File No: LTD/1701

January 2014

NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME (NICNAS)

PUBLIC REPORT

Polymer in RE6754

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 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

TABLE OF CONTENTS

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/1701	Akzo Nobel Pty Ltd	Polymer in RE6754	ND*	< 5 tonnes per annum	Component of automotive coatings

*ND = not determined

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, or the *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 2004).

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 assessed use pattern, the notified polymer is not considered to pose an unreasonable risk to the environment.

Recommendations

CONTROL MEASURES

Occupational Health and Safety

- No specific engineering controls, work practices or personal protective equipment are required for the safe use of the notified polymer itself. However, these should be selected on the basis of all ingredients in the formulation.

  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.

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;

or

(2) Under Section 64(2) of the Act; if
  - the function or use of the polymer has changed from a component of 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.

(Material) Safety Data Sheet
The (M)SDS of a product containing the notified chemical 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)
Akzo Nobel Pty Ltd (ABN: 91 000 017 354)
51 McIntyre Road
SUNSHINE NORTH VIC 3020

NOTIFICATION CATEGORY
Limited: Synthetic polymer with Mn ≥ 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, import volume, site of reformulation and identity of manufacturer.

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

PREVIOUS NOTIFICATION IN AUSTRALIA BY APPLICANT(S)
None

NOTIFICATION IN OTHER COUNTRIES
US and Europe

2. IDENTITY OF CHEMICAL

MARKETING NAME(S)
RE6754 (contains < 40% notified polymer)

MOLECULAR WEIGHT
> 1,000 Da

ANALYTICAL DATA
Reference IR and GPC spectra were provided.

3. COMPOSITION

DEGREE OF PURITY
> 95%

4. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE AT 20 °C AND 101.3 kPa: Colourless or pale yellow liquid (for imported aqueous product containing notified polymer at < 40% concentration).

Property	Value	Data Source/Justification
Melting Point/Freezing Point	~ 0 °C	Estimated. For imported aqueous product containing notified polymer at < 40% concentration.
Boiling Point	100-171 °C	(M)SDS. For imported aqueous product containing notified polymer at < 40% concentration.
Density	1050 kg/m^3 at 20 °C	(M)SDS. For imported aqueous product containing notified polymer at < 40% concentration.
Vapour Pressure	Not determined	Expected to be low based on the high molecular weight of the notified polymer

Water Solubility	Not determined	The notified polymer is expected to be water dispersible based on its amphiphilic structure.
Hydrolysis as a Function of pH	Not determined	Contains hydrolysable functionalities, however, hydrolysis is expected to be slow under environmental conditions (pH 4 – 9).
Partition Coefficient (n-octanol/water)	Not determined	Expected to partition to the interface between octanol and water, based on its amphiphilic structure.
Adsorption/Desorption	Not determined	Expected to partition to surfaces from water in the environment based on its cationicity and high molecular weight.
Dissociation Constant	Not determined	The notified polymer is a salt and is ionised in this form.
Flash Point	Not determined	The notified polymer will be introduced in an aqueous emulsion and used in a paste and will never be isolated.
Flammability	Not determined	The notified polymer will be introduced in an aqueous emulsion and used in a paste and will never be isolated.
Autoignition Temperature	Not determined	The notified polymer will be introduced in an aqueous emulsion and used in a paste and will never be isolated.
Explosive Properties	Not determined	Contains no functional groups that imply explosive properties.
Oxidising Properties	Not determined	Contains no functional groups that imply oxidative properties.

DISCUSSION OF PROPERTIES

Reactivity
The notified polymer is expected to be stable under normal conditions of use.

Physical hazard classification
Based on the limited submitted 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 into Australia as a component of an aqueous emulsion at < 40% concentration for reformulation locally.

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

Year	*1*	*2*	*3*	*4*	*5*
Tonnes	< 5	< 5	< 5	< 5	< 5

PORT OF ENTRY
Melbourne

TRANSPORTATION AND PACKAGING
The notified polymer will be imported into Australia as a component of an aqueous emulsion at < 40% concentration in 200 kg drums for local reformulation into pigment paste. The products containing the notified polymer will be transported from the port of entry by road to the reformulation site. After reformulation, the pigment products containing < 2% notified polymer will be transported in 200 kg drums by road to car manufacture facilities.

