive.

DISCUSSION OF PROPERTIES

For full details of water solubility test, refer to Appendix A.

Reactivity

The notified polymer is stable under normal storage and handling conditions.

Dangerous Goods classification

Based on the limited physical-chemical data provided in the above table the notified polymer is not classified according to the Australian Dangerous Goods Code (NTC, 2007). However the data above do not address all Dangerous Goods endpoints. Therefore consideration of all endpoints should be undertaken before a final decision on the Dangerous Goods classification is made by the introducer of the polymer.

5. INTRODUCTION AND USE INFORMATION

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

The notified polymer will be imported in a resin solution at up to 70% concentration or as part of a finished product (RK-69376) at up to 20% 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>	<50	<60	<60	<60	<60

PORT OF ENTRY
Adelaide, Sydney

IDENTITY OF MANUFACTURER/RECIPIENTS
DuPont (Australia) Ltd

TRANSPORTATION AND PACKAGING

The notified polymer will be imported in steel drums of at least 200 Litre capacity. Four drums will be packed to a pallet and loaded into a container. The reformulated paint will be filled and transported in 200L drums.

USE

The notified polymer will be used as a component of automotive coatings (lacquers/paints).

OPERATION DESCRIPTION

Reformulation:

The product containing the notified polymer (<70% concentration) will be added to a mixing tank using direct piping from storage tanks or tilting from a truck or forklift. It will be mixed with other ingredients and samples taken for quality control purposes. Upon batch quality control approval the final paint product (<20% notified polymer) will be gravity fed from the mixing tank into reconditioned 200 L drums. Following completion of six batches, the mixer will be cleaned using a pressure spray of solvent.

Paint Application:

The final paint product containing <20% notified polymer will be transferred from the drums to robotic spray equipment using pumps and flexible hoses. The paint will be applied by robots in a spray booth area. Workers may be required to undertake manual touch-ups, which will be applied by spray in spray booths. The coated automotive part will then be transferred to an oven for curing at elevated temperatures.

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>
Transport drivers	4	4	19
Storeman	4	1.5	150
Reformulation site (Riverstone)			
Paint reformulation workers	6	8	60
Quality control testing workers	2	4	60
Filling room workers	2	4	60
Transport drivers to warehouse	4	48	60
Paint Application site			
Storeman	6	1.2	100
Spray painters	10	9	300
Cleaning workers	4	4	100
Quality control testing workers	2	2	240

EXPOSURE DETAILS

Transport and storage workers are not expected to be exposed to the notified polymer except in the event of an accident as the imported notified polymer and the coatings will be transported and stored in sealed containers.

Reformulation

Dermal and ocular exposure of workers to the notified polymer (<70% concentration) may occur during the transfer of the product containing the notified polymer to the mixing tank, subsequent filling of the final product to drums (including the connecting and disconnecting of piping lines) and during quality control processes.

Such exposure is expected to be reduced by the use of largely automated processes, the exhaust ventilation of the mixing and filling areas and the wearing of personal protective equipment (PPE) including, overalls, gloves and goggles.

Inhalation exposure to vapors and aerosols is not likely to occur during mixing as local exhaust ventilation is used in the mixing and filling areas.

Paint application

Dermal and ocular exposure of workers to the notified polymer (<20% concentration) may occur during transfer from drums to the robotic spray equipment prior to being fed to the spray supply, during cleaning of equipment and quality control testing of product.

Such exposure is not expected to be significant due to the use of pumping equipment and PPE such as gloves and splash resistant clothing.

Inhalation exposure of workers to the notified polymer (<20% concentration) may occur when workers are required to perform manual touch-ups by spraying. Such exposure to the notified polymer will be minimised by the use of spray booths during spray operations and PPE such as eye protection, coveralls, and gloves.

6.1.2. Public exposure

The notified polymer and coatings containing the notified polymer will be available only for industrial use and will not be sold to the public.

