File No: LTD/1229

31 August 2006

NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME (NICNAS)

FULL PUBLIC REPORT

Polymer in RCP-29668

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 the Environment and Heritage.

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Director
NICNAS

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1. APPLICANT AND NOTIFICATION DETAILS

APPLICANT(S)
DuPont (Australia) Ltd. (ABN: 59 000 716 469)
168 Walker Street
North Sydney NSW 2060

NOTIFICATION CATEGORY
Limited: Polymer with NAMW ≥ 1000 (greater than 1 tonne per year).

EXEMPT INFORMATION (SECTION 75 OF THE ACT)
Data items and details claimed exempt from publication:

1) Chemical name
2) Other names or synonyms. Any cross references to product names or companies otherwise using this chemical.
3) CAS number
4) Molecular formula
5) Structural formula
6) Functional groups
7) Spectral data
8) Molecular weight
9) Weight percentage and ingredients, including catalysts or process additives
10) Residual monomers/other reactants
11) Purity
12) Identity and % weight of toxic or hazardous impurities
13) Non-hazardous impurities
14) Identity of additives/adjuvants
15) Manufacture/import volume of RCP-49668 or any associated paint
16) Identity of manufacture sites
17) Process description, encompassing any technique or technology surrounding the manufacture of polymer RCP29668 or paint using RCP29668
18) Paint manufacture using RCP29668, method, application and quantity. Percentage in paint not otherwise disclosed by the MSDS or label.
19) Any information relating to or inferring any commercial arrangements

With regard to the paint manufacture, the claim for exempt information does not include basic information as defined by the Act.

VARIATION OF DATA REQUIREMENTS (SECTION 24 OF THE ACT)
Variation to the schedule of data requirements is claimed as follows:

1) Melting point/Freezing point
2) Boiling point
3) Density
4) Vapour pressure
5) Water solubility
6) Partition coefficient
7) Adsorption/desorption
8) Dissociation constant
9) Flammability limits
10) Autoignition temperature

PREVIOUS NOTIFICATION IN AUSTRALIA BY APPLICANT(S)
None

NOTIFICATION IN OTHER COUNTRIES
USA - TSCA TS1174 (2001)
USEPA (2000)
Health Canada: NSN11965 (13/12/02)
Environment Canada: NSN11965 (2002)

2. IDENTITY OF CHEMICAL

MARKETING NAME(S)
RCP-29668 (30-60% notified polymer in resin solution, <20% notified polymer in imported finished paints)

3. COMPOSITION

DEGREE OF PURITY
>70%

HAZARDOUS IMPURITIES/RESIDUAL MONOMERS
All hazardous impurities and residual monomers are present at below the relevant cut offs for classification of the notified polymer as a hazardous substance.

NON HAZARDOUS IMPURITIES/RESIDUAL MONOMERS (>1% by weight)
None

ADDITIVES/ADJUVANTS
None

DEGRADATION PRODUCTS
The degradation products due to fire are expected to be CO, CO_2 , H_2O and small amounts of SO_2.
The polymer is not readily biodegradable but is expected to slowly degrade by biotic and abiotic mechanisms in landfill.

LOSS OF MONOMERS, OTHER REACTANTS, ADDITIVES, IMPURITIES
The notified polymer is not expected to lose monomers, impurities or other reactants during normal conditions of use.

4. INTRODUCTION AND USE INFORMATION

MODE OF INTRODUCTION OF NOTIFIED CHEMICAL (100%) OVER NEXT 5 YEARS
The notified polymer will not be manufactured in Australia but will be imported as a component in paint at a concentration up to 20%. The notified polymer may also be imported as resin solution RCP-29668 for paint manufacture in Australia, at a concentration of 30-60%.

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

Year	*1*	*2*	*3*	*4*	*5*
Tonnes	3-10	3-10	10-30	10-30	10-30

USE
Resin used in automotive paint.

5. PROCESS AND RELEASE INFORMATION

5.1. Distribution, transport and storage

PORT OF ENTRY
The notified polymer will be imported as a component of a resin to be used in local paint manufacturing or as part of imported finished paint.

The notified polymer will be manufactured in Europe or the USA and imported through Sydney by seafreight.

IDENTITY OF MANUFACTURER/RECIPIENTS
Initially to the notifier.

TRANSPORTATION AND PACKAGING
Imported Product
The notified polymer will be imported as a component of finished paint in dangerous goods approved mild steel cans (1 L, 0.95 L, 3.78 L, or 4 L), then boxed as part of a FCL shipment to the warehouse, where it will be stored until distribution to end users.

