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**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION
AND ASSESSMENT SCHEME**

FULL PUBLIC REPORT

Polymer in Zonyl 8740

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For Enquiries please contact the Administration Coordinator at:

Street Address: 92 Parramatta Rd Camperdown, NSW 2050, AUSTRALIA

Postal Address: GPO Box 58, Sydney 2001, AUSTRALIA

Telephone: (61) (02) 9577-9466 **FAX (61) (02) 9577-9465**

Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT**Polymer in Zonyl 8740****1. APPLICANT**

DuPont (Australia) Ltd of 49-59 Newton Road WETHERILL PARK NSW 2164 has submitted a limited notification statement in support of their application for an assessment certificate for Polymer in Zonyl 8740.

2. IDENTITY OF THE CHEMICAL

Polymer in Zonyl 8740 is not considered to be hazardous based on the nature of the polymer and the data provided. Therefore 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.

Trade Name: Polymer in Zonyl 8740

**Number-Average
Molecular Weight:** > 1 000

**Maximum Percentage of Low
Molecular Weight Species**

Molecular Weight < 500: none

Molecular Weight < 1 000: none

3. PHYSICAL AND CHEMICAL PROPERTIES

The notified polymer is imported into Australia as a 30% aqueous dispersion. The properties given below are of the dispersion unless otherwise specified

**Appearance at 20°C
and 101.3 kPa:** clear, tan liquid with a mild acrylic odour

Melting Point: not applicable

Density: 1 130 kg/m³

Vapour Pressure: not determined

Water Solubility: notifier claims 100% dispersible in water (see

below)

Partition Co-efficient (n-octanol/water):	not provided
Hydrolysis as a Function of pH:	not provided
Adsorption/Desorption:	not provided
Dissociation Constant:	not provided
Flash Point:	not provided
Flammability Limits:	not provided
Autoignition Temperature:	not provided
Explosive Properties:	not provided
Reactivity/Stability:	toxic, severely irritating decomposition products may be formed if the notified polymer is heated above 300°C

Comments on Physico-Chemical Properties

The vapour pressure of the polymer is not relevant as it has a high molecular weight and is not expected to be volatile.

The polymer sidechains comprise of quaternary amine functionality that is expected to confer appreciable water solubility. However, the notifier claims that the notified polymer is 100% dispersible in water. It is not water soluble, rather it has been polymerised as a dispersion of waxy polymer. The charge on the polymer creates an affinity that enables the particles to remain suspended in solution as a complex aggregate. It is noted that the polymer also contains a large proportion of highly lipophilic sidechains that will minimise the polymer's solubility in water. However, the overall effect on water solubility is unclear.

The notifier claims that the backbone of the polymer contains no hydrolysable groups. However, the polymer contains ester functionalities which may hydrolyse, but this is expected to be negligible under environmental conditions (due to low water solubility).

The partition coefficient was not supplied and would be very difficult to measure. The notifier claims that the polymer is rendered insoluble and attaches itself to the metal ions in masonry substrate at neutral or alkaline pH. The notifier claims that the bonding of the Zonyl cation to the substrate is approximately 20 orders of magnitude more stable than the product. It is agreed that the polymer will be strongly bound to metal ions in the masonry substrates. Binding to cellulosic fibre,

eg paper, wood, cotton, etc, is expected to occur but it is unclear as to the strength of the binding. Some of the polymer could be washed away in acidic water.

4. PURITY OF THE CHEMICAL

Degree of Purity: 100%

**Maximum Content
of Residual Monomers:** none

Additives/Adjuvants: none

5. USE, VOLUME AND FORMULATION

The notified polymer will not be manufactured or reformulated in Australia. It will be imported as a 30% aqueous dispersion. The notified polymer will not be repackaged in Australia. The polymer will be sold initially to the waterproofing contractor market (specialist industrial contractors) and will be applied as a water remedial barrier for brickwork, masonry, wood and fabric. It will not be sold to the general public. In most cases the polymer coating once applied will be covered by a barrier, eg carpet, paint, etc.

The Zonyl family of fluorinated surface active treatments have been used by industry in Australia for over 15 years with no known health effects.

6. OCCUPATIONAL EXPOSURE

The product containing the notified polymer will be imported in 200 L or 22.5 L polyethylene drums. Waterside, warehouse and transport workers are unlikely to be exposed to the notified polymer under normal circumstances.

