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NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME

FULL PUBLIC REPORT

RC5156

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Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT

RC5156

1. APPLICANT

DuPont (Australia) Ltd. of 49-59 Newton Road, WETHERILL PARK NSW 2164 has submitted a notification statement in support of their application for an assessment certificate for RC5156 as a synthetic polymer of low concern.

2. IDENTITY OF THE CHEMICAL

The chemical name, CAS number, molecular and structural formulae, molecular weight, spectral data, details of the polymer composition and details of exact import volume have been exempted from publication in the Full Public Report and the Summary Report.

The polymer meets the criteria for assessment as a synthetic polymer of low concern.

Number-Average Molecular Weight (NAMW):	>1000
Maximum Percentage of Low Molecular Weight Species	
Molecular Weight < 500:	< 2 %
Molecular Weight < 1 000:	< 5 %
Polymer Stability	The polymer is expected to be stable
Reactivity	The polymer does not contain any reactive functional groups
Particle Size	The polymer will not be used in Australia in solid form
Charge Density	The polymer will not be charged under normal environmental conditions
Water Solubility	The polymer is stated to have a solubility of <1 ppm
Method of Detection and Determination:	The polymer is characterised by GPC and identified by IR spectroscopy. A reference spectrum has been provided.

The water solubility of the notified polymer has not been measured as the polymer is produced in solution and not purified to the extent required to accurately measure water

solubility. The polymer will be predominantly hydrophobic and has a high molecular weight, and so the estimated water solubility seems correct.

3. PHYSICAL AND CHEMICAL PROPERTIES

The polymer will be imported as a solution in a mixture of solvents, as part of a paint component. The properties reported below are variously those of the paint solution and of the notified polymer, as stated. The flammability properties are due to the solvents in the paint.

Appearance at 20°C and 101.3 kPa:	Colourless to light yellow clear solution in pure form, but will only be imported in pigmented paints
Glass Transition Temperature:	57.1°C for the polymer (calculated)
Specific Gravity:	1.02 (polymer, estimated)
Water Solubility:	not determined (see below)
Hydrolysis as a Function of pH:	No groups are expected to be hydrolysed under normal environmental conditions
Dissociation Constant:	There are no acidic or basic functional groups
Flash Point:	not determined
Flammability Limits:	Upper Explosive Limit = 13.1 % Lower Explosive Limit = 1.0 % (for the solution)
Autoignition Temperature:	> 370°C (for the solution) > 220°C (for the polymer, estimated)
Explosive Properties:	The polymer is not expected to be explosive
Reactivity/Stability:	The polymer as notified contains no reactive functional groups

Comments on Physico-Chemical Properties

The notifier states a value of < 1 mg/mL for the water solubility of this polymer although this has not been measured. The polymer has a low proportion of hydrophilic groups, and is intended to disperse pigment particles in a stable manner within polymer microgel particles in a paint formulation. The microgel particles in which the notified polymer will be located will be expected to be extremely water insoluble.

The notified polymer is of high molecular weight, with the notifier claiming that as a constituent of vehicle finishing paints it is designed to be chemically and environmentally inert. While the new polymer contains pendant ester linkages and other functionalities which are inherently susceptible to hydrolytic cleavage, the polymer will be securely bound into a cured resin matrix in the paint. This will preclude contact between the potentially reactive

functionalities and water (as well as other reactants in the environment), and hence the possibility for hydrolysis or other reactions would be extremely small.

The polymer has no well defined melting point, but the glass transition temperature was stated to be 57.1°C, but no substantiating reports or calculations accompanied the submission.

4. PURITY OF THE CHEMICAL

Degree of Purity: < 4 % in paint component

Maximum Content of Residual Monomers: The residual monomers are present at < 1 %, and are present at below the cutoff levels for classification of the polymer as hazardous.

Additives/Adjuvants:

The notified polymer will be imported in pre-prepared paint tinters, and will have a large number of adjuvants such as stabilisers, pigments and solvents. A number of the components of the imported paints are specified in the Material Safety Data Sheet (MSDS); it is likely that individual batches of the paints will have some differences in formulation. Certainly there will be differences in the pigments incorporated.

5. USE, VOLUME AND FORMULATION

The notified polymer will not be manufactured in Australia. It will be imported at a volume of less than 20 tonnes per annum. The polymer will be imported in the form of a component of pre-prepared automotive paint components, IMRON 6000 Tinters, at a concentration of < 4 % (w/w). The paint will initially be supplied to Original Equipment Manufacturers in the heavy vehicle market for refinish work.

