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NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME

FULL PUBLIC REPORT

Polymer in DSX-1550

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Street Address: 92 -94 Parramatta Rd CAMPERDOWN NSW 2050, AUSTRALIA
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Telephone: (61) (02) 9577 9514 FAX (61) (02) 9577 9465

Director
Chemicals Notification and Assessment

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1. APPLICANT

Cognis Australia Pty Ltd of 83 Maffra St Broadmeadows VIC 3047 (ACN 006 374 456) has submitted a notification statement in support of their application for an assessment certificate for the synthetic polymer of low concern (PLC), Polymer in DSX-1550.

2. IDENTITY OF THE CHEMICAL

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

Marketing names: DSX-1550

3. POLYMER COMPOSITION AND PURITY

Details of the polymer composition have been exempted from publication in the Full Public Report.

4. PLC JUSTIFICATION

The notified polymer meets the PLC criteria.

5. PHYSICAL AND CHEMICAL PROPERTIES

The notified polymer will be imported as an aqueous solution. The following physico-chemical properties are for the imported aqueous solution containing <50% notified polymer.

Property	Result	Comments
Appearance	Opaque white liquid	
Boiling point	Not determined	
Density	1.06 g/cm^3	

Water solubility	1 kg/L	The notified polymer is dispersible in water at 20°C. The notifier stated that the notified polymer is '100% water soluble'. This is likely in view of the high (~90%) polyethylene glycol content.
Flammability	Not determined	
Autoignition temperature	Not determined	
Explosive properties	Not determined	
Stability/reactivity	Not determined	Under normal conditions of storage, the polymer is not expected to undergo degradation. Hazardous polymerisation will not occur.
Hydrolysis as function of pH	Not determined	The polymer contains urethane linkages, but these would not be expected to undergo hydrolysis under environmental conditions (pH 4-9).
Partition coefficient	Not determined	The notified polymer is expected to preferentially partition into the aqueous phase, because of its high water solubility.
Adsorption/desorption	Not determined	The polymer would be expected to exhibit hydrophilic behaviour and be mobile in soils.
Dissociation constant	Not determined	The polymer does not contain any acidic protons that would be expected to dissociate under environmental conditions, although the urethane proton could hydrolyse under extreme conditions.

Comments on physical and chemical properties

No test reports were provided for the determination of physical and chemical properties.

6. USE, VOLUME AND FORMULATION

Use:

The notified polymer is used as a thickener in low PVC gloss coatings.

Manufacture/Import volume:
The estimated quantity of the notified polymer to be imported is as follows:

Year 1	400 kg
Year 2	800 kg
Year 3	1200 kg
Year 4	1600 kg
Year 5	2000 kg

Formulation details:
The notified polymer will not be manufactured in Australia. It will be imported in 20L plastic pails or 200L plastic lined steel drums as a component of an aqueous solution (<50%) and formulated into coatings. The formulated coating containing <1% notified polymer will be packed in 1, 2, 4, 10 or 20L epoxy lined paint cans for professional or do it yourself (DIY) applications.

7. OCCUPATIONAL EXPOSURE

The formulation of coatings containing the notified polymer is conducted in 1000 L capacity stainless steel mixers. The polymer in DSX-1550 is first blended with other coating ingredients using a high-speed disperser. Other ingredients are blended at low speed, and finally followed by addition of pigment with high-speed dispersion. After quality control, the batch is filtered and transferred to a multi-head filling machine to fill epoxy lined paint cans. The entire process is automated.

Trade and DIY painters will apply the formulated coating to surfaces by brush, roller or spraying.

Exposure route	Exposure details	Controls indicated by notifier
Coating Manufacture		
Production workers (15 workers, 4 – 6 hours/day, 200 days/year)		
dermal	Possible skin contamination during manual weighing and addition of polymer solution (<50% notified polymer) to high speed disperser. Subsequent operations enclosed. Possible skin contamination (<1% notified	Operators wear overalls, safety glasses and chemical resistant gloves. General and local exhaust ventilation employed. Process largely automated.

	polymer) if cleaning or maintenance of machinery is required.	