The notified polymer will be used in a range of low concentrations diluted with water. Workers in the waterproofing industry may be exposed to the notified polymer when applying the waterborne form to brickwork, masonry and concrete. The method of application is by brush, roller and non-atomising spray. . There is the potential for dermal exposure to the notified polymer when workers decant the aqueous dispersion into a dilution vessel. There is also potential for dermal, inhalational and ocular exposure to the notified polymer when workers in waterproofing industry apply the dispersion containing the notified polymer using spray equipment. Should contact occur during dilution or application, the polymer dispersion is likely to remain on the skin for some time, hence prolonging exposure.

Workers may also experience dermal, inhalational or ocular exposure to 2-propanol in the dispersion when diluting and spraying. The notifier states that exposure to the notified polymer and to 2-propanol may be minimised by worker training, appropriate work practices and when applied to exterior surfaces even though potential for dermal and ocular exposure would still be likely . When applied to interior surfaces

the users will ensure that the process is carried out under good ventilation.

There may be significant worker contact with dried paints containing the notified polymer, however, it will be bound to the metal ions in concrete and masonry and will therefore not be bioavailable.

7. PUBLIC EXPOSURE

The polymer will be used by professional industrial applicators and will not be sold to the public. The public may be exposed to the polymer by dermal contact with the treated surfaces. However, the notified polymer is covalently bound to the substrates and public exposure from the treated materials is expected to be minimal.

Residual polymer in containers will be rinsed and recycled, and a small amount will be disposed of by incineration. Waste materials treated with the notified polymer will be disposed of to landfill. Public exposure from disposal is expected to be negligible.

8. ENVIRONMENTAL EXPOSURE

Release

The notified polymer is sold as a 30 to 60% aqueous dispersion. The substance may be used in a range of concentrations. Typically the product is applied to exterior surfaces through non-atomising spray, though interior surfaces can also be coated, *ie* bathroom floors, etc. The substance readily bonds to metal ions in concrete and masonry in preference to remaining in solution as the pH reduces when acetic acid is evaporated, neutralised or diluted. Coatings on wood and fabric are not expected to be as strong, but unless the coated article is immersed in acidic water, the polymer is not expected to enter the environment. Therefore, the notifier claims that releases/losses to the environment should be negligible.

Runoff from coated surfaces is expected to be negligible as the material is spray applied. Runoff from vertical surfaces is expected to be minimal due to the fine film application method. Also, the solution is expected to absorb quickly to the surface. The polymer product is not a heavy duty waterproofing agent, and thus not suitable for marine applications, *ie* waterproofing jetties and docks. The notifier claims that if the polymer was released to water of neutral or alkaline pH, it would be neutralised and partition to sediment.

Drums and containers containing residues of the notified polymer will be rinsed with water and then sent for recycling. Here, any remaining residues will be incinerated.

Fate

The notifier polymer is likely to remain covalently bound to the surface to which it is coated. Should the polymer be released in the environment, it is likely to bind to clay.

The notifier claims that surfaces coated with the notified polymer will be disposed of as a prescribed waste. It is expected that most coated materials, *ie* concrete, masonry and wood, will be disposed of to/as landfill.

Products of incineration are likely to include oxides of carbon and nitrogen, and hydrogen fluoride.

Bioaccumulation of the polymer is unlikely to occur as biological membranes are not permeable to polymers of very large molecular size (1,2).

9. OVERALL ASSESSMENT OF TOXICOLOGICAL DATA

The notified polymer in dispersion was of low acute toxicity via the oral route in the rat with a LD₅₀ value of greater than 11 000 mg/kg. It was a slight to moderate skin irritant and a slight irritant to the eye in rabbits.

On the basis of submitted data, the notified chemical would not be classified as hazardous in accordance with the *Approved Criteria for Classifying Hazardous Substances* (8) [NOHSC:1008(1994)] (Approved Criteria).

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

Ecotoxicology data is not required for polymers with NAMW greater than 1 000 according to the Act. However, the notifier has supplied the following test reports (results from range-finding studies).

Test	Species	Results (Nominal ^a)
Acute Toxicity ^b (static, unaerated)	Fathead Minnows (<i>Pimephales promelas</i>)	96 h LC ₅₀ between 50-500 mg/L
Acute Immobilisation ^b (static, unaerated)	Water flea (<i>Daphnia magna</i>)	48 h EC ₅₀ between 50-500 mg/L

a. Nominal concentrations tested were 0, 0.5, 1.0, 50, 500 and 5 000 mg/L; and b. 100% mortality/immobility was observed for fish/daphnids at the 500 and 5000 mg/L test concentrations, while no mortality/immobility was observed at the other concentrations.