6. OCCUPATIONAL EXPOSURE

The notified polymer will be imported in 0.95 L (1 US quart) and 3.78 L (1 US gallon) Dangerous Goods approved cans. The notifier has provided no detail on the type of packaging for the overall shipment of imported individual containers or the handling involved in breaking up the shipment into individual containers for dispatch to the customer sites. The notifier states that the individual product containers are not opened before arrival at the end use site and that the likelihood of a spill is low.

The product is stored in a Dangerous Goods approved warehouse and transported in small lots to the customer facility. The paints containing this polymer will initially be supplied to Original Equipment Manufacturers (OEMs) in the heavy vehicle industry, whose facilities could be expected to include comprehensive engineering controls and facilities for waste trapping and disposal. The notifier intends further expansion of the use of the product containing the notified polymer into the car refinish industry, with a market penetration of 20 % being indicated as a possible goal. With 4000 spray painting businesses employing 19000 trained professional spray painters throughout Australia, this would imply that around

4000 workers would be exposed to the notified polymer in the non-cured form.

The spray painters who will be exposed to the notified chemical will be fully TAFE trained. Typically the spray painter will measure the appropriate amounts of the different components required in a particular formulation into an open container and pour this mixture into a spray gun. The spraying of the automobile will be carried out in a laminar flow downdraft spray booth which is designed to rapidly remove aerosol particles and solvent vapour from the atmosphere. Several possible booth designs may be used. In a dry floor booth, the overspray will be collected in filters contained in the floor of the booth; any unremoved particulates will reach the exhaust stack with the solvent vapours. In a wet floor booth, overspray will collect in a pool of water below the grill floor or in a wet scrubber in the exhaust and will be removed with a filter. The residual solids will be disposed of to secure landfill. The spray booths are subject to AS/NZS/4114.1:1995 *Spray Painting Booths – Design, Construction and Testing* and AS/NZS/4114.1:1995 *Spray Painting Booths – Selection, Installation and Maintenance*.

Residual paint mixture will be washed from the equipment manually, using recycled paint solvent, and the washings will be disposed of by solvent recyclers.

Once residual final paint mixture has dried, the notified polymer will be irreversibly bound within the cured matrix and not separately available for either exposure to workers, or for dermal absorption.

Spray painters will wear appropriate personal protective equipment at all times; gloves and overalls while mixing the paint, and, in addition, a full face shield and respirator while inside the spray booth.

7. PUBLIC EXPOSURE

There is little potential for public exposure to the notified polymer arising from transport, occupational use and disposal. In the event of an accidental spill, the polymer will remain part of the paint, which the notifier states should be scraped up and placed in suitable containers for disposal. The polymer would not be expected to partition into the aqueous compartment if released into the environment, but rather to associate with the sediments, as detailed below. Waste from the industrial use of the polymer will be disposed of through a licensed waste disposal contractor in approved landfill. The polymer in the form of uncured paint will therefore remain within the industrial domain, and public exposure due to the environmental spread of the polymer is unlikely.

The notified polymer will enter the public domain only in the form of cured paint films on heavy vehicles. This paint film will contain the polymer in a crosslinked unreactive form which will not be bioavailable.

8. ENVIRONMENTAL EXPOSURE

Release

Except in the case of accident, no release or exposure to the environment is expected from this polymer during transportation. The MSDS for the new tinter gives adequate instructions for cleaning up such spills.

The notifier has estimated that up to 5% of the paint tinter may be left in the tins after use and another 5% may be left in the spraying equipment. However, the major release will be as a consequence of overspray during application, which may be as high as 50% of total paint used, despite the claim that the new material will be used only by qualified professional spray painters. On the basis of the import volume figures provided, a number of tonnes of the new polymer could be released during spray paint application. It is expected that this release would be on a nationwide basis, so release would be quite diffuse.

In the case of material left in cans, this could be expected to be mixed with residual hardener (at least when used in dedicated spray painting shops), and disposed of with the empty containers into landfill. The notifier indicates that paint and solvent residues removed from spray equipment would be collected and reprocessed by a solvent reclamation company. Presumably the entrained solids would be recovered during this process and sent to landfill or incinerated.

Paint residues from spray booths (i.e. the overspray) would be in the form of dried aggregates or flakes, and would be captured by air filters as solid waste, or be washed away with water and presumably discharged to sewer - possibly after treatment to remove solids. Some dried paint may be captured in air filters, then combined with other solid waste. This would be placed into landfill or incinerated by qualified licensed contractors. The company indicates that the preferred method for disposal of waste or unused paint, including those formulations containing the new polymer, is via incineration.

