

File No: PLC/123

September 1999

**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION
AND ASSESSMENT SCHEME**

FULL PUBLIC REPORT

RC 5158

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Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT**RC 5158****1. APPLICANT**

Du Pont (Australia) Ltd of 49-59 Newton Road WETHERILL PARK NSW 2164 has submitted a Polymer of Low Concern notification statement in support of their application for an assessment certificate for RC 5158.

2. IDENTITY OF THE CHEMICAL

The chemical name, other name, CAS number, molecular and structural formulae, molecular weight, low molecular weight species, spectral data, details of the polymer composition and maximum residual levels, and import volumes have been exempted from publication in the Full Public Report.

Trade Name: Polyester resin;
RC 5158

Characterisation as a Synthetic Polymer of Low Concern (PLC)

The polymer has a NAMW<1 000. All monomers except one are on the proposed list of allowable reactants for polyesters as PLC. The exception is the anhydrous form of a listed reactant, so the notified polymer was accepted as a PLC on the understanding that no pendant anhydride groups were present in the polymer. The notified polymer was accepted as a polymer of low concern by the Canadian notification and assessment authority.

Polymer Stability Highly stable under normal conditions. Decomposition will occur at temperature in excess of 250°C.

Reactive Functional Groups: Aliphatic hydroxyl groups are low concern groups, which are not considered to be reactive under normal environmental conditions.

Charge Density No potentially cationic groups

3. PHYSICAL AND CHEMICAL PROPERTIES

Appearance at 20°C and 101.3 kPa:	Clear viscous solution
Melting Point:	Not determined
Density:	1.05±0.05 g/cm ³ (estimate)
Particle Size	Not applicable for a resin solution
Water Solubility	Expected to be negligible
Flammability Limits:	Upper Explosive Limit = 11.4% (polymer solution), Lower Explosive Limit = 1.0% (polymer solution), Polymer is a combustible solid.
Autoignition Temperature:	> 427°C (polymer solution).
Explosive Properties:	Polymer not expected to be explosive.

Comments on Physico-Chemical Properties

The notified polymer is a solid at normal temperatures and is dissolved in solvents (ethyl acetate and xylene) prior to import into Australia. Much of the physico-chemical data for the notified polymer is either not provided, is generic or is based on the solvents present in the polymer solution.

The polymer solution is flammable due to its solvent content. Flammability limits of the polymer are estimated from the flammability limits of these solvents. Autoignition temperature of the notified polymer is estimated from the solvent with the lowest autoignition temperature (ethyl acetate). The notified polymer is considered to be non-reactive under normal conditions. The notified polymer contains hydroxyl groups, which are designed to crosslink when mixed with the highly reactive isocyanate hardener.

4. PURITY OF THE CHEMICAL

Purity:	> 96.6%
Hazardous Impurities:	Levels of residual monomers were all below 1%, well below concentration cut-off levels.
Additives/Adjuvants:	None

5. USE, VOLUME AND FORMULATION

The notified polymer is intended for use as a binder resin in automotive paints. It will not be manufactured or reformulated in Australia but will be imported as an ingredient of an automobile paint formulation (containing 15-40% of the notified polymer in a mixture of solvents), 574H Imron 5000 Metallic Binder. Import volumes are estimated to reach 60 tonnes by the fifth year. Initially, the paint is expected to be used by the heavy vehicle industry.

6. OCCUPATIONAL EXPOSURE

The notified polymer will be imported in 0.95 L or 3.78 L 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 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 notifier states that weighing is carried out in a well ventilated area. 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. The notifier states that the weighing station has exhaust ventilation.

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; goggles or safety spectacles, gloves and overalls while weighing and mixing the paint, and cleaning

spray equipment. In addition, a full face shield and respirator are worn by workers operating inside the spray booth.

7. PUBLIC EXPOSURE

Automotive paints containing the notified polymer will be sold only to licensed professional spray painters and will not be available to the general public. The potential for public exposure to the notified polymer during transport and coating operations or from disposal is assessed as negligible. Although members of the public will make dermal contact with automobiles coated with products containing the notified polymer, exposure will be negligible because of the cured state of the notified polymer in the coatings.

8. ENVIRONMENTAL EXPOSURE

Release

The notifier anticipates that the potential for significant release during a transport emergency is very low.

The polymer solution is a mixture of the notified polymer (RC 5158), ethyl acetate and xylene. Volatility of the polymer solution is due to the presence of solvents which, when exposed to air, are expected to volatilise until the residual polymer solidifies. It is expected that release of the notified polymer into the atmosphere will be limited.

Release of the notified polymer is expected to occur during cleaning of paint spray equipment and as residues in discarded cans. The notifier has estimated that < 5% (w/w) of the notified polymer will remain in cans which will then be disposed of to land fill. A further 5% is expected to remain as residues in spray equipment. These polymer residues are washed off with solvent, which is then collected and recycled. Dried solids accumulated during solvent recycling are expected to be disposed of to landfill. Together, this represents a total of 10% of notified polymer would be released annually via this release pathway. Residues of the notified polymer being released to the environment prior to application. Assuming an annual import of 60 tonnes, this equates to approximately 6 000kg.

The majority of release of the polymer will occur during spray application. The notifier anticipates up to 50% of paint will be lost as a result of overspray. This overspray is caught on screens which are then disposed of to landfill. Assuming an annual polymer import of 60 tonnes, (and a 10% loss as residues in cans and equipment prior to application) this equates to a maximum of 27 000 kg being released per annum to landfill.

The release of the remaining polymer will be determined by the fate of the vehicle or equipment being painted, i.e. it will either be recycled or deposited in landfill. Recycling will presumably result in the polymer being incinerated, releasing water vapour, oxides of carbon and possibly oxides of heavy metals.