Laboratory/Quality Assurance (QA) technician (6 workers, 4-6 hours/day, 200 days/year)

dermal	Possible skin contamination when preparing small scale formulations (<50% notified polymer) or testing small samples (<1% notified polymer) prior to can filling	Safety glasses, disposable gloves and a laboratory coat for personal protection. If deemed necessary, the dispersion of the notified polymer into the coating can be performed in a fume hood.

End Use

Sales Personnel (>500 workers, 0.5-1 hour/day, 200 days/year)

Limited dermal	Intermittent skin contamination to sales staff (<1% notified polymer).	Protective coat

Trade and DIY painters (>10,000 workers, 6 hours/day, 200 day/year for trade painters and 10 days/year for DIY painters)

Dermal and limited ocular and respiratory	Extensive skin contamination of trade painters with formulated paint during brush, roller or spray application (<1% notified polymer). Some ocular contamination from splashes and inhalation exposure from spray mist during coating application (<1% notified polymer).	Overalls and goggles worn by trade painters. Respiratory protection also worn by trade painters if spray application.

Transport and storage

Transport and Warehouse Workers (15 workers, 4-6 hours/day, 200 days/year)

dermal	Possible skin contamination if accidental spillage occurs and clean-up is required.	Standard sturdy containers and use of correct equipment and machinery for internal and external transport.

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8. PUBLIC EXPOSURE

It is expected that during transport, storage, coating manufacture, and industrial use, exposure of the general public to the notified polymer will be minimal, except in the event of an accidental spill.

Public exposure to surface coatings containing the notified polymer is expected to be widespread but intermittent i.e. limited to periods of home decoration. The likely route of exposure would be dermal, with the possibility of accidental oral and ocular exposure. Due to the wide range of applications in the domestic and industrial environment, public exposure via dermal contact with dried surface coating films containing the notified polymer is expected to be high.

9. ENVIRONMENTAL EXPOSURE

9.1. Release

Paint Manufacture
Small quantities of waste may be generated by cleaning up minor spills, cleaning out manufacturing equipment and rinsing out surfactant drums, usually with hot water. The aqueous phase will be disposed of through the on-site waste treatment plant. Waste water from the treatment plant will either be reused or discharged through the sewer system. Solid waste from the treatment plant will be disposed of in landfill. The estimated amount of paint released per batch, from washings of mixing vessels and pumps is 10 kg with estimated production to be 50 batches in year one, rising to 250 batches by year 5. Therefore, the total amount of notified polymer released would be <10 kg per annum in year 1 rising to <50 kg per annum by year 5.

Spillages will be contained by bunding and the notifier has indicated that all materials will be sent offsite by licensed waste disposal contractors.

All washings will be sent to the on-site treatment plant. This includes a continuous biological system consisting of a 50 000 L averaging tank, solids separator, grease remover, automatic pH adjustment, and a dissolved air flotation tank. The plant capacity is 20-30 000 L/hour. The normal release during the production process is <200 g of the notified polymer per batch. Water soluble wastes from this stream will go to sewer, and insoluble wastes will go to landfill. Import containers with residual polymer (1%) will be sent to landfill by licensed waste disposal contractors.

End Use
The expected use pattern is 4-6 hours/day for 200 days/year for trade painters, and 6 hours/day for 10 days/year for DIY painters. The notifier has stated that, in the case of DIY painters, around 1% of the annual import volume will be washed off, on cleaning, from paintbrushes and into the domestic sewer. However, it is more likely that the polymer waste generated from the cleaning of paint applicators will be up to 5%. Therefore the annual amount that will be disposed to household drains will be <200 kg/year by year 5. In the case of trade painters, excess paint from brushes and rollers will be wiped off by newspaper and disposed to landfill, and the balance will be washed to sewer. Therefore, the release to sewers from trade painters is likely to be considerably less than DIY painters.