Fate

The notifier expects that, if any of the uncured tinter formulation containing the new polymer were spilt, it would be expected to associate with and become assimilated into the organic component of soils and sediments because of its predominantly hydrophobic nature. Biological membranes are not permeable to polymers of very large molecular size, consequently bioaccumulation of the notified polymer would not be expected if quantities of the uncured polymer were to be released into the water compartment.

Once applied to the metal panels of vehicles the notified polymer will be incorporated in a hardened paint matrix and bound the surface of metal panels on vehicles. Any fragments, chips or flakes of the dried paint will be of little concern as they are expected to be inert. At the end of their useful life, metal panels coated with the polymer are likely to be either recycled for steel reclamation or be placed into landfill. When recycled the paint would be destroyed in the blast furnaces and converted to water vapour and oxides of carbon, nitrogen and sulphur, and ash. When deposited into landfill with used paint tins or on discarded panels, the organic components of the cured paint including the new polymer would be inert and immobile, but could nevertheless be expected to be very slowly degraded through the biological and abiotic processes operative in these facilities.

Any of the notified polymer released to the sewer would be bound within particles and flakes of a cured polymer matrix (paint). These would be quite insoluble, and would be expected to

become associated with the sewer plant sludge and deposited into landfill or incinerated.

9. EVALUATION OF TOXICOLOGICAL DATA

No toxicology data were submitted, which is acceptable for a synthetic polymer of low concern. The polymer is stable with low volatility. Polymers of high molecular weights do not readily cross biological membranes. The notified chemical is currently in use in the United States in a similar way to the proposed Australian use. The notifier states that no occupational or public health issues have been reported in the United States.

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

No ecotoxicological data were provided, which is acceptable for synthetic polymers of low concern.

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

It is possible that up to 60% of the new polymer could be released as a consequence of paint application, but this is expected to be nationwide and hence diffuse. The majority of the material would be encapsulated in a cured polymer matrix and is expected to be insoluble and inert. Most of this solid waste would be deposited into landfill or incinerated.

However, some of the cured waste paint may be released into sewers as a consequence of cleaning spray equipment or wash down of spray booths. It would become incorporated into sewerage treatment plant sludge and eventually either incinerated or placed into landfill.

The polymer is unlikely to present a hazard to the environment when it has been incorporated into the paint, applied to solid substrates and cured. Such painted objects will be consigned to metal reclamation plants or landfill at the end of their useful lives and the paint containing the notified substance will share their fate.

The main environmental hazard would arise whereby spills in transport accidents may release small quantities of the polymer to drains and waterways. However, the polymer should quickly become immobile on association with the soil/sediment layer.

The low environmental exposure of the polymer as a result of the proposed use indicates the overall environmental hazard should be low.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

Occupational Health and Safety

There is little potential for significant occupational exposure to the notified polymer in the transport and storage of the paint components containing this polymer. The greatest exposure is in the use and disposal of the paints.

The MSDS for the pre-prepared paint component lists a number of potential health effects, namely gastrointestinal distress, skin, eye and respiratory irritation, nervous system depression and chronic brain and nervous system damage. These relate mainly to the solvents and additives, rather than the notified polymer.

The final paint mix, including the pre-prepared paint containing the notified polymer, could contain a wide variety of additional ingredients once fully mixed. This is likely to introduce human health hazards because, apart from a range of potentially toxic solvents, the other components include resins with pendant isocyanate groups. The spraying procedure also produces a dense aerosol of paint particles which would adversely affect human health even in the absence of additional hazardous components. It is also probable that professionals involved in the spray painting industry will use a number of different paint formulations.

For these reasons, the notified polymer must be assessed for the contribution it makes to the hazards associated with use of the spray paints. The presence of many potential and actual hazardous substances in the formulations requires the use of stringent engineering controls, such as a correctly constructed and maintained spray booth, and of a high level of personal protective equipment, such as impermeable overalls and gloves and a full face shield and respirator. The use of the paint containing the notified polymer should be in accordance with the NOHSC *Draft National Code of Practice for Spray Painting* (National Occupational Health and Safety Commission, 1991). The level of protection from exposure afforded by the standard protective measures will provide adequate protection from the notified polymer, which is likely to be less intrinsically toxic than most of the solvents, pigments and other paint resins.

Once the applied final paint mix has hardened, the polymer will not be separately available for exposure or absorption.

