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November 2001

**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION  
AND ASSESSMENT SCHEME**

**FULL PUBLIC REPORT**

**Polymer in Primal Binder U-51**

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.

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Director  
Chemicals Notification and Assessment

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**FULL PUBLIC REPORT**

**Polymer in Primal Binder U-51**

**1. APPLICANT**

**Original Holder of Assessment Certificate (First Applicant)**

An Assessment Certificate for the notified chemical known by the name Polymer in Primal Binder U-51 was granted to Rohm and Haas Australia Pty Ltd of 969 Burke Road Camberwell, Victoria 3124 (ABN 29 004 513 188).

The Assessment Report for Polymer in Primal Binder U-51 is identified by the sequence number PLC/259.

**Second Applicant**

Since granting of the abovementioned Assessment Certificate, Bayer Australia Pty Ltd of 633-647 Springvale Road, Mulgrave North, Victoria 3170 (ABN 22 000 138 714) has submitted a notification statement in support of their application for an extension of the original Assessment Certificate for Polymer in Primal Binder U-51. Rohm and Haas Australia Pty Ltd has agreed to this extension.

Information submitted by Rohm and Haas Australia Pty Ltd pertains to the introduction of the notified polymer as a binder for aqueous basecoat in leather finishing and indicates that introduction volumes and use pattern remain the same as those assessed in PLC/259.

**2. IDENTITY OF THE CHEMICAL**

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

**Marketing names:** Primal Binder U-51 (35% notified polymer)

**3. POLYMER COMPOSITION AND PURITY**

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

**Purity (%):** >98%

**Hazardous impurities (other than residual monomers and reactants):** None.

**Non-hazardous impurities at 1% by weight or more:** None.

**Additives/adjuvants:**

| Chemical name          | CAS no.   | % Weight |
|------------------------|-----------|----------|
| N-methyl-2-pyrrolidone | 872-50-4  | 5        |
| Water                  | 7732-18-5 | 60       |

#### 4. PLC JUSTIFICATION

The notified polymer meets the PLC criteria.

#### 5. PHYSICAL AND CHEMICAL PROPERTIES

Data of physical and chemical properties were generated from Primal Binder U-51 containing 35% notified polymer unless otherwise specified.

| Property                            | Result  | Comments  |
|-------------------------------------|---|---|
| <b>Appearance</b>                   | Hazy colourless aqueous dispersion                  |   |
| <b>Boiling point</b>                | Not determined                                      |   |
| <b>Density</b>                      | 1 050 kg/m <sup>3</sup>                             |   |
| <b>Water solubility</b>             | Not determined                                      | In alkaline solutions (> pH 8) the notified polymer will be present as a salt and as such is expected to be soluble in water. However as the corresponding acid, the notified polymer is expected to be less soluble. |
| <b>Particle size</b>                | Not determined                                      | The notified polymer is manufactured in solution.   |
| <b>Flammability</b>                 | Non-flammable                                       | Dried notified polymer may support combustion.  |
| <b>Autoignition temperature</b>     | Not determined                                      | Not expected to autoignite.   |
| <b>Explosive properties</b>         | Not determined                                      | Not expected to be explosive.   |
| <b>Stability/reactivity</b>         | Stable under normal conditions of use and handling. | As a durable coating binder, it is resistant to degradation, decomposition and depolymerisation.  |
| <b>Hydrolysis as function of pH</b> | Not determined                                      | Hydrolysis of the urethane linkages is possible but would not be expected under   |

|                              |                |   |
|------------------------------|----------------|---|
| <b>Partition coefficient</b> | Not determined | environmental conditions (pH 4-9).<br>Given the notified polymer's expected water solubility and likely hydrophilic nature, it would partition into the aqueous phase, except if present as the acid. |
| <b>Adsorption/desorption</b> | Not determined | In its acid form the notified polymer is expected to adsorb to, or be associated with, soil/sediment and organic matter and be immobile in soil due to its low water solubility.                      |
| <b>Dissociation constant</b> | Not determined | Carboxylic acid is known to have pKa's between 4-5.   |

## 6. USE, VOLUME AND FORMULATION

**Use:** The notified polymer is used as a binder for aqueous basecoat in leather finishing. The treated leather will be used in furniture, automotive upholstery and sports shoes.

**Manufacture/Import volume:** Up to 40 tonnes of the notified polymer will be imported annually in the first 5 years.

**Formulation details:** The notified polymer will not be manufactured in Australia. It will be imported as a component of Primal Binder U-51 at a concentration of 35%. Primal Binder U-51 polymer solution will be packaged in 200 L steel drums.