The warehouse re-aggregates the imported goods into cartons for transport by dangerous goods approved courier to the distributors' approved stores/warehouses then by DG approved courier by road to individual smash repair shops.

DuPont Protective Coatings Local Manufacture
RCP29668 resin solution containing the notified polymer will be imported in FCLs of 200 L closed head steel drums, 4 to a pallet. These drums will be transported by road from the wharf to the notifier's manufacturing site for manufacture into finished paint. The finished paint will then be packed into 1 L or 4 L mild steel cans that will be palletised into cardboard trays, each carton containing eight cans for transport and storage in the warehouse. Final distribution is the same as for the imported product.

5.2. Operation description

Local manufacture of paint by DuPont Protective Coatings
Drums (200 L) are received and stored in a drum farm at the manufacturing site until required for production.

Resin solution containing the notified polymer is transported and emptied into a 5000 L covered mixer using a trolley jack with tilt facility. Bulk solvents are added to the batch slowly via piped supply directly into the mixer or pumped from drums. Manufacturing occurs over a period of up to 10 hours. When loading of the product formulation is complete the mixture is stirred for 30 minutes to 1 hour before the batch is tested. The batch is then automatically drummed off into 1 L or 4 L cans.

Up to 400 tonnes of finished product may be produced in 80 batches throughout the year.

The finished products will be used by professional spray painters. The product will be mixed with other components and sprayed in a booth fitted with an exhaust/filter system.

5.3. Occupational exposure

Number and Category of Workers

Import and Distribution of Finished Product

Category of Worker	*Number*	*Exposure Duration*	*Exposure Frequency*
Transport driver inwards	1	4 hrs	20 days per year
Warehouse storemen	10	0.05hrs	2000 hrs per year
Transport drivers outwards	30	4 hrs	20000 hrs per year
Local Manufacturing			
Storemen	1	2hrs per day	1 day per year
Factory hand (mixing resin solution)	1	6hrs per day	80 days per year
Filling room		6hrs per day	80 days per year

Quality control	1	0.66hr per day	80 days per year
Local Use By Spray Painters			
Weighing and mixing	3800	0.8hr per day	125 days per year
Spraying	3800	0.6 hr per day	125 days per year
Cleaning	3800	0.25 hr per day	125 days per year

Exposure Details

Import and distribution of finished product

Exposure of transport and warehouse workers to the notified polymer within finished paint products (<20% concentration) is only likely to occur in the event of an accidental spillage.

Local manufacturing

Dermal and ocular exposure of workers to the notified polymer may occur during the manufacture of paint products. Specifically, this may occur during the emptying of polymer resin solution into the mixer but is unlikely to be large given the mechanically assisted transfer procedure and the use of personal protective equipment (PPE) as typically employed in the industry. The maximum exposure level of the notified polymer would be <60%. Local exhaust ventilation is used to control exposure to solvent fumes, and aerosols containing the notified polymer are unlikely to be formed.

Local use by spray painters

There is the potential for professional spray painters to be exposed to the notified polymer via dermal, ocular and inhalation routes. However, this should be minimised by use of the finished paint products in spray painting booths fitted with exhaust/filter systems. In addition, the spray painters can use an air respirator, face shield, gloves and protective suit to protect from potential exposure to over spray. The maximum concentration of the notified polymer to which such workers are likely to be exposed is <20%.

5.4. Release

RELEASE OF CHEMICAL AT SITE

The notified polymer is not currently manufactured in Australia but is reformulated into paint formulations. The release of the notified polymer at the reformulation site is minimal. The moderate viscosity of RCP29668 allows the resin to nearly completely drain from the 200 L drums used for import. The residual in the drums would be less than 1 % resulting in up to 300 kg being sent to drum recycling.

The drum recycle firm will remove residual resin by either solvent wash or by removing the top of the drum and incinerating any residuals.

Wash solvent is recycled and any polymer residues cooked to form a solid polymer mass that complies with NSW EPA specifications for water-soluble fractions <1ppm. The residual polymer mass may then be either land filled or sent to a asphalt manufacturer to be used as a modifier that enhances anti stone chip in road base.

RCP29668 residues remaining in the 5,000 L mixer are removed from the mixer sidewalls and filling equipment by solvent wash using recycled washout solvent. The conical gravity feed shape of the mixer minimises residual paint remaining and requiring to be washed from the mixer and filling lines. Assuming that 10 L of reformulated paint remains in each batch of approximately 5000 L then the wastage rate is 0.2%. This results in 60 kg of the notified polymer being sent to a solvent recycling firm for recycling using the same NSW EPA protocol as used by the drum reconditioning firm above.