The ecotoxicity data for the notified polymer suggest that the notified polymer is slightly toxic to practically non-toxic to both fathead minnows and water flea. The fish LC₅₀ and *daphnia* EC₅₀ values are between 50 and 500 mg/L. The results presented are from range-finding studies, thus more exact values are not possible, but are indicative of low toxicity despite the presence of ammonium cations (9). No data were provided for algal growth inhibition. Green algae are known to be about

six times more sensitive than fish to cationic polymers (that is, algal 96 h EC₅₀ versus 96 h LC₅₀). The mode of toxic action for these polymers is surface active, *ie* they react with the biological membranes. However, the aquatic toxicity of this polymer will be highly mitigated by the presence of dissolved organic carbon in water (9). Also, given the predicted low exposure to the aquatic environment, hazard to algae is considered to be negligible.

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

The environmental hazard through the use of the notified polymer is considered to be negligible. Losses and overall exposure of the polymer to the environment are anticipated to be low due to its chemical properties, and proposed application method and use. When the polymer product is applied to the surface, the acetic acid is evaporated, neutralised or diluted. The polymer strongly binds with the surface where it will remain, becoming a repellent of water (moisture), glue and dirt. The notifier claims that in most cases the chemical will be covered by a barrier preventing any direct exposure to the environment.

The supplied ecotoxicological data show that the polymer is at worst slightly toxic to fish and daphnia. However, exposure to the aquatic environment is not expected.

Incineration of the polymer can produce hydrogen fluoride (HF). However, it is not expected to present a significant hazard to the environment due to the small and diffuse quantity expected.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

The occupational health risk posed by the notified polymer to waterside, warehouse and transport workers will be negligible, as they will come in contact with the notified polymer only in the event of leaking packaging or an accident.

The polymer in the imported dispersion has some potential to cause skin and eye irritation to workers who will handle the dispersion while decanting and applying it. It would therefore be prudent to limit possible eye or dermal exposure to the notified polymer through the use of appropriate personal protective equipment. Based on toxicological information provided by the notifier, the polymer is not expected to be classified hazardous. There are negligible levels of residual monomers and low molecular weight species that might pose a toxicological hazard when using the notified polymer.

The polymer dispersion contains 2-propanol. This has an atmospheric exposure standard specified in Worksafe Australia's *Exposure Standards for Atmospheric Contaminants in the Occupational Environment* (10) of TWA 400 ppm (983 mg/m³) and STEL 500 ppm (1 230 mg/m³). The concentration of 2-propanol which is less than 0.5% in the polymer dispersion indicates that except in exceptional circumstances (e.g zero ventilation, confined area, headspace of drums) this exposure threshold is unlikely to be attained.

The public may be exposed to the polymer by dermal contact with the treated surfaces. The notified polymer is covalently bound to the substrates and the polymer has a high molecular weight, however, the polymer is not bioavailable. The proposed use is not considered to pose a significant health hazard to the public

13. RECOMMENDATIONS

To minimise occupational exposure to Polymer in Zonyl 8740, the following guidelines and precautions should be observed:

- Safe practices, for handling any chemical formulation, should be adhered to - these include:
 - minimising spills and splashes;
 - practising good personal hygiene; and
 - practising good housekeeping and maintenance including bunding of large spills which should be cleaned up promptly with absorbents and put into containers for disposal.
- It is expected that, in the industrial environment, protective clothing conforming to and used in accordance with Australian Standard (AS) 2919 (11) and protective footwear conforming to Australian/New Zealand Standard (AS/NZS) 2210 (12) should be worn as a matter of course. In addition, it is advisable when handling the dispersion containing the notified polymer to wear chemical-type goggles (selected and fitted according to AS 1336 (13) and meeting the requirements of AS/NZS 1337 (14)), impermeable gloves (AS 2161)(15) should be worn to protect against unforeseen circumstances. If the dispersion is to be applied using spray equipment then the appropriate respiratory device should be selected and used in accordance with AS/NZA 1715 (16) and should conform to AS/NZA 1716 (17).
- A copy of the MSDS should be easily accessible to employees.

14. MATERIAL SAFETY DATA SHEET

The MSDS for Zonyl 8740 containing the notified polymer was provided in accordance with the *National Code of Practice for the Preparation of Material Safety Data Sheets* (18).