The general public may be exposed to the dry coating / substrate that have been coated with product containing the notified polymer. However, at this stage, the notified polymer will be trapped within a dry and cured film and will not be bioavailable.

6.2. Human health effects assessment

No toxicological data on the notified polymer were submitted. The notified polymer is not expected to be significantly absorbed from the gastrointestinal, respiratory or dermal tract, due to its high molecular weight and low proportion of low molecular weight species. The notified polymer contains functional groups that are alerts for skin irritation and a functional group that indicates possible concern for lung toxicity if inhaled (references in exempt information report).

The lung toxicity of the notified polymer resulting from the presence of the functional group may not be significant considering the relatively high molecular weight of the notified polymer (NAMW >1000) and the relatively low proportion of low molecular weight species. However, lung toxicity resulting from inhalation of the notified polymer cannot be completely ruled out. Even if the notified polymer is an irritant, it is not expected to cause irritation at the concentration used in final spray products (<20%).

Health hazard classification

As no toxicity data are provided, the notified polymer cannot be classified according to the *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 2004).

6.3. Human health risk characterisation

6.3.1. Occupational health and safety

Toxicological studies are not provided for the notified polymer. The notified polymer may have the potential to cause lung effects from inhalation of its vapours or aerosols. Inhalation exposure of workers may potentially occur mainly during manual spray application of products containing the notified polymer (<20%). However, the estimated low vapour pressure and the use of engineering controls such as spray booths should minimise this risk. In addition, the majority of spray application is performed using robots.

The notified polymer may also have skin irritating potential, though it is not expected at concentration <20%. Dermal and ocular exposure of workers to the notified polymer may occur particularly during coating product formulation and during coating application. However, the controls in place such as the use of personal protective equipment (PPE), engineering controls and the robotic applications are expected to minimize exposure.

In summary, the risk to workers from the use of the notified polymer is not expected to be unacceptable.

6.3.2. Public health

Public exposure to the notified polymer is not expected as the notified polymer or the coatings containing the notified polymer will not be sold to the public. In addition, the notified polymer is not expected to be bioavailable upon contact with substrates coated with the notified polymer.

The risk to the public from exposure to the notified polymer is not considered to be unacceptable.

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 in either finished automotive coating products or resin solution that will be reformulated into finished automotive coating products.

Drums used to import the resin solution containing the notified polymer will retain < 0.3% residues of notified polymer. The drums will be sent to drum recyclers where the residue will either be rinsed out or thermally decomposed. The equipment used to blend the resin solution into finished product will be washed with solvent. The solvent containing the notified polymer will be sent to solvent recyclers where it will be used to make insoluble rubber for disposal to landfill or used as fuel for cement or brick kilns. Spills during transport and reformulation are expected to be collected with inert material and disposed of to landfill.

RELEASE OF CHEMICAL FROM USE

The coating containing the notified polymer will be applied to automobiles in spray booths equipped with water floors and water wall curtains that capture overspray. The overspray (constituting approximately 20% of the total imported notified polymer) will be washed into a collection trough where it will be coagulated and collected. The collected semi-solid polymeric waste will be thermally decomposed in plant boilers, brick kilns, or cement works to recover its calorific value or disposed of to landfill.

RELEASE OF CHEMICAL FROM DISPOSAL

The notified polymer in coatings is expected to share the fate of the automobiles to which it has been applied. The notified polymer in coatings will therefore either be thermally decomposed during metal reclamation processes or disposed of to landfill.

7.1.2 Environmental fate

No environmental fate data were submitted. The majority of the notified polymer is expected to be heat cured into an inert matrix as part of its normal use pattern as a component in automotive coatings. The notified polymer will be irreversibly bound into the matrix and, in this form, is not expected to be bioavailable or biodegradable. Notified polymer in solid waste disposed of to landfill, is not expected to be mobile and will slowly degrade *in situ*, primarily by abiotic processes. The notified polymer will eventually degrade in landfill, or by thermal decomposition during metal reclamation processes, to form water and oxides of carbon, nitrogen and silicon.