Thus the maximum total waste of notified polymer from local reformulation will be approximately 300 + 60 = 360 kg, none of which is released into the environment due to controls in place.

Spills may occur on the filling line but are usually limited to a 4 L can unit which is adsorbed with sand or vermiculite and shovelled into an open head drum for disposal.

RELEASE OF CHEMICAL FROM USE

It is expected that up to 5% of the paint containing the notified polymer will remain in its container

requiring disposal. Of the remaining 95% of the total import volume of notified polymer a maximum of a further 10% of the polymer is likely to be wasted from cleaning of the mixing container and spray equipment. It is likely that approximately 86% of the total import volume of the notified chemical will be used for its intended purpose for spray painting once wastage from other sources is taken into account. During spray painting operations it is expected that between 20 – 50% will be wasted as overspray. An estimated amount of overspray, which is also the average of the extremes, is 35%. The vast majority of spray painting will be performed in spray booths where the notified polymer will be captured by a water curtain of spray booth/room filters as dried, catalysed, insoluble polymers. It is expected that almost all of the notified polymer will be removed as sludge before entering the sewer. The remaining polymer in the sewage will largely adhere to the sludge in the Sewage Treatment Plant (STP) with minimal amounts entering the aquatic environment. Although it is possible for overspray to be collected on newspaper for very minor repairs, this technique is not condoned by the industry and is not generally practiced. The amount collected on newspaper is expected to be minimal and after curing is likely to be disposed of as domestic waste.

5.5. Disposal

Unused paint, mostly cross-linked, dirty paint laden wash solvent and residuals from spills are poured into a closed head drum and sent to a solvent recycling firm for distillation and recycle of the solvent. The residual polymer is reduced to a solid after distillation residues are autoclaved at high temperatures so that the polymer mass is highly cross-linked and there is no water extractable fraction remaining. Once tested to the NSW EPA protocol for water extractable fraction, the polymer mass may be sent to landfill or can be combined with asphalt to be used as road base tackifier.

Residual paint in containers is expected to be disposed to landfill.

Collected overspray will be disposed to landfill.

5.6. Public exposure

Public exposure to the notified polymer during transportation is unlikely except in the case of an accident. The maximum concentration of notified polymer to which the public may be exposed is <60%.

The notified polymer will not be sold to the public, being used by professional spray painters in a controlled industrial setting. The polymer will become a part of the fully cured motor vehicle topcoat before it will come in contact with the general public. As part of the topcoat the polymer will be fully cured and cross-linked by isocyanate cure and adhered to a vehicle's outer surface forming a continuous totally insoluble molecule of infinite size and is consequently rendered non-bioavailable.

6. PHYSICAL AND CHEMICAL PROPERTIES

The data supplied are primarily for the polymer solution RCP-29668, containing the notified polymer at a concentration of 30-60%, as it is manufactured in solvent and is never isolated.

Appearance at 20°C and 101.3 kPa Clear viscous liquid

Melting Point/Freezing Point Not determined

Remarks As a polymer solution, the freezing point would be similar to the solvent butyl acetate (-73.5°C). Data for the generic solid PMMA indicates a melting point of 130°C, but typically for a copolymer like that in RCP-29668 the melting point will be over a range of temperatures as the notified polymer is less crystalline than PMMA.

Boiling Point 142-152°C at 101.3 kPa as the polymer solution RCP29668

METHOD DuPont method similar to OECD TG 103 Boiling Point.

Remarks Cited in MSDS for product containing the notified polymer. The solid polymer is expected to decompose at temperatures >200°C before volatilising.

Density 1010 kg/m^3 as the polymer solution RCP-29668

METHOD DuPont method similar to OECD TG 109 Density of Liquids and Solids.
Remarks Cited in MSDS for product containing notified polymer. The density of the notified polymer is expected to be typical of a solid acrylic such as PMMA (1.17-1.20).

Vapour Pressure <0.7 kPa at 25ºC for the polymer solution. This is based upon the vapour pressure of butyl acetate.

Remarks The notified polymer resin solution is expected to have a vapour pressure approximating the highest vapour pressure of the solvent. The solvent is primarily pentyl acetate, which has a vapour pressure of 0.65kPa.