The estimated total release of polymer (assuming an annual import volume of 60 tonne and the above release estimates) is expected to be no greater than 33 tonne per year for the next five years.

The notifier has stated that because the final paint product has a high solids content, there will be a net environmental benefit as use of this product will result in lower VOC emissions relative to other products currently in use.

Fate

The majority of release of the notified polymer will be disposed to land fill. The apparent low solubility of the polymer and high volatility of the associated solvents, suggests that the majority of polymer waste will be in solid form with little expected to migrate through to the aquatic compartment. Soil mobility is also expected to be very low.

It is difficult to predict the course of degradation of the notified polymer in the environment, particularly in the absence of polymer specific physico-chemical data. It is anticipated that small portions of the non-crosslinked polymer (i.e. residues in cans) will slowly degrade via aerobic, anaerobic and abiotic processes. The crosslinked polymer (i.e. cured paint product) is likely to degrade more slowly via biotic and abiotic processes. Degradation products are expected to be carbon dioxide and water.

Recycling of vehicles retaining the cured polymer are assumed to result in the polymer being incinerated to water vapour, oxides of carbon and possibly oxides of heavy metals.

9. EVALUATION OF TOXICOLOGICAL DATA

No toxicology data were submitted.

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

No ecotoxicological data were submitted.

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

It is expected that approximately 33 tonne of the notified polymer will eventually be disposed of to landfill across several sites. The notifier states that the polymer solution is only supplied to licensed professional spray painters and will not be available to the general public. This distribution pattern is likely to minimise the hazard to the environment in any one site. At disposal, the polymer is likely to be in a solid form either as the notified polymer alone or as part of a crosslinked polymer matrix. In the solid form, mobility and solubility is expected to be minimal. The high molecular weight suggests that bioaccumulation is unlikely (Connell, 1990).

When in solid form alone or in the matrix, the notified polymer will offer no foreseeable risk. However, given the toxic nature of the solvents used in the polymer solution, accidental spills should be prevented from entering sewers and waterways.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

No toxicological data on the notified polymer have been submitted. The residual hazardous monomers are well below the cut-off concentrations for hazardous substances. Considering the high molecular weight of the notified polymer and its chemical structure, the polymer is unlikely to be classified as a hazardous substance according to NOHSC *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 1999a). During end use, the notified polymer will crosslink by reaction with isocyanate hardener. In the cured state on automobiles, the notified polymer or its impurities are not likely to pose a toxicological hazard.

According to the material safety data sheet (MSDS) provided for the product 574H Imron 5000 Metallic Binder, the product will produce gastro-intestinal distress on ingestion and may also be an eye and skin irritant. Inhalation may cause respiratory irritation and central nervous system depression. Prolonged overexposure may cause permanent brain and nervous system damage. These effects relate mainly to the solvents and additives, rather than the notified polymer.

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 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, there may be components containing 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 formulation requires the use of stringent engineering controls, such as a correctly constructed and maintained spray booth, and a high level of personal protective equipment, such as impermeable overalls, gloves, full face shield and goggles during mixing and cleaning. A respirator should be used during spraying operation. The use of the paint containing the notified polymer should be in accordance with the NOHSC *Draft National Reference Document for Spray Painting* (NOHSC, 1999b). 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 n-butyl alcohol, methyl amyl ketone, ethyl acetate, heptane and xylene, identified as ingredients in the pre-prepared paint 574H Imron 5000 Metallic Binder (NOHSC, 1995). 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

The notified polymer, RC 5158, will be used only in automobile coatings. Although members of the public will make dermal contact with automobiles coated with products containing the notified polymer, exposure will be negligible because of the cured state of the notified polymer in the coatings, from which the notified polymer is not likely to be bioavailable. Based on this information and the polymer's expected low toxicity, it is considered that the notified polymer will not pose a significant hazard to public health when used in the proposed manner.

13. RECOMMENDATIONS

To minimise occupational exposure to RC 5158 the following guidelines and precautions should be observed:

- Handling the paint containing the notified polymer should be in accordance with the NOHSC *Draft National Reference Document for Spray Painting* (NOHSC, 1999) including the use of safety goggles, respirator, industrial clothing, impermeable gloves or mittens and occupational footwear;
- Employers should ensure that NOHSC exposure standards for all of the components of the final paint mix are not exceeded in the workplace;
- 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; and
- A copy of the MSDS should be easily accessible to employees.

14. MATERIAL SAFETY DATA SHEET

The MSDS for 574H Imron 5000 Metallic Binder was provided in accordance with the *National Code of Practice for the Preparation of Material Safety Data Sheets* (NOHSC, 1994). An MSDS for the notified chemical as provided to Canada was included in the submission. This is acceptable as the notified chemical will not be isolated in Australia.

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 may be required if any of the circumstances stipulated under subsection 64(2) of the Act arise. No other specific conditions are prescribed.

16. REFERENCES

Connell DW (1990) General characteristics of organic compounds which exhibit bioaccumulation. In: D. W. Connell ed. *Bioaccumulation of Xenobiotic Compounds*. CRC Press, Boca Raton.

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

NOHSC (1995) *Adopted National Exposure Standards for Atmospheric Contaminants in the Occupational Environment*, [NOHSC:1003(1995)]. In: ed. *Exposure Standards for Atmospheric Contaminants in the Occupational Environment: Guidance Note and National Exposure Standards*. National Occupational Health and Safety Commission, Australian Government Publishing Service, Canberra.

NOHSC (1999) *Approved Criteria for Classifying Hazardous Substances* [NOHSC:1008(1999)]. Canberra, National Occupational Health and Safety Commission, Australian Government Publishing Service.

NOHSC (1999) *Draft National Reference Document for Spray Painting*, National Occupational Health and Safety Commission.