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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3. Karr, M. S., 1995, *Acute Oral Toxicity Study of T-6334 in Rats*, Project No. 10222-001, Haskell Laboratory for Toxicology and Industrial Medicine., Newark, Delaware.
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6. Organisation for Economic Co-operation and Development 1995-1996, *OECD Guidelines for the Testing of Chemicals on CD-Rom*, OECD, Paris.
7. Draize, J.H. 1959, 'Appraisal of the Safety of Chemicals in Foods, Drugs and Cosmetics', *Association of Food and Drug Officials of the US*, vol. 49, pp. 2-56.
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9. Nabholz, J.V., Miller, P. & Zeeman, M. 1993, 'Environmental risk assessment of new substances under the toxic substance control act section five', In Landis, W.G., Hughes, J.S., & Lewis, M.A., *Environmental Toxicology and Risk Assessment*, American Society for Testing and Materials, ASTM STP 1179, Philadelphia, pp. 40-55.

10. National Occupational Health and Safety Commission 1995, 'Adopted National Exposure Standards for Atmospheric Contaminants in the Occupational Environment, [NOHSC:1003(1995)]', in *Exposure Standards for Atmospheric Contaminants in the Occupational Environment: Guidance Note and National Exposure Standards*, Australian Government Publishing Service, Canberra.
11. Standards Australia 1987, *Australian Standard 2919-1987, Industrial Clothing*, Standards Association of Australia, Sydney.
12. 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.
13. Standard Australia 1982, *Australian Standard 1336-1982, Recommended Practices for Eye Protection in the Industrial Environment*, Standards Association of Australia, Sydney.
14. Standard Australia 1984, *Australian Standard 1337-1984, Eye Protectors for Industrial Applications*, Standards Association of Australia, Sydney.
15. Standard Australia 1978, *Australian Standard 2161-1978, Industrial Safety Gloves and Mittens (excluding Electrical and Medical Gloves)*, Standards Association of Australia, Sydney.
16. Standards Australia/Standards New Zealand 1994. *Australian/New Zealand Standard 1715 - 1994 Selection, Use and Maintenance of Respiratory Protective Devices*. Standards Association of Australia/Standards Association of New Zealand, Sydney/Wellington.
17. Standards Australia/ Standards New Zealand, 1991. *Australian/New Zealand Standard 1716 - 1991 Respiratory Protective Devices*. Standards Association of Australia, Sydney.
18. 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.

¹ The Draize Scale for evaluation of skin reactions is as follows:

Erythema Formation	rating	Oedema Formation	rating
No erythema	0	No oedema	0
Very slight erythema (barely perceptible)	1	Very slight oedema (barely perceptible)	1
Well-defined erythema	2	Slight oedema (edges of area well-defined by definite raising)	2
Moderate to severe erythema	3	Moderate oedema (raised approx. 1mm)	3
Severe erythema (beet redness)	4	Severe oedema (raised more than 1 mm and extending beyond area of exposure)	4

² The Draize scale for evaluation of eye reactions is as follows:

CORNEA			
Opacity	rating	Area of Cornea involved	rating
No opacity	0 none	25% or less (not zero)	1
Diffuse area, details of iris clearly visible	1 slight	25% to 50%	2
Easily visible translucent areas, details of iris slightly obscure	2 mild	50% to 75%	3
Opalescent areas, no details of iris visible, size of pupil barely discernible	3 moderate	Greater than 75%	4
Opaque, iris invisible	4 severe		

CONJUNCTIVAE					
Redness	rating	Chemosis	rating	Discharge	rating
Vessels normal	0 none	No swelling	0 none	No discharge	0 none
Vessels definitely injected above normal	1 slight	Any swelling above normal	1 slight	Any amount different from normal	1 slight
More diffuse, deeper crimson red with individual vessels not easily discernible	2 mod.	Obvious swelling with partial eversion of lids	2 mild	Discharge with moistening of lids and adjacent hairs	2 mod.
Diffuse beefy red	3 severe	Swelling with lids half-closed	3 mod.	Discharge with moistening of lids and hairs and considerable area around eye	3 severe
		Swelling with lids half-closed to completely closed	4 severe		

IRIS	
Values	rating
Normal	0 none
Folds above normal, congestion, swelling, circumcorneal injection, iris reacts to light	1 slight
No reaction to light, haemorrhage, gross destruction	2 severe