Water Solubility ~ 0.5 g/L at 25°C as the polymer solution RCP-29668

METHOD In house method similar to OECD TG 105 Water Solubility. Three 10 g samples were added to 500 mL of water and stirred for 24, 28 and 72 hours respectively at 25°C. Aliquots (70 mL) of the aqueous phase were centrifuged at 1700 rpm, filtered through a 0.5 µm filter and baked for two hours at 110°C.
Remarks Flask Method
TEST FACILITY DuPont (2006)

Hydrolysis as a Function of pH

METHOD Not tested

Remarks The notified polymer contains hydrolysable groups, but it is unlikely to undergo hydrolysis in the environmental pH range of 4 – 9.

Partition Coefficient (n-octanol/water)

METHOD Not tested
Remarks The notified polymer is likely to be surface active due to its functional groups and chemical structure. The partition coefficient is not a valid test for surface active chemicals.

Adsorption/Desorption
– screening test

METHOD Not tested
Remarks The notified chemical has significant hydrophobic portions as well as ionic sites. These are likely to bind respectively to the organic portion and the charged portions of the soil. The polymer is likely to be immobile in soils.

Dissociation Constant pKa < 1

METHOD Not tested
Remarks The notified polymer contains anionic groups that are expected to show typical acidity. This will only apply to the water soluble fraction of the notified polymer (known to be relatively insoluble).

Particle Size Not applicable

Remarks The notified polymer is not isolated from solution

Flash Point 22.8 – 37.8ºC at 101.3 kPa for resin solution

METHOD EC Directive 92/69/EEC A.9 Flash Point.

Remarks Cited in MSDS for product containing notified polymer, largely dictated by the pentyl acetate solvent.
TEST FACILITY DuPont Lab

Flammability Limits Upper: 7.6%
Lower: 1.1% for the polymer solution

METHOD EC Directive 92/69/EEC A.11 Flammability (Gases).
Remarks Cited in MSDS, for product containing notified polymer.

The solid polymer is not expected to have a measurable vapour pressure and is expected to be combustible, not flammable. The results shown above for the polymer solution are primarily characteristic of the solvents present in the solution, which is largely pentyl acetate.
TEST FACILITY DuPont Lab

Autoignition Temperature >200°C

Remarks Typical value for acrylic polymers

Explosive Properties Not determined

Remarks The chemical components, functional groups and structure of the notified polymer suggest the polymer is not likely to be explosive.

Reactivity

Remarks The notified polymer contains ionised groups that are not typically reactive. The polymer has no hydrolysable functionality, low reactivity with other groups of low chemical potential, high stability, and is not classified as an oxidising substance under the IMDG or ADG.

7. TOXICOLOGICAL INVESTIGATIONS

No toxicity data were submitted.

8. ENVIRONMENT

8.1. Environmental fate

8.1.1. Bioaccumulation

Not tested. The notified polymer has a high molecular weight and is unlikely to cross biological membranes and is therefore unlikely to bioaccumulate.

8.2. Ecotoxicological investigations

The polymer is cationic and will therefore show toxicity to aquatic life forms, especially algae. The aquatic toxicity increases with charge density, however, the FGEW for this polymer is close to 5000, where aquatic toxicity is expected to be low.

9. RISK ASSESSMENT

9.1. Environment

9.1.1. Environment – exposure assessment

The notified polymer is used in an automotive refinish spray paint resin for the manufacture of an isocyanate curing topcoat. The topcoat will remain permanently bonded to the metal surface. At the end of its useful life it will be disposed to landfill or recycled. During recycling the metal components will be melted in a furnace where the coating will be decomposed to oxides of carbon, sulphur and nitrogen and water vapour. Overspray and other wastes during use amounting to up to 11.7 tonnes will cure and be captured, with the resulting sludge being landfilled. Residues from drum recycling are likely to be incinerated or used as tackifier in road base. Any spills are expected to bind to soil and not be mobile, where they will eventually undergo in-situ degradation by biotic and abiotic processes.

9.1.2. Environment – effects assessment

The notified polymer is cationic and will therefore show toxicity to aquatic life forms, especially algae. The aquatic toxicity increases with charge density, however, the FGEW for this polymer is close to 5000, where aquatic toxicity is accepted to be low.

9.1.3. Environment – risk characterisation

Although no predicted environmental concentration (PEC) and consequently risk quotient (RQ) can be calculated it is expected that the release of the notified polymer to the environment would be minimal. The risk is therefore expected to be acceptable.

9.2. Human health

9.2.1. Occupational health and safety – exposure assessment

During the local manufacture of paint products, dermal and incidental ocular contact are the main potential routes of exposure to the notified polymer. However, overall worker exposure is expected to be low, given the use of mechanically assisted transfer procedures, the use of personal protective equipment, local exhaust ventilation and the fact that aerosols are unlikely to be produced during mixing.

