

File No: PLC/93

July 1999

**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION
AND ASSESSMENT SCHEME**

FULL PUBLIC REPORT

RC13491

This Assessment has been compiled in accordance with the provisions of the *Industrial Chemicals (Notification and Assessment) Act 1989* (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 National Occupational Health and Safety Commission which also conducts the occupational health & safety assessment. The assessment of environmental hazard is conducted by the Department of the Environment and the assessment of public health is conducted by the Department of Health and Family Services.

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Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT**RC13491****1. APPLICANT**

DuPont (Australia) Limited 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 RC13491.

2. IDENTITY OF THE CHEMICAL

Claims were made and accepted for the identity of RC 13491 to be exempt from publication in the Full Public Report. The data items were:

chemical name
CAS number
molecular and structural formulae
molecular weight
spectral data
details of the polymer composition
residual monomers and impurities
import volume.

Trade Name: RC 13491

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:** viscous, water white, clear liquid (for the solution)

Melting Point: not determined (see comments below)

Specific Gravity:	1.02 ± 0.5 kg/L (based on similar acrylic resins) 1.18 kg/L (for the solution)
Water Solubility:	not determined (see comments below)
Particle Size Distribution:	0.2 – 0.4µm (polymer)
Flash Point:	not determined (se comments below)
Flammability limits:	Upper Explosive Limit = 10.7% Lower Explosive Limit = 1.0% (for the solution)
Autoignition Temperature:	> 220°C (polymer) ; 370°C (for the solution)
Explosive Properties:	The polymer is not expected to be explosive
Reactivity/Stability:	The polymer contains no reactive functional groups

Comments on Physico-Chemical Properties

The polymer is amorphous and does not have a melting point, rather it has a glass transition at -8.8°C where the polymer transforms from glass to a rubber. The polymer does not have a boiling point as it decomposes before boiling.

Water solubility has not been determined. However, the notifier claims that by analogy with similar acrylics the water solubility will be exceedingly low (< 1ppm). Additionally, any free hydroxy groups of the polymer will react with isocyanate ends of polymeric isocyanates, which are added immediately prior to application of paint. This will cure to form an inert film of ultra high molecular weight.

The notified polymer contains both ester and epoxide functionalities which have the potential to hydrolyse. However, given the low water solubility of the polymer, particularly when cross-linked into the cured paint, this would be unlikely in the environmental pH range of 4 to 9.

The polymer is stable under normal conditions of use. It will not hydrolyse, undergo thermal or photodegradation, or depolymerize.

4. PURITY OF THE CHEMICAL

Degree of Purity: <50% in paint component

Maximum Content of Residual Monomers: The residual monomers are each present at <3%, below the concentration cutoff levels for classification of the polymer as a hazardous substance.

Additives/Adjuvants: The notified polymer will be imported in pre-prepared paints, and will contain 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).

5. USE, VOLUME AND FORMULATION

The notified polymer will not be manufactured in Australia. It will be imported at a volume of less than 60 tonnes per annum.

The polymer will be imported as a component of a pre-prepared paint, Imron 8975S Basemaker, at a concentration of <50% (w/w). It will be used in spray painting of motor vehicles. The new paint formulation comprises one part of a new spray painting technology called the Imron system. This system is characterised by a high solid content in the uncured paint, together with a lower content of volatile organic solvents (VOCs). The imported paint contains 10 to 30 % VM&P naphtha.

6. OCCUPATIONAL EXPOSURE

The notified polymer will be imported as an end-use product in 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.

For the purposes of market evaluation, the paint system binder containing the polymer will be supplied initially to Original Equipment Manufacturers (OEM) of the heavy vehicle market, for refinish purposes.

The notifier indicated that OEMs have well equipped premises for spray painting of vehicles. The notifier did not describe specific details of the work process or control measures.

For the purpose of this assessment, the following is a precis of a spray painting process in work places that implement good hygiene practices and precautionary measures to control exposure to hazardous substances. Typically the spray painter will measure the appropriate amounts of the different components required in a particular formulation, including the pre-prepared paint containing the notified polymer, 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 should conform to AS/NZS/4114.1 *Spray Painting Booths – Design, Construction and Testing* and AS/NZS/4114.2 *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 dermal absorption.

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

7. PUBLIC EXPOSURE

The paint containing the notified polymer will only be applied by professional spray painters. Therefore public contact will only occur from touching the dried paint film on automobiles. The paint film consists of polymer that has cross-linked to form a continuous polymer film in matrix with pigments and other polymers. There are no chemically reactive polymers in the dried paint film. Consequently, the potential for public exposure to the notified polymer during all phases of its life cycle is considered to be negligible.

8. ENVIRONMENTAL EXPOSURE

Release

Waste paint containing the notified polymer remaining after mixing with thinners and hardener, or retained in spray equipment will be disposed of to a waste drum. This material, totaling up to 10% of paint, is typically sent to a waste disposal company for solvent recovery. The solidified residue obtained after solvent recovery is taken to State Waste Management Centres for consignment to landfill or incineration.

Overspray is caught in filters of the spray booth and may constitute from 20-50% of total paint sprayed. Solid residues are trapped in filters which, when due for replacement (typically every three months), are disposed of to landfill or incinerated.

Some spray shops may have a "wet floor" arrangement, which is used in place of or in combination with dry filters. In this instance, a water trap is used to catch overspray. Periodically (typically every three months), water from the trap is collected by a waste disposal company for treatment. Treatment usually involves flocculation or centrifugation of the suspended material, which is then taken via State Waste Management Centres to landfill or for incineration.

The notifier estimates that between 1-1.5 L of paint will be required to completely cover a car or truck cabin. Touch-up of damaged paintwork on imported vehicles will use 0.1-0.2 L and is anticipated to be the most frequent use (>90%).