In addition to paint washings, there will be residual paint in 'empty' containers. Although the notifier has estimated that up to 2% of the notified polymer could be disposed via this route, this could be as high as 10%, with trade paint residuals likely to be considerably less. This residual amount is likely to be dried prior to disposal via commercial and domestic garbage

collection. Therefore, up to 500 kg of the notified polymer could be disposed of to landfill via this route.

Summary of Total Release
The complete annual release scenario is described below:

	Landfill	Sewer
Manufacture	<50 kg/year	<50 kg/year
Use	<500 kg/year	<200 kg/year
Total	<550 kg/year	<250 kg/year

9.2. Fate

Waste polymer sent to landfill as a dry solid is expected to remain associated with the soils and sediments and would not be expected to leach into the aquatic environment.

When released to the sewer the relatively high water solubility of the polymer may cause it to stay in solution as it is expected to be present in concentrations far below its saturation point. The notified polymer released to the sewer is expected not to significantly degrade but will be highly diluted as copious amounts of water are used when washing out brushes and rollers. Distribution of the final paint product is expected to be widespread, causing further dispersion of the notified polymer in the sewer systems.

The coating is expected, when dry, to form a solid inert film that will share the fate of the substrate and would not present a significant hazard. Any fragments, chips or flakes of the paint will be of little concern as they are expected to be inert. The notified polymer will become encapsulated within the dried paint matrix.

Bioaccumulation of the polymer is unlikely due to the high molecular weight of the polymer, even before curing (Connell, 1989). The notified polymer is not expected to be bioavailable especially once dry due to being encapsulated within the paint matrix.

10. EVALUATION OF HEALTH EFFECTS DATA

No toxicological data on the notified polymer were provided.

11. EVALUATION OF ENVIRONMENTAL EFFECTS DATA

No ecotoxicological data were provided.

12. ENVIRONMENTAL RISK ASSSESSMENT

The products containing the notified substance are likely to be used throughout Australia. The majority of the notified polymer will be applied to various substrates and cured into solid paint coatings, which will share the fate of these substrates and be eventually disposed to landfill, although incineration is a possible option. In addition, minor waste volumes will be

generated from the reformulation of the notified polymer and the disposal of residual polymer in paint tins. Less than 550 kg of solid waste polymer will be generated from these processes. Disposal to landfill is unlikely to present a significant risk to the environment, as the cured polymer is likely to be bound to soils and sediments and expected to be subject to slow abiotic degradation, and not expected to leach. Incineration of wastes will generate oxides of carbon and nitrogen.

Less than 250 kg of waste polymer, produced during reformulation, and from the roller/brush cleaning process, will be discharged in domestic wash waters to waste water treatment systems. If it presumed as a worst case scenario that there is no removal of the polymer in the sewage treatment plant, the resultant Predicted Environmental Concentration (PEC) in receiving waters is calculated below:

Amount released to sewer:	<250 kg
Population of Australia:	19 million
Volume of water/person:	150 L
PEC in receiving water:	<0.23 μg/L

Although the notified polymer is water soluble, the PEC is likely to be well below expected aquatic toxicity levels for polymers of this type, which tend to be >1 mg/L (Boethling and Nabholz, 1997).

The main environmental hazard would arise through spillage in transport accidents that may release quantities of the polymer to drains and waterways.

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

13. HEALTH AND SAFETY RISK ASSESSMENT

13.1. Hazard assessment

No toxicological information was provided for the notified polymer. However, the notified polymer has a high molecular weight and is unlikely to penetrate biological membranes. It contains no reactive functional groups and residual monomers are present below the relevant concentration cut offs for classification of the notified polymer as a hazardous substance. The polymer meets the PLC criteria and is unlikely to be a hazardous according to the NOHSC *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 1999).

The notified polymer is not a dangerous good for road or rail transport.