Significant amounts of notified polymer are not expected to be released to the aquatic environment. Bioaccumulation of the notified polymer is unlikely due to its high molecular weight and its limited release to surface waters.

7.1.3 Predicted Environmental Concentration (PEC)

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

7.2. Environmental effects assessment

No ecotoxicological data were submitted. The notified polymer is a high molecular weight non-ionic polymer that is not expected to be hazardous to aquatic organisms.

7.2.1 Predicted No-Effect Concentration

A predicted no-effect concentration (PNEC) has not been calculated for the notified polymer as, based on its reported use pattern, ecotoxicologically significant quantities are not expected to be released 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 in ecotoxicologically significant quantities is not expected based on its reported use pattern as a component in automotive coatings. The majority of the notified polymer will be disposed to landfill as cured coating. In its cured state the notified polymer is irreversibly bound into the inert coating matrix and is unlikely to leach or be bioavailable. Due to its limited environmental exposure, the risk of the notified polymer to the environment is expected to be low based on its reported use pattern.

8. CONCLUSIONS AND REGULATORY OBLIGATIONS

Hazard classification

As no toxicity data are provided, the notified polymer cannot be classified according to the *Approved Criteria for Classifying Hazardous Substances* [NOHSC:1008(2004)].

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 expected to pose a risk to the environment.

Recommendations

CONTROL MEASURES**Occupational Health and Safety**

- Employers should implement the following isolation and engineering controls to minimise occupational exposure to the notified polymer during reformulation:
 - Exhaust ventilation
 - Enclosed and automated systems
- Employers should implement the following safe work practices to minimise occupational exposure to the notified polymer during reformulation:
 - Avoid breathing aerosols
 - Avoid contact with eyes and skin
- Employers should ensure that the following personal protective equipment is used by workers to minimise occupational exposure to the notified polymer during reformulation and application:
 - Appropriate respiratory protection
 - Overalls, gloves and eye protection

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

- Spray application should be carried out in accordance with the Safe Work Australia *National Guidance Material for Spray Painting* [NOHSC (1999)] or relevant State and Territory Codes of Practice.
- A copy of the MSDS should be easily accessible to employees.
- If products and mixtures containing the notified polymer are classified as hazardous to health in accordance with the *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.

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 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(2) of the Act; if

- the function or use of the polymer has changed from a component of industrial coatings at <20%, or is likely to change significantly;
- the amount of polymer being introduced has increased from 60 tonnes, 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.

No additional secondary notification conditions are stipulated.

Material Safety Data Sheet

The MSDS of the notified polymer and products containing the notified polymer provided by the notifier were reviewed by NICNAS. The accuracy of the information on the MSDS remains the responsibility of the applicant.

APPENDIX A: PHYSICAL AND CHEMICAL PROPERTIES

Water Solubility $\leq 46.5 \times 10^{-3}$ g/L at 40°C (analogue of the notified polymer)

Method	OECD TG 120 Solution/Extraction Behaviour of Polymers in Water
Remarks	Three samples of test substance (2 g) were added to buffer water (200 mL) at pH 2, 7 and 9. Each flask was agitated at 300 rpm for 24 hours. After agitation the upper transparent aqueous solution (5 mL) was taken by pipette and filtered (0.45 µm filter). The TOC of the filtered solution was measured by a total organic carbon analyser.
Test Facility	References in exempt information report

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- NTC (National Transport Commission) 2007 Australian Code for the Transport of Dangerous Goods by Road and Rail (ADG code), 7th Edition, Commonwealth of Australia
- United Nations (2009) Globally Harmonised System of Classification and Labelling of Chemicals (GHS), 3rd revised edition. United Nations Economic Commission for Europe (UN/ECE), <http://www.unece.org/trans/danger/publi/ghs/ghs_rev03/03files_e.html>.
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