USE
The notified polymer will be used as a component of primer in automotive coatings at < 2% concentration.

OPERATION DESCRIPTION

Reformulation
At the reformulation site, the emulsion containing the notified polymer (< 40% concentration) will be transferred from the import containers into an enclosed and automated blending tank. Therein, the notified polymer will be mixed with other ingredients. When blending is complete, a sample will be taken by QA staff for testing. The resulting pigment paste containing the notified polymer (< 2% concentration) will then be dispensed into 200 kg drums for supply to end-users.

End-use
At car manufacturing facilities, the pigment paste containing the notified polymer (< 2% concentration) will be pumped to an application tank and mixed with other components to form the finished primer. The primer will be applied to cars and car parts by a dipping process, and then cured by oven baking. The mixing process will be enclosed, and both mixing and dipping processes will be automated.

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)*
Reformulation - reactor/blending operators	8	25-35
Reformulation - maintenance personnel	1	5
Reformulation - laboratory staff	2-4	10
Reformulation - storage and handling	2-4	25-35
Transport – delivery	1-2	25-35
Application - electrocoat tank operators	1-2	20
Application - application/curing operators	1-2	20
Application - maintenance personnel	1-2	15
Application - laboratory staff	1-2	50

EXPOSURE DETAILS
Transport and storage workers may come into contact with the notified polymer in the imported emulsion (< 40% concentration) or as a component of pigment paste (< 2% concentration) only in the event of accidental rupture of containers.

Reformulation
Reformulation will be largely enclosed and automated; however workers may be exposed (dermal and ocular) to the notified polymer at < 40% concentration when transferring the emulsion from import containers to the mixing tank or transferring pigment paste from the mixing tank to the repackaging containers, during quality control testing and maintenance and cleaning tasks. Dermal and ocular exposure to workers should be further mitigated through the use of personal protective equipment (PPE) including protective coveralls, impervious gloves and goggles and local exhaust ventilation. Inhalation exposure is not expected as the notified polymer is expected to have a low vapour pressure at ambient temperatures.

End-use
The primer formation and application processes will be largely enclosed and automated; however workers (application operators and service technicians) may be exposed (dermal and ocular) to the notified polymer at < 2% concentration during quality control operations and maintenance and service tasks. Inhalation exposure to the notified polymer is not anticipated due to the expected low vapour pressure of the notified polymer and enclosed processes. Dermal and ocular exposure to workers should be further mitigated through the use of PPE including protective coveralls, impervious gloves and goggles.

Once the primer is cured and dried, the notified polymer will be bound within a hard durable coating matrix and will not be bioavailable.

6.1.2. Public Exposure

The notified polymer will be used in industrial settings only and will not be sold to the public. The public may come into contact with cars and car parts coated with primer containing the notified polymer. However, once the primer is cured and dried, the notified polymer will be bound within a hard durable coating matrix and will not be available for exposure.

6.2. Human Health Effects Assessment

No toxicity data were submitted.

The notified polymer is of high molecular weight and has a low proportion of low molecular weight species (< 500 Da); hence absorption across biological membranes is not expected. Furthermore, the notified polymer does not contain any functional groups of concern for chronic toxicity.

The notified polymer contains two functional groups (carboxylic acid and hydroxyl groups) that have been associated with irritation; however, given the high molecular weight and low proportion of low molecular weight species irritation effects are expected to be limited. The notifier has also stated that contact may result in slight skin and eye irritation.

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, or the *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 2004).

6.3. Human Health Risk Characterisation

6.3.1. Occupational Health and Safety

The notified polymer is expected to be of low hazard, presenting at most only as a slight skin and eye irritant. Given workers will only be exposed to the notified polymer at up to 40% concentration, the risk of irritation effects is expected to be low. Therefore, the risk of the notified polymer to occupational health is not considered to be unreasonable given the assumed low hazard and the assessed use pattern.