There are NOHSC exposure standards for butyl acetate, methyl amyl ketone, ethylbenzene, xylene, amyl acetate, toluene, methanol and tetrahydrofuran, identified as ingredients in the pre-prepared paint Imron 5000 Metallic Binder. The employer is responsible for ensuring that these exposure standards, and exposure standards pertaining to other final paint mix additives, are not exceeded in the workplace.

The paint components containing the notified polymer are flammable due to their solvent content. Precautions must be taken to avoid sources of ignition, e.g. use of earthing leads. Operators should wear antistatic overalls and footwear.

Similar considerations apply in the disposal of the polymer. The wastes containing the notified polymer may be hazardous substances on the basis of the solvent and other resin content, and the precautions used on the basis of these additional materials should be adequate for protection from the notified polymer. In addition, much of the polymer will be crosslinked, hardened and immobilised by the time of disposal.

Public Health

There is negligible potential for public exposure to the notified polymer arising from use in paints. There may be public contact with the notified polymer on the painted surfaces of

heavy vehicles, but its adhesion to the substrate and the physico-chemical properties of the cured paint will be sufficient to preclude absorption across the skin or other biological membranes. Therefore, based on its use pattern and physico-chemical characteristics, the notified chemical will not pose a significant hazard to public health.

13. RECOMMENDATIONS

To minimise occupational exposure to RC5156 the following guidelines and precautions should be observed:

- Employers should ensure that NOHSC exposure standards for all of the components of the final paint mix are not exceeded in the workplace;
- Safety goggles should be selected and fitted in accordance with Australian Standard (AS) 1336 (Standards Australia, 1994) to comply with Australian/New Zealand Standard (AS/NZS) 1337 (Standards Australia/Standards New Zealand, 1992);
- Industrial clothing should conform to the specifications detailed in AS 2919 (Standards Australia, 1987) and AS 3765.2 (Standards Australia, 1990);
- Impermeable gloves or mittens should conform to AS 2161 (Standards Australia/ Standards New Zealand, 1998);
- All occupational footwear should conform to AS/NZS 2210 (Standards Australia/ Standards New Zealand, 1994);
- Spillage of the notified chemical should be avoided. Spillages should be cleaned up promptly with absorbents which should then be put into containers for disposal;
- Good personal hygiene should be practised to minimise the potential for ingestion;
- A copy of the MSDS should be easily accessible to employees.

14. MATERIAL SAFETY DATA SHEET

The MSDS for the notified chemical was provided in accordance with the *National Code of Practice for the Preparation of Material Safety Data Sheets* (National Occupational Health and Safety Commission, 1994).

This MSDS was provided by the applicant as part of the notification statement. It is reproduced here as a matter of public record. The accuracy of this information remains the responsibility of the applicant.

15. REQUIREMENTS FOR SECONDARY NOTIFICATION

Under the Act, secondary notification of the notified chemical shall be required if any of the circumstances stipulated under subsection 64(2) of the Act arise. No other specific conditions

are prescribed.

16. REFERENCES

National Occupational Health and Safety Commission (1991) Draft National Code of Practice for Spray Painting. Australian Government Publishing Service, Canberra.

National Occupational Health and Safety Commission (1994) National Code of Practice for the Preparation of Material Safety Data Sheets [NOHSC:2011(1994)]. Australian Government Publishing Service, Canberra.

Standards Australia (1987) Australian Standard 2919-1987, Industrial Clothing. Standards Association of Australia, Sydney.

Standards Australia (1990) Australian Standard 3765.2-1990, Clothing for Protection against Hazardous Chemicals Part 2 Limited protection against specific chemicals. Standards Association of Australia, Sydney.

Standards Australia (1994) Australian Standard 1336-1994, Eye protection in the Industrial Environment. Standards Association of Australia, Sydney.

Standards Australia/Standards New Zealand (1992) Australian/New Zealand Standard 1337-1992, Eye Protectors for Industrial Applications. Standards Association of Australia/ Standards Association of New Zealand, Sydney/Wellington.

Standards Australia/Standards New Zealand (1994) Australian/New Zealand Standard 2210-1994, Occupational Protective Footwear. Standards Association of Australia/Standards Association of New Zealand, Sydney/Wellington.

Standards Australia/Standards New Zealand (1998) Australian/New Zealand Standard 2161.2-1998, Occupational protective gloves, Part 2: General requirements. Standards Association of Australia/Standards Association of New Zealand, Sydney/Wellington.