Professional spray painters may be exposed to the notified polymer via dermal, ocular and inhalation routes. Overall exposure is expected to be minimised by working in spray painting booths fitted with exhaust/filter systems and the use of personal protective equipment.

9.2.2. Public health – exposure assessment

Public exposure to the notified polymer is only likely to occur in the event of a transport accident. Members of the public may come into contact with motor vehicles that have been sprayed with paint containing the notified polymer, however, the polymer will be fully cured and is not considered to be bioavailable.

9.2.3. Human health – effects assessment

No toxicological data have been provided for the notified polymer and therefore it cannot be classified in accordance with the NOHSC Approved Criteria for Classifying Hazardous Substances (NOHSC, 2004). However, the polymer has a high molecular weight and is therefore unlikely to be absorbed across biological membranes, has low levels of low molecular weight species and does not contain impurities that would cause it to be classified as a hazardous substance according to the NOHSC criteria. As a polymer is cationic there is some potential for irritation.

9.2.4. Occupational health and safety – risk characterisation

The notified polymer has not been tested for any toxicological properties but may be an irritant based on its cationic nature. However, a low order of toxicity can be predicted as discussed in section 9.2.3. In addition, given that exposure of workers to the notified polymer during reformulation or end use is mitigated through the use of engineering controls and personal protective equipment, the OHS risk of the notified polymer is considered to be low.

9.2.5. Public health – risk characterisation

The risk to public health from exposure to the notified polymer is considered to be low, given that transport accidents are unlikely to occur. In addition, public exposure to the notified polymer in a cured film on the exterior of motor vehicles, presents minimal risk to public health

as the polymer will not be bioavailable.

10. CONCLUSIONS – ASSESSMENT LEVEL OF CONCERN FOR THE ENVIRONMENT AND HUMANS

10.1. Hazard classification

Based on the available data the notified chemical is not classified as hazardous under the NOHSC *Approved Criteria for Classifying Hazardous Substances*.

10.2. Environmental risk assessment

The notified polymer is not considered to pose a risk to the environment based on its reported use pattern.

10.3. Human health risk assessment

10.3.1. Occupational health and safety

There is Low Concern to occupational health and safety under the conditions of the occupational settings described.

10.3.2. Public health

There is No Significant Concern to public health when used as an ingredient in paint formulations for the automotive industry.

11. MATERIAL SAFETY DATA SHEET

11.1. Material Safety Data Sheet

The MSDS of products containing the notified polymer provided by the notifier were in accordance with the NOHSC *National Code of Practice for the Preparation of Material Safety Data Sheets* (NOHSC, 2003). They are published here as a matter of public record. The accuracy of the information on the MSDS remains the responsibility of the applicant.

11.2. Label

The label for a product containing the notified polymer provided by the notifier was in accordance with the NOHSC *National Code of Practice for the Labelling of Workplace Substances* (NOHSC, 1994). The accuracy of the information on the label remains the responsibility of the applicant.

12. RECOMMENDATIONS

CONTROL MEASURES

Occupational Health and Safety

- Employers should implement the following engineering controls to minimise occupational exposure to formulations containing the notified polymer:
  - Mechanically assisted transfer procedures when emptying the polymer resin solution into the mixer.
  - Local exhaust ventilation during the manufacture of paint products.
  - Spray painting booths fitted with an exhaust/filter system during end-use spray painting.

- Employers should ensure that the following personal protective equipment is used by workers to minimise occupational exposure to formulations containing the notified polymer:
  - Air-fed respirators (if necessary), face shields, gloves, and protective suits during spray painting operations.

  Guidance in selection of personal protective equipment can be obtained from

Australian, Australian/New Zealand or other approved standards.

- 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 NOHSC *Approved Criteria for Classifying Hazardous Substances*, workplace practices and control procedures consistent with provisions of State and Territory hazardous substances legislation must be in operation.

Environment

Disposal

- The notified polymer should be disposed of by authorised incineration or landfill.

Emergency procedures

- Spills or accidental release of the notified polymer should be handled by physical containment using inert adsorbent (vermiculite sand etc.), with subsequent disposal.

12.1. Secondary notification

The Director of Chemicals Notification and Assessment must be notified in writing within 28 days by the notifier, other importer or manufacturer:

(1) Under Section 64(2) of the Act:
  - if any of the circumstances listed in the subsection arise.

The Director will then decide whether secondary notification is required.

No additional secondary notification conditions are stipulated.

13. BIBLIOGRAPHY

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