File No: PLC/208

December 2000

**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME**

# FULL PUBLIC REPORT

## Acrylic Resin WC-22-9063

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 Aged Care.

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, National Occupational Health and Safety Commission, 92-94 Parramatta Road, Camperdown NSW 2050, between the following hours:

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For enquiries please contact the Administration Coordinator at:

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Director
Chemicals Notification and Assessment

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## 1. APPLICANT

PPG Industries Australia Pty Ltd of McNaughton Road, CLAYTON VIC 3168 (ACN 055 500 939) has submitted a notification statement in support of their application for an assessment certificate for the synthetic polymer of low concern (PLC) in 'Acrylic Resin WC-22-9063'.

## 2. IDENTITY OF THE CHEMICAL

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

**Marketing name:**
Polymer in Acrylic Resin WC-22-9063 [25% weight solids dispersion in water, propanol, 2-(2-methoxy)- and propanol, 2-(2-propoxy)-].

## 3. POLYMER COMPOSITION AND PURITY

Details of the polymer composition have been exempted from publication in the Full Public Report. The number-average molecular weight (NAMW) is >1000.

## 4. PLC JUSTIFICATION

The notified polymer meets the PLC criteria.

## 5. PHYSICAL AND CHEMICAL PROPERTIES

The polymer is never isolated in pure form. The following data is for a 25% polymer solution in water, 2-(2-methoxy) propanol and 2-(2-propoxy) propanol, unless specified otherwise.

| Property | Result | Comments |
|---|---|---|
| **Appearance** | Slightly yellow viscous liquid with a mild solvent odour. | |
| **Boiling point** | Not determined. | Expected to boil initially at the boiling point of water |

| | | |
|---|---|---|
| | | (100°C). |
| **Specific gravity** | 1.029. | Calculated specific gravity of pure polymer is 1.131. |
| **Vapour pressure** | Not determined | Expected to be similar to water |
| **Water solubility** | Not soluble in water. | Dispersible in water. |
| **Particle size** | Not applicable. | |
| **Flammability** | The polymer dispersion is not flammable. | |
| **Autoignition temperature** | Not applicable. | |
| **Explosive properties** | Not available. | The polymer is expected to be stable under normal use conditions. |
| **Stability/reactivity** | The polymer and the polymer dispersion are stable but may react with strong oxidising agents. | |
| **Hydrolysis as function of pH** | Not determined. | |
| **Partition coefficient** | Not determined. | The polymer is expected to largely partition in n-octanol rather than water due to its insolubility in water |
| **Adsorption/desorption** | No information available. | |
| **Dissociation constant** | Not measured. | At high pH the polymer will be anionic. |

### 5.1 Comments on physical and chemical properties

The water solubility of the polymer is unable to be determined, as it is never isolated from the polymer solution. The notifier claims that the polymer is dispersible but not soluble in water. The polymer has an anionic surface charge, which aids in dispersion stability. The representative structure contains a number of hydroxyl and polar oxygen atoms that would aid water solubility, but also contains hydrophobic aromatic and aliphatic chains.

Despite containing ester linkages, the polymer is not expected to undergo hydrolysis in the environmental pH range of between 4 and 9 due to the expected low water solubility.

## 6. USE, VOLUME AND FORMULATION

**Use:**
The notified polymer will be imported in 200L drums as 25% solids (w/w) polymer dispersion in solvent and water. In Australia, the polymer will be incorporated as a component of an automotive coating at up to 10% by weight. These coatings will be used on the external primed surface of car bodies.

**Manufacture/Import volume:**
Two tonnes of the notified polymer will be imported in each of the first five years.

**Formulation details:**
The polymer dispersion will be blended with other ingredients to form automotive coating. The coating will be filtered and filled in 200L steel drums for transport to the customer site. The concentration of the notified polymer in the finished coating is expected to be 10%.

At customer site the coating will be mixed, stirred and diluted and used by manual or automatic spray gun. The object will be spray-painted and heat cured, resulting in the finished painted article.

