File No: PLC/10

Date: 3 August 1994

NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME

FULL PUBLIC REPORT

POLYMER LATEX DISPERSION

This Assessment has been compiled in accordance with the provisions of *the Industrial Chemicals (Notification and Assessment) Act 1989,* as amended and Regulations. This legislation is an Act of the Commonwealth of Australia. The National Industrial Chemicals Notification and Assessment Scheme (NICNAS) is administered by Worksafe Australia which also conducts the occupational health & safety assessment. The assessment of environmental hazard is conducted by the Commonwealth Environment Protection Agency and the assessment of public health is conducted by the Department of Health, Housing, Local Government and Community Services.

For the purposes of subsection 78(1) of the Act, copies of this full public report may be inspected by the public at the Library, Worksafe Australia, 92-94 Parramatta Road, Camperdown NSW 2050, between the hours of 10.00 a.m. and 12.00 noon and 2.00 p.m. and 4.00 p.m. each week day except on public holidays.

Under subsection 34(2) of the Act the Director of Chemicals Notification and Assessment is to publish this Report in the Chemical Gazette on 6 September 1994.

Enquiries contact Chemicals Assessment Branch on (02) 565 9464:

Street Address: 92 Parramatta Rd Camperdown, NSW 2050, AUSTRALIA
Postal Address: GPO Box 58, Sydney 2001, AUSTRALIA
Telephone: (61) (02) 565-9466 **FAX (61) (02) 565-9465**

Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT

POLYMER LATEX DISPERSION

1. APPLICANT

Dulux Australia, McNaughton Road, Clayton, Victoria 3168

2. IDENTITY OF THE POLYMER

Trade name:	Polymer latex dispersion
Method of detection and determination:	The polymer can be separated by gel permeation chromatography and identified by infra-red spectroscopy

. Comments on Chemical Identity

The very wide range in the molecular weight is due to the variation in polymerisation conditions and the ratio of monomers.

3. PHYSICAL AND CHEMICAL PROPERTIES

Appearance at 20˚C and 101.3 kPa:	Milky white liquid in water dispersion
Glass-transition temperature:	Not determined
Odour:	Odourless
Specific Gravity:	1070 at 20˚C (in water) 1130 at 20˚C (calculated for polymer alone)
Water Solubility:	< 0.001 g/L at 20˚C
Vapour Pressure:	Not determined
Hydrolysis as a function of pH:	Not determined
Dissociation constant:	Not determined
Flash point:	Not applicable
Flammability Limits:	Not applicable
Autoignition Temperature:	Not determined

Explosive Properties:	Not applicable
Reactivity:	Stable under normal use conditions at ambient temperature; will react with oxidising agents; paint films containing the polymer will degrade slowly in the presence of UV light
Particle size distribution:	Not applicable

. Comments on physico-chemical properties

A melting point for the polymer was not determined as the polymer is always manufactured as a dispersion in water, and is never isolated. This is acceptable to CEPA.

The notifier claims that in polymer dispersions of the type notified here, polymerisation begins in the aqueous phase, with a certain critical threshold of solubility being reached. As polymerisation proceeds past this point, a high molecular weight polymer forms, with surfactants and other additives being required to stabilise the final product against separation. As there is no evidence of low molecular weight oligomers in the dispersion, the company therefore estimates that the solubility of the solution to be < 1 $mg.L^{-1}$. This is acceptable, as low water solubility is a required property of a paint resin.

A dissociation constant was not determined on the grounds that the polymer does not contain any ionisable groups and should not be cationic or anionic in the pH range 4 - 9. This is acceptable.

The polymer constituents contain a number of ester groups, which means that hydrolysis is theoretically possible, but unlikely under environmental conditions due to the low solubility.

4. PURITY OF THE CHEMICAL: >99%

5. INDUSTRIAL USE

The polymer will be used in paints as a film forming substance in architectural and industrial applications.

6. OCCUPATIONAL EXPOSURE

The polymer will be manufactured in a closed reactor as a 30-60% aqueous dispersion at 100-500 tonnes (as solid polymer) in the first year and 500-2000 tonnes (as solid polymer) in the next four years.