Once cured, the paint containing the notified polymer may be painted with clear topcoats. The crosslinked polymer will be effectively inert and will be disposed of with the vehicles. Releases of the cured polymer during vehicle repairs and touch-up work will be diffuse and limited to small quantities of the cured polymer.

Environmental release may occur following transport accidents. Rupture of drums containing the polymer would release a maximum of 1 850 mL per drum.

Fate

The low water solubility of the notified polymer indicates that leaching from landfill sites is not expected. Any incineration of the notified polymer is expected to produce water and oxides of carbon.

The majority of the notified polymer is not expected to be released to the environment until it has been cured into a solid polymer matrix and overcoated with basecoats and topcoats. The resultant matrix structure should limit the hydrolysis or biodegradation of the polymer and the over coating will minimise environmental exposure. Bioaccumulation of the polymer is unlikely because of the high molecular weight of the polymer *per se* (Connell, 1989), without consideration of the curing process.

9. EVALUATION OF TOXICOLOGICAL DATA

No toxicology data were submitted, which is acceptable for a synthetic polymer of low concern. The polymer is stable and has a NAMW > 1000. Polymers of high molecular weight do not readily traverse biological membranes. The notified polymer 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 of NAMW >1 000.

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

Disposal of the notified polymer to landfill at up to 60% of imported volumes as either an inert solid or cured paint largely from paint overspray, is unlikely to present a hazard to the

environment. The polymer will be in a solid matrix and is not expected to biodegrade or leach.

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

The low environmental exposure of the polymer as a result of the proposed use, and its expected low environmental toxicity, indicates that the overall environmental hazard should be low.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

Occupational Health and Safety

No toxicological data have been provided, therefore a hazard assessment of the notified polymer cannot be made against the NOHSC *Approved Criteria for Classifying Hazardous Substances* (National Occupational Health and Safety Commission, 1999a). However, the notified polymer is not expected to cause systemic or acute toxicity because of the high molecular weight and low monomer content. According to the notifier, no adverse health effects have been characterised following human exposure to similar polymers in use overseas.

The MSDS for the pre-prepared paint component lists a number of potential health effects, namely skin, eye and respiratory irritation, gastrointestinal distress, liver and kidney damage, liver or kidney tumours and central nervous system effects. These relate to the solvents and additives in the mixture rather than the notified polymer.

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 isocyanate groups. Regulation 14(1)(a) of the *National Model Regulations for the Control of Workplace Hazardous Substances* (National Occupational Health and Safety Commission, 1994b) provides for health surveillance for isocyanates. Health surveillance should be conducted for any worker who has been identified in the workplace assessment process as having a significant risk of exposure to isocyanates. 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 spray paints in general. 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 *National Reference Document for Spray Painting* (National Occupational Health and Safety Commission, to be published). 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. Under normal use conditions, when the above control and precautionary measures are implemented, it is unlikely that the notified polymer will pose any significant risk to occupational health.

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 alcohol, toluene, xylene and hexyl acetate isomers, identified as ingredients in the pre-prepared paint Imron 8975S Basemaker. 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. In addition, the pre-prepared paint contains VM&P naphtha (10 to 30%). There is no NOHSC exposure standard established for VM&P naphtha, however the notifiers MSDS recommends an action level of 100 ppm (TWA). According to the NOHSC *List of Designated Hazardous Substances*, preparations containing VM&P naphtha at and above 10% are to be labeled with risk phrase R65 – Harmful: may cause lung damage if swallowed (National Occupational Health and Safety Commission, 1999b), if certain viscosity criteria¹ are met. The notifier has provided sufficient information that the paint product is outside these criteria, and the risk phrase R65 is not required.

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 anti-static overalls and footwear.

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

Public Health

¹ Preparations containing VM&P naphtha need not be classified harmful by ingestion if the liquid preparation has a kinetic viscosity measured by means of rotational viscometry, in accordance with ISO standard 3219 or equivalent method, of greater than 7 x 1/1 million m²/sec at 40°C, and on the basis of an aspiration hazard when placed on the market in aerosol containers or in containers fitted with a sealed spray attachment.

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 automobiles, 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 polymer will not pose a significant hazard to public health.

13. RECOMMENDATIONS

1. Employers are responsible in preventing employee exposure to workplace hazards during spray painting by implementing control measures such as elimination of hazard, substitution of safer alternatives, isolation of the spray painting process, engineering controls, administrative controls, and the use of personal protective equipment. Further guidance on preventing employee exposure during spray painting can be found in NOHSC *National Reference Document for Spray Painting* (National Occupational Health and Safety Commission, to be published).
2. 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;
3. Good personal hygiene should be practised to minimise the potential for ingestion;
4. A copy of the MSDS should be easily accessible to employees.

14. MATERIAL SAFETY DATA SHEET

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

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 polymer 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

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National Occupational Health and Safety Commission (to be published) National Reference Document for Spray Painting. Canberra, Australian Government Publishing Service.

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

National Occupational Health and Safety Commission (1999b) List of Designated Hazardous Substances [NOHSC:10005(1999)]. Canberra, Australian Government Publishing Service.

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Standards Australia/Standards New Zealand (1995a) Australian/New Zealand Standard 4114.1-1995, Spray Painting Booths - Design, Construction and Testing. Sydney/Wellington, Standards Association of Australia/Standards Association of New Zealand.

Standards Australia/Standards New Zealand (1995b) Australian/New Zealand Standard 4114.2-1995, Spray Painting Booths - Selection, Installation and Maintenance. Sydney/Wellington, Standards Association of Australia/Standards Association of New Zealand.