## 7. OCCUPATIONAL EXPOSURE

| Exposure route | Exposure details | Controls indicated by notifier |
|---|---|---|
| ***Paint Manufacture*** – Includes laboratory development, paint make-up and QC testing. | | |
| *Laboratory development – weighing and testing (3 factory workers, 8 hours/day; 80 days/year).* | | |
| Dermal | Skin contact during the handling of small quantities of the polymer solution and paint. | Workers wear coveralls, impervious gloves and goggles. |
| *Paint make-up (18 factory workers, 4 hours/day; 200 days/year).* | | |
| Dermal and ocular | Paint make-up involves decantation (manual) of the dispersion (25% notified polymer) into mixing vessels, where it will be blended with other ingredients to produce paints (10% notified polymer). Possible skin and eye contamination while pouring the dispersion in mixers. | Mixers fitted with local exhaust ventilation to capture volatiles; coveralls, impervious gloves and goggles worn by workers. |

*QC testing (3 factory workers, 4 hours/day; 200 days/year).*

| | | |
|---|---|---|
| Dermal | Skin contact during the handling of small quantities of paint. | Workers wear coveralls, impervious gloves and goggles. |

*Filling into drums (3 factory workers, 4 hours/day; 200 days/year).*

| | | |
|---|---|---|
| Dermal and ocular | Paint from the tanks will be automatically (under gravity) filtered and filled into 200L drums. Possible skin and eye contamination during filtration and filling drums. | Drums filled under exhaust ventilation to capture volatiles; coveralls, impervious gloves and goggles worn by workers. |

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**Paint Application -** Includes adding of paint to circulation tank, spray application and cleaning of spray equipment.

*Adding of paint to circulation tank (6 workers, 2 hours/day; 200 days/year).*

| | | |
|---|---|---|
| Dermal and ocular | Skin and eye contact (splashes) to the polymer in paint is possible during mixing (stirring/thinning) and pouring the paint into the tank. | Mixing of paint in ventilated paint kitchen. Workers wear anti-static coveralls, impervious gloves, anti-static footwear and eye protection. |

*Hand spraying (12 workers, 8 hours/day; 200 days/year).*

| | | |
|---|---|---|
| Dermal and inhalation | Formation of aerosols and therefore inhalation exposure is possible during spray application. | Paint application (manual and automatic spray) in spray booths with effective fume extraction systems (down draft ventilation). Workers wear nylon overalls, calico hoods and nylon gloves. |

*Cleaning of spray equipment (6 workers, 2 hours/day; 200 days/year).*

| | | |
|---|---|---|
| Dermal | Skin contact with the paint is possible during cleaning of equipment. | Workers wear coveralls, impervious gloves and goggles. |

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***Transport and storage***

Transport worker (1) and storage workers (2); 2 hours/day; 100 days/year.

| | | |
|---|---|---|
| Dermal | Containers will be sealed and exposure is unlikely except in the event of a spill. | Not indicated, but expected to be as a minimum gloves, and coveralls. |

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## 8. PUBLIC EXPOSURE

During transportation of the polymer and paint, exposure of the general public is only likely to occur in the event of an accidental spill. The public will come into contact with the polymer after it has been applied to, and becomes an integral part of a hard durable coating on motor vehicles. This coating is formed by the reaction of the notified polymer (and other polymers in the paint) with a cross-linking resin under the action of heat to form a high molecular weight, stable paint film.

## 9. ENVIRONMENTAL EXPOSURE

### 9.1. Release

Paint Manufacture: During reformulation of the polymer into paint products, spillage will be contained to the plant by bunding. The notifier estimates that up to 110 kg (equivalent to 4.5 % of total import volume) per year of waste polymer will be generated during the manufacturing process as follows: rinsing of manufacturing equipment 20 kg per year; residual polymer in drums 40 kg per year; paint manufacture 50 kg per year. This waste will either be incinerated or disposed of to landfill. Release to the atmosphere is expected to be minimal due to the non-volatile nature of the polymer.

Paint Application: The total amount of waste polymer generated during application is estimated to be up to 680 kg/year, generated in the following ways. At customer sites paint will be sprayed with a transfer efficiency of approximately 35 % for hand spray and 80 % for the automatic method. The average transfer efficiency is estimated to be 70 %, so about 30 % of the paint (equivalent to 600 kg/year of the polymer) will be lost as over-spray. Over-spray will be captured and collected within spray booth water, which will be treated to separate out the waste paint component. The separated sludge containing the waste polymer will be incinerated. It is estimated that cleaning of spray guns and mixing equipment will generate up to 40 kg per year of waste polymer, which will be collected and disposed of in the same way as wastewater from spray booths. Drums containing polymer residues will be incinerated by a drum recycler, generating up to 40 kg per year waste polymer.