The polymer will be manufactured by about 14 workers in a robust reactor as a 30-60% aqueous dispersion. Once

manufactured the aqueous polymer dispersion is drummed and transported to another site to be blended into paint by about 200 workers. Typically, manufacture and blending involves mixing monomers and other ingredients with water in a closed vessel. These processes are automated and are carried out under local exhaust ventilation.

Once blended, the paint containing the notified polymer will be used by industrial painters (~30), professional painters (~1000) and home handy men (~1000's). Typically, industrial applications will involve the use of spray or roller coaters in an enclosed ventilated booth with a filtered exhaust system.

7. PUBLIC EXPOSURE

The public should not be directly exposed to the polymer during manufacture or paint production. However, the public may come into contact with the finished paint product when used by home handy men.

8. ENVIRONMENTAL EXPOSURE

The polymer latex dispersion is manufactured in a closed reactor, located in a bunded area. Therefore any spills associated with the manufacturing process, or generated during the filtering and drum filling operations, will be contained. Such wastes will be diluted with water and passed to the sewers in Melbourne. **The company estimates that up to 20 tonnes per year will be disposed of in this way.** The notifier claims that negligible release is expected to the atmosphere during manufacture, due to the involatile nature of the polymer.

The polymer dispersion in water will be stored and transported in 1100 L pallecons or bulk tankers. These will transported by either road or rail.

Paints containing the polymer emulsion will be manufactured at the Dulux Plant in Rocklea, Queensland. The polymer dispersion, as approximately 30-60% w/w in water, will be used as a film forming polymer in industrial and architectural paints. These paints are to be applied by brush, roller or spray. Coatings will be heat-cured following application to the painted articles.

Potential points of release during paint manufacture occur during the high speed dispersing and blending in the mixer, batch testing and filtration and drum filling procedures. Again, spills during these times will be contained by on-site bunding, with no atmospheric losses anticipated due to the involatility of the polymer. The company estimates that accidental spills, cleaning of paint manufacturing equipment and rinsing of polymer emulsion drums, will produce **approximately 15 tonnes of waste polymer per year.** Such

aqueous wastes will be disposed of by a licensed waste disposal contractor at the Willawong tip in Brisbane.

Paints manufactured from the polymer dispersion will be applied either as industrial coatings, in spray booths, or as architectural paints, applied by standard painting equipment (eg. brushes, rollers). Industrial paints will be stored and transported in 20 L pails or 200 L plastic lined steel drums. Architectural paints will be stored and transported in epoxy lined tin plate cans, of 500 mL, 1, 4 or 10 L capacity.

The notifier claims that there will be no immediate release of the polymer to the environment during industrial paint application, as all applied paint will be captured within the plant on standard engineering controls. This waste is to be pre-treated prior to disposal (by flocculation). The collection of **approximately 8 tonnes of aqueous waste polymer per year**, to be disposed of the landfill at trade waste dumps (Tullamarine and Castlereagh) by licensed contractors is anticipated.

Release of the polymer to the environment as a result of using architectural paints is thought to occur mainly through the cleaning of brushes and rollers, and by disposal of empty paint cans which contain paint residues. **An estimated 2 tonnes (again, aqueous) per year will be lost in this way.** Washings from brushes etc. will go to sewers, whilst empty paint cans will be disposed of to council landfills.

Total wastes to go either to landfill or sewers as a result of manufacture of the polymer, and paint manufacture therefore amount to 45 tonnes per year.

. Fate

The polymer will be cured following the application to painted surfaces. Such curing is expected to increase the molecular weight, and should further decrease the potential for solubility. These factors should ensure that any wastes disposed of to landfill will remain immobile in the soil compartment.

Breakdown by hydrolysis, UV degradation or biodegradation is expected to occur very slowly, if at all. The low water solubility and high molecular weight should mean that any wastes entering waterways will become immobile in sediments.

Bioaccumulation is unlikely, given the high molecular weight and low solubility of the polymer.

9. ASSESSMENT OF ENVIRONMENTAL EFFECTS

No ecotoxicological data were provided which is acceptable for polymers of low concern. No toxic effects are anticipated from a neutral polymer with low water solubility and high molecular weight.