6.3.2. Public Health

The notified polymer will be used in industrial settings only and will not be sold to the public. The public may come into contact with the painted articles containing the notified polymer. However, once the notified polymer is cured, it will be bound within a polymer matrix and will not be bioavailable. Therefore, when used in the proposed manner, 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. Therefore, release of the notified polymer from this activity is not expected. Reformulation of the notified polymer will take place in Australia. However, accidental spillage from this process is expected to be limited due to the automated nature of the blending process which is typically in closed chambers. Accidental spills/leaks of the notified polymer during blending are expected to be contained in a bunded area, collected and disposed of to landfill.

During the reformulation process, it is estimated by the notifier that up to 8 kg of the total annual import volume of the notified polymer (due to sampling, maintenance and waste from the cleaning of equipment) is expected to be disposed of to landfill as solid waste. Under normal circumstances, there will be no rejected reformulated product. However, in a rare event, the notifier estimates that up to 4% (5,000 kg × 4% = 200 kg) of the total annual import volume of the notified polymer may be disposed of to landfill as rejected product. Wastewaters from the reformulation process are expected to be contained in the internal interceptor pit for treatment (flocculation) before it is released to the sewer as trade waste.

RELEASE OF CHEMICAL FROM USE
The materials containing the notified polymer are currently only used in the automotive industry. The potential release scenarios of the notified polymer at the industrial coating plants include:

a) Road tanker delivery to plants
No significant release of the product containing the notified polymer is expected during transport. In the unlikely event of a spill, the product containing the notified polymer will either be contained and disposed of to landfill or will be drained to the on-site interceptor pit.

b) Electrocoat (e-coat) immersion tank
Automotive bodies and parts are passed through the electrocoat tank by conveyor where the electrodeposition coating (e-coating) is deposited on the surface. The e-coat tank is replenished with additional coating. Overflow and excess coating is expected to be recycled or directed to internal interceptor pits. Residues collected from filtration of the e-coat tank contents are also expected to be directed to internal interceptor pits. It is expected the filters will eventually be dried and disposed of to landfill. No significant release of the notified polymer is expected at this stage.

c) E-Coat wash water tanks
Rinsing of the automotive metal surfaces after deposition is conducted by a closed loop process, with successive rinses, each feeding back to the previous rinse. The final rinse drainings and filtration residues are expected to be directed to the on-site interceptor pits. Sludge from the on-site interceptor pits, containing residues of the notified polymer, is expected to be disposed of to landfill, and effluent is expected to be directed to local sewage treatment plants (STPs).

During a typical e-coating process, the application transfer efficiency of e-coating is generally near unity and a typical transfer rate is approximately 97%. The 3% losses include 0.5% lost in water via the ultrafiltrate and 2.5% lost as sludge during the cleaning and rinsing of the electrodip tank. Up to 25 kg/year (5,000 kg × 0.5%) of the notified polymer is expected to enter internal interceptor pits.

RELEASE OF CHEMICAL FROM DISPOSAL
The notified polymer is expected to share the fate of the coated automobile parts and, at the end of the car's useful life, the coated metal articles will be sent to metal reclamation facilities or be disposed of to landfill. Residual notified polymer in empty import containers, up to 2% (5,000 kg × 2% = 100 kg) of the total import volume, is expected to be disposed of to landfill during drum recycling.

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 an inert coating matrix during the heat curing process. The notified polymer will share the fate of the coated automotive parts, which will involve eventual disposal to landfill or thermal decomposition during metal reclamation. In its cured form, the notified polymer is not expected to be bioavailable or mobile in the environment. Bioaccumulation of the uncured polymer is unlikely as it is not expected to cross biological membranes due to its high molecular weight.

Most of the residues of the notified polymer in waste streams generated from the electrodeposition coating process are expected to be captured by on-site interceptor pits. However, a small amount of the notified polymer may not be captured by these systems and could be released to the sewer. In sewage treatment plants, most of the notified polymer is expected to partition to sludge and sediment as it is a potentially cationic polymer and has high molecular weight. Sludge from treatment plants may be collected for disposal to landfill or used in soil remediation. The notified polymer released to the aquatic environment is expected to bind to sediments and suspended solids. Therefore, the notified polymer is expected to be significantly removed from receiving waters. The notified polymer will eventually degrade in landfill or by thermal decomposition during metal reclamation processes, to form water and oxides of carbon and sulfur.