### 9.2. Fate

Polymer waste generated from the manufacture of paint products will either be sent to land-fill or incinerated. Polymer waste generated as a result of paint application will be incinerated. During incineration, the polymer would burn emitting water vapour and oxides of carbon and nitrogen. Polymerised polymer in landfill is expected to be immobile. Free unreacted polymer is also likely to be immobile due to its low water solubility and expected high binding affinity to soils. It could be expected to degrade slowly via biotic and abiotic processes.

Once applied to metal panels, the notified polymer will be incorporated in a hard, durable, inert paint film. Fragments, chips and flakes of the paint are expected to be inert and to partition to the soil compartment. The metal panels coated with the polymer are likely to be either recycled for steel reclamation or placed into landfill at the end of their useful life.

During steel reclamation the polymer would be destroyed in furnaces and converted to water vapour and oxides of carbon and nitrogen.

The polymer is not expected to cross biological membranes due to its high molecular weight and low water solubility, and should not bioaccumulate (Connell, 1990).

## 10. EVALUATION OF HEALTH EFFECTS DATA

No toxicological data on the notified polymer were submitted. The notifier states that similar polymers are in use and to date no adverse health effects have been reported.

The Material Safety Data Sheet (MSDS) for the product (WC-22-9063 Acrylic Resin) states that the product may cause nausea and vomiting if consumed in large amounts. It may be an eye and skin irritant. Inhalation of aerosols and mists of the product may produce respiratory irritation.

The health hazards of the additives and adjuvants are tabulated below.

| Chemical | Health hazards | Regulatory controls |
|---|---|---|
| **Additives/adjuvants** | | |
| Propanol, 2-(2-methoxy)- | None | Exposure standard 100 TWA, 150 ppm STEL (NOHSC, 1995). |
| Propanol, 2-(2-propoxy)- | Moderate eye irritant (RTECS, 1997) | - |

## 11. EVALUATION OF ENVIRONMENTAL EFFECTS DATA

No ecotoxicological data were submitted.

## 12. ENVIRONMENTAL RISK ASSSESSMENT

Minimal release to water is expected during paint manufacture and application. Most waste polymer will be generated during end-use and is ultimately expected to be released to land fill or incinerated. Polymer released to land fill is unlikely to be mobile in the soil environment and to slowly degrade to carbon dioxide gas through abiotic and biotic processes. The environmental hazard of the notified polymer in landfill is expected to be low. Incinerated polymer would be rapidly destroyed and converted to water vapour and oxides of carbon and nitrogen.

In the event of accidental release of the polymer into waterways, the polymer is expected to settle to the bottom and bind to sediments where it would slowly degrade. The long-term

environmental hazard of the notified polymer in the aquatic environment is expected to be low.

The notified polymer has a counter ion present in the imported polymer dispersion. The counter-ion appears to be only slightly toxic based upon structural analogue information. In addition, minimal release to the aquatic compartment is expected.

The polymer's high molecular weight and low water solubility should prevent bioaccumulation. Given the above, the overall environmental hazard is expected to be low.

## 13. HEALTH AND SAFETY RISK ASSESSMENT

### 13.1. Hazard assessment

The notified polymer in Acrylic Resin WC-22-9063 is considered stable under normal conditions of use. No toxicological information has been provided for the notified polymer, however, due to its high molecular weight and lack of reactive functional groups, the polymer is unlikely to be a hazardous substance according to the NOHSC *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 1999a). Since the notified polymer has high NAMW, absorption across biological membranes would be restricted.

The product, Acrylic Resin WC-22-9063, is not classified by the notifier as a hazardous substance.

### 13.2. Occupational health and safety

Exposure to the notified polymer may occur during paint manufacture and spray application. During these processes where manual handling is required, exposure is most likely to occur from skin contact with the notified polymer at 25% as it is incorporated during paint manufacture, and from exposure to paints that contain the notified polymer at up to 10%. Potential for skin contact during formulation is mitigated by the presence of engineering controls, such as closed systems and local exhaust ventilation, and a requirement for workers to wear personal protective equipment, such as impervious gloves, overalls and eye protection. Skin contact and inhalation exposure from the notified polymer during spray painting is considered low as long as in situ engineering controls (spray booth) and full personal protective equipment are utilized. Once the final paint mix has hardened, the notified polymer is bound within the matrix and unavailable for exposure or uptake. Given the expected low toxicity of the polymer, the risk of health effects from the polymer is low, should exposure occur.