10. ASSESSMENT OF ENVIRONMENTAL HAZARD

Though large quantities are expected to be released into the waterways and to landfill, the polymer latex dispersion is not expected to have any ecotoxic properties. The low water solubility and high molecular weight should mean that the polymer will not cross biological membranes. The anticipated curing of painted items prior to their use should serve to further increase the molecular weight, reducing the chance of adverse environmental impact still further.

11. ASSESSMENT OF OCCUPATIONAL AND PUBLIC HEALTH AND SAFETY EFFECTS

Polymer latex dispersion has been notified as a synthetic polymer of low concern under section 23 for the purpose of section 24A of the *Industrial Chemicals Notification and Assessment Act 1989*.

The notified polymer has a number average molecular weight well above 1000 and, as such, is not expected to cross biological membranes. As a result adverse health effects would not be expected to result from exposure to the polymer.

The polymer would not be classified as a hazardous substance on the basis of the levels of residual monomers.

Exposure of workers to the polymer during manufacture, blending and paint application is expected to be low as a result of engineering controls and the use of hardy containers.

The low expected intrinsic toxicity of the polymer and low exposure suggests that the occupational health risk is minimal. However, the Material Safety Data Sheet (MSDS) states the product containing the polymer is an eye and a skin irritant. Therefore, eye and skin contact with the product should be avoided.

The polymer meets the criteria for a synthetic polymer of low concern specified in regulation 4A of the Act and can therefore be considered to be of low hazard to human health.

Although there is potential for public contact with the notified chemical, the properties of the chemical suggest there should be negligible absorption and therefore low risk to public safety.

12. RECOMMENDATIONS

To minimise occupational exposure to Polymer latex dispersion the following guidelines and precautions should be observed:

. if engineering controls and work practices are insufficient to reduce exposure to a safe level, the

following personal protective equipment which comply with Australian Standards should be worn:

- safety glasses or face shield {AS 1336-1982(1), AS 1337-1984 (2)};
- protective clothing {AS 3765.1-1990(3), AS 3765.2-1990 (4)}; and
- PVC gloves {AS 2161-1978(5)}.

- good personal hygiene should be practiced;
- any spillages should be promptly cleaned up and disposed according to local or state regulations;
- a copy of the Material safety Data Sheet (MSDS) for should be readily accessible to employees; and
- the large volumes of wastes to be produced as a result of manufacturing and use of this polymer are of concern, and the notifier should practice pollution avoidance and focus on ways to cut down emissions, particularly during polymer manufacture.

13. MATERIAL SAFETY DATA SHEET

The Material Safety Data Sheet (MSDS) for Polymer latex dispersion was provided in Worksafe Australia format (6). This MSDS was provided by Dulux Australia as part of their notification statement. It is reproduced here as a matter of public record. The accuracy of this information remains the responsibility of Dulux Australia.

14. REQUIREMENTS FOR SECONDARY NOTIFICATION

Under the *Industrial Chemicals (Notification and Assessment) Act 1989*, secondary notification of Polymer latex dispersion shall be required if any of the circumstances stipulated under subsection 64(2) of the Act arise. .

15. REFERENCES

1. Australian Standard 1336-1982, "Recommended Practice for Eye Protection in the Industrial Environment", Standards Association of Australia Publ., Sydney, 1982.
2. Australian Standard 1337-1984, "Eye Protectors for Industrial Applications", Standards Association of Australia Publ., Sydney, 1984.

3. Australian Standard 3765.1-1990, "Clothing for Protection Against Hazardous Chemicals, Part 1: Protection Against General or Specific Chemicals", Standards Association of Australia Publ., Sydney, 1990.

4. Australian Standard 3765.2-1990, "Clothing for Protection Against Hazardous Chemicals, Part 2: Limited Protection Against Specific Chemicals", Standards Association of Australia Publ., Sydney, 1990.

5. Australian Standard 2161-1978, "Industrial Safety Gloves and Mittens (excluding Electrical and Medical Gloves)", Standards Association of Australia Publ., Sydney, 1978.

6. National Occupational Health and Safety Commission, *Guidance Note for the Completion of a Material Safety Data Sheet,* 2nd. edition, AGPS, Canberra, 1990.