7.1.3. Predicted Environmental Concentration (PEC)
The notified polymer in wastewaters from reformulation and use (5,000 kg × 0.5% = 25 kg) is expected to be contained in an internal interceptor pit and it is expected that 90% of the notified polymer is removed within internal interceptor pits based on its cationicity and high molecular weight (Boethling and Nabholz, 1997). Therefore, release of the notified polymer to a local Sewage Treatment Plant (STP) is up to 2.5 kg/annum

(25 kg/year × 10%). The Predicted Environmental Concentration (PEC) was calculated assuming that, after treatment, 10% of the total notified polymer contained in wastewater treated on site will be released to sewer annually. It was assumed that a further 90% of the notified polymer released to the local STP will partition to sludge. The release of the notified polymer will occur over 260 days per annum into the local STP. This corresponds to release only on working days, based on a 5 day work week. The average daily flow of the applicable local STP is 329 ML/day. The results of the calculation are shown in the table below.

Predicted Environmental Concentration (PEC) for the Aquatic Compartment		
Annual quantity of chemical released to internal interceptor pits	25	kg/year
Removal within internal interceptor pits	90%	
Annual quantity of chemical released to sewer	2.5	kg/year
Days per year where release occurs	260	days/year
Daily chemical release:	0.01	kg/day
Individual Sewage Treatment Plant Average Daily Flow:	329	ML/day
Removal within STP	90%	**Mitigation**
Dilution Factor - River	1.0	
Dilution Factor - Ocean	10.0	
PEC - River:	0.003	µg/L
PEC - Ocean:	0.0003	µg/L

Partitioning to biosolids in STPs Australia-wide may result in an average biosolids concentration of 0.26 mg/kg (dry wt). Biosolids are applied to agricultural soils, with an assumed average rate of 10 t/ha/year. Assuming a soil bulk density of 1500 kg/m^3 and a soil-mixing zone of 10 cm, the concentration of the notified polymer may approximate 0.002 mg/kg in applied soil. This assumes that degradation of the notified polymer occurs in the soil within 1 year from application. Assuming accumulation of the notified polymer in soil for 5 and 10 years under repeated biosolids application, the concentration of notified polymer in the applied soil in 5 and 10 years may approximate 0.01 mg/kg and 0.02 mg/kg, respectively.

STP effluent re-use for irrigation occurs throughout Australia. The agricultural irrigation application rate is assumed to be 1000 L/m^2/year (10 ML/ha/year). The notified polymer in this volume is assumed to infiltrate and accumulate in the top 10 cm of soil (density 1500 kg/m^3). Using these assumptions, irrigation with a concentration of 0.003 µg/L may potentially result in a soil concentration of approximately 0.02 µg/kg. Assuming accumulation of the notified polymer in soil for 5 and 10 years under repeated irrigation, the concentration of notified polymer in the applied soil in 5 and 10 years may be approximately 0.1 µg/kg and 0.2 µg/kg, respectively.

7.2. Environmental Effects Assessment

No ecotoxicity data were submitted. Cationic polymers have the potential to exert toxic effects to aquatic life. However, the majority of the notified polymer will be cured into an inert, cross-linked matrix with other chemical substances as part of the coating process, and will not be bioavailable in this form. Furthermore, given that the notified polymer is efficiently removed from wastewater during on site and STP treatments, it is not expected to reach ecotoxicologically significant concentrations in the environment.

7.2.1. Predicted No-Effect Concentration

A Predicted No-Effect Concentration (PNEC) was not calculated as no ecotoxicological data were submitted and there will be very low potential for aquatic exposure.

7.3. Environmental Risk Assessment

A Risk Quotient was not quantified as a PEC and PNEC were not calculated. The reported use pattern of the notified polymer indicates that there is no significant anticipated aquatic release. In its cured state the notified polymer will be irreversibly bound into an inert matrix and is unlikely to leach or be bioavailable. On the basis of the assessed use pattern, the notified polymer is not considered to pose an unreasonable risk to the environment.

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