The notified polymer is of low concern to worker health and safety and no specific additional risk reduction measures are necessary.

Exposure to the solvent for the resin solution will need be controlled by the use of effective ventilation systems to reduce exposure and personnel wearing the appropriate protective equipment.

As one of the solvents has assigned exposure standard, the employers need to ensure that atmospheric concentrations of the solvents are below their exposure standard levels.

There is little potential for significant occupational exposure to the notified polymer in the transport and storage of the polymer solution other than in the event of an accidental spill.

### 13.3. Public health

The notified chemical will not be sold to the public. The public will only be exposed to the notified polymer once it has become part of an inert and fully cured paint film on motor vehicles. Therefore, the risk to the public from exposure to the notified polymer is considered low.

## 14. MSDS AND LABEL ASSESSMENT

### 14.1. MSDS

The MSDS of the product, Acrylic Resin WC-22-9063, 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 product, WC-22-9063 Acrylic Resin, 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

To minimise occupational exposure to the notified polymer the following practices and guidelines should be observed:

- Use of the paint containing the notified polymer by spray application should be in accordance with the *National Guidance Material for Spray Painting* (NOHSC 1999c).

- No specific personal protective equipment is required for the polymer; however, it is good practice to wear overalls, gloves and eye protection.

- A copy of the MSDS for the notified polymer and the products that contain it should be easily accessible to employees.

Workplace practices and control procedures consistent with provisions of State, Territory and Commonwealth legislation based on the *National Model Regulations for the Control of Workplace Hazardous Substances* must be in operation if products containing the notified polymer are determined to be hazardous.

If products containing the notified polymer are hazardous to health in accordance with the NOHSC *Approved Criteria for Classifying Hazardous Substances* (National Occupational Health and Safety Commission, 1999b), workplace practices and control procedures consistent with State and territory hazardous substances regulations must be in operation. In particular, exposure standards for product components must be adhered to in the workplace.

Guidance in selection of protective eyewear may be obtained from Australian Standard (AS) 1336 (Standards Australia, 1994) and Australian/New Zealand Standard (AS/NZS) 1337 (Standards Australia/Standards New Zealand, 1992); for industrial clothing, guidance may be found in AS 3765.2 (Standards Australia, 1990); for impermeable gloves or mittens, in AS 2161.2 (Standards Australia/ Standards New Zealand, 1998); for occupational footwear, in AS/NZS 2210 (Standards Australia/ Standards New Zealand, 1994a); for respirators, in AS/NZS 1715 (Standards Australia/ Standards New Zealand, 1994b) and AS/NZS 1716 (Standards Australia/ Standards New Zealand, 1994c); or other internationally accepted standards.

## 16. REQUIREMENTS FOR SECONDARY NOTIFICATION

Secondary notification may be required if:

(i) any of the circumstances stipulated under subsection 64(2) of the Act arise. If any importer or manufacturer of (the notified polymer) becomes aware of any of these circumstances, they must notify the Director within 28 days; or

(ii) the notified polymer is introduced in a chemical form that does not meet the PLC criteria.

## 17. REFERENCES

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National Institute of Occupational Safety and Health (1997). Registry of Toxic Effects of Chemical Substances, 1997.

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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.

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

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

National Occupational Health and Safety Commission (1999c) National Guidance Material for Spray Painting [NOHSC: 10005(1999)]. Sydney, Australian Government Publishing Service.

Standards Australia (1990) Australian Standard 3765.2-1990, Clothing for Protection against Hazardous Chemicals Part 2 Limited protection against specific chemicals. Standards Association of Australia.

Standards Australia (1994) Australian Standard 1336-1994, Eye protection in the Industrial Environment. Standards Association of Australia.

Standards Australia/Standards New Zealand (1992) Australian/New Zealand Standard 1337-1992, Eye Protectors for Industrial Applications. Standards Association of Australia/ Standards Association of New Zealand.

Standards Australia/Standards New Zealand (1994a) Australian/New Zealand Standard 2210-1994, Occupational Protective Footwear. Standards Association of Australia/Standards Association of New Zealand.

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