The notified polymer will be imported at <50% solution in diethylene glycol monobutyl ether and water. Due to the presence of diethylene glycol monobutyl ether, the imported polymer solution is classified as hazardous according to the NOHSC *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 1999) and warrants the risk phrase, R36 - Irritating to the eyes.

13.2. Occupational health and safety

Skin contamination with the notified polymer may occur during paint formulation, QC testing, packaging, cleaning of spills, and maintenance and cleaning of equipment. QC testing provides the possibility of exposure to small quantities of the notified polymer when collecting samples. The formulation process is largely enclosed, with local exhaust ventilation provided, and workers handling the polymer will wear personal protective equipment consisting of safety glasses, protective gloves and overalls. These controls will also provide protection against exposure to other constituents of the formulated coating. These controls and the low toxicological impact render the health risk from the notified polymer for these formulation workers as low.

During spray application of the formulated coating, inhalation exposure to the notified polymer may occur, in addition to dermal and ocular exposure during brush or roller application and cleaning of equipment. Exposure from the notified polymer (<1%) during end-use is expected to be low considering the low concentration of the notified polymer in the coatings and when personal protective equipment are utilised. Due to the low toxicity of the polymer and its low concentration in paints, the risk of adverse health effects from the notified polymer is negligible for painters.

Once the final paint mix has hardened, the notified polymer is bound within the matrix and unavailable for exposure.

There is no occupational exposure expected for transport and storage workers except in case of an accident.

Conclusion
The notified polymer is not hazardous to human health and safety, and measures are in place to control occupational exposure. Therefore, the notified polymer is of low concern to occupational health and safety and no specific risk reduction measures are necessary.

13.3. Public health

The toxicological hazard from the application of surface coatings containing low concentration of the notified polymer to members of the public in domestic/household situations is likely to be low. The notified polymer in dried surface coating films will be encapsulated within an inert, very high molecular weight film matrix. This will render the notified polymer biologically unavailable, consequently public exposure to the notified chemical from dried surface coating films is considered to be low.

Based on this information, the notified polymer will not pose a significant hazard to public health when used in the proposed manner.

14. MSDS AND LABEL ASSESSMENT

14.1. MSDS

The MSDS of the notified polymer provided by the notifier was in accordance with the NOHSC *National Code of Practice for the Preparation of Material Safety Data Sheets* (NOHSC, 1994a). It is published here as part of the assessment report. The accuracy of the information on the MSDS remains the responsibility of the applicant.

14.2. Label

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

15. RECOMMENDATIONS

Control Measures

No specific precautions are required to control exposure to the notified polymer. However, in the interests of good occupational health and safety, the following guidelines and precautions should be observed:

- Employers should implement the following engineering controls:
  - exhaust ventilation during formulation and filling processes
  - enclosed and automated formulation process

- Employers should implement the following safe work practices:
  - during manual weighing and transfer to high speed dispenser tank, avoid spills and splashing

- Employers should ensure that the following personal protective equipment is used by workers:
  - chemical resistant gloves
  - protective clothing which protects the body, arms and legs
  - eye protection when splashes are generated
  - respiratory protection when spray painting

  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.

Secondary notification

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

(1) Under subSection 64(1) of the Act:
- the notified polymer is introduced in a chemical form that does not meet the PLC criteria.

or

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

The Director will then decide whether secondary notification is required.

17. REFERENCES

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

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

National Occupational Health and Safety Commission (1994b) National Code of Practice for the Labelling of Workplace Substances [NOHSC:2012(1994)]. Australian Government Publishing Service, Canberra.

National Occupational Health and Safety Commission (1999) Approved Criteria for Classifying Hazardous Substances [NOHSC:1008(1994)]. Australian Government Publishing Service, Canberra.

R. S. Boethling and J. V. Nabholz; "Environmental Assessment of Polymers under the U.S. Toxic Substances Control Act", Chapter 10 (pp 187-234) of Ecological Assessment of Polymers, J. D. Hamilton and R. Sutcliffe (Ed's), Van Nostrand Reinhold (1997).