## 7. OCCUPATIONAL EXPOSURE

| <b>Exposure route</b>  | <b>Exposure details</b>   | <b>Controls indicated by notifier</b>  |
|--|---|--|
| <b><i>Formulation</i></b>  |   |  |
| <i>2-3 Formulators (4-6 hours/day, 100 days/year).</i>             |   |  |
| Skin, eye  | Transferring and adding primal Binder U-51 and other components into the mixing vessel. | Safety glasses, impervious gloves.<br>Overalls and safety boots.<br><br>Exhaust ventilation systems are installed in the mixing room.  |
| <b><i>End use</i></b>  |   |  |
| <i>2-3 Spray machine operators (6-8 hours/day, 100 days/year).</i> |   |  |
| Skin, eye  | Transferring basecoat and operating spray machines.                                     | Safety glasses, impervious gloves.<br>Overalls and safety boots.<br><br>Enclosed rotary spray unit. An exhaust ventilation system is present above the spray machines and any overspray is |

filtered and caught in a water curtain filtering system.

*2-3 Leather handlers (6-8 hours/day, 100 days/year).*

|           |  |   |
|-----------|--|---|
| Skin, eye | Placing untreated leather and collecting dried treated leather on the conveyor line. | Safety glasses, impervious gloves. Overalls and safety boots. |
|-----------|--|---|

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### ***Transport and storage***

*5 Waterside, workers, 5-10 transport and warehouse workers.*

|      |   |                |
|------|---|----------------|
| None | Load/unload drums from trucks.<br>No exposure anticipated except in the event of an accident. | Not specified. |
|------|---|----------------|

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At customer sites, Primal Binder U-51 will be decanted or pumped into a stainless steel mixing vessel, mixed with other components such as pigment, defoamer, thickener and water. The finished basecoat, comprising of 20% of Primal Binder U-51 or 7% of the notified polymer, is gravity fed or pumped into 200 litre drums or 20 litre pails and transported to the spray line. The basecoat is pumped directly from drums or pails to spray unit. The basecoat will be applied by rotary spray application to untreated leather on a conveyor line, and the treated leather will then be dried in ovens through a drying tunnel prior to further treatment. Any overspray is filtered and caught in a water curtain filtering system during the spray application. Potential for exposure to the notified polymer via inhalation is expected to be minimal due to its low volatility and the presence of exhaust ventilation and air purification systems in the working area. Exposure by eye and skin contact is most likely during transfer of the polymer solution or basecoat. A combination of engineering controls and personal protective equipment will minimise worker exposure during formulation and application of the basecoats.

## **8. PUBLIC EXPOSURE**

There is potential for public exposure in a transport emergency. In the event of an accidental spillage during transportation or reformulation, the spill should be taken up in accordance with instruction on the Material Safety Data Sheet.

The majority (> 90%) of the notified polymer will be applied to and remain in finished leather as a basecoat and covered with 2 to 3 topcoats. The public will come into contact with the finished leather which is used for manufacture of furniture, upholstery and sport shoes. However, since the leather is over-coated with further polymer topcoats, public exposure to the notified polymer will be minimal.

## **9. ENVIRONMENTAL EXPOSURE**

### **9.1. Release**

*Storage sites*

The notified polymer in Primal Binder U-51 will be stored in banded warehouses at the transport depot and customer sites. In the event of a spill the notified polymer will be taken up with adsorbent material and disposed of to a licensed waste landfill site.

#### *Basecoat Formulation:*

Spills of the notified polymer during formulation will be taken up with adsorbent material and disposed of to a licensed waste landfill site. Based on the maximum import volume, up to 100 kg of the notified polymer will be lost in this manner each year.

Wash water from formulation equipment will be re-used in subsequent batches where possible. Otherwise, it will be treated on site during which it is estimated that >90 % of the notified polymer will be precipitated in treatment plant sludge and disposed of to landfill. The remaining <10 % in the supernatant water will be released into the sewer. Approximately 50% of the wash water will be re-used in subsequent batches and the remainder released into the sewer. Therefore, up to a further 45 kg per annum will be disposed of in landfill and 5 kg per annum will be released into the sewer. An estimated 100 kg of the notified polymer will be lost to landfill as residues in the empty import drums each year.

#### *Basecoat Application*

The basecoat will be applied to leather via rotary spray application. The spray unit consists of several spray nozzles attached to a horizontal rotation frame mostly enclosed in a metal cabinet. A conveyer belt carries the leather product into the cabinet, where the basecoat is applied and then into a heated drying tunnel.

The notifier estimates that approximately one third of the basecoat will be lost as overspray. Of this, 50% will be trapped in the spray both water reservoir and 50% will be removed by the scrubber unit. At the maximum import volume, this equates to 6.6 tonnes per annum lost in this manner. The water reservoir will be periodically drained and the wastewater treated and the majority of the notified polymer removed on-site prior to release into the sewer. However, up to 300 kg of the notified polymer will be released into the sewer each year. All other dry wastes generated during the application of the basecoat, including the waste obtained from the periodic cleaning of scrubber baffles and filters will also be disposed of in landfill.

#### *Use of Leather*

The majority of the notified polymer will be applied to finished leather as a component of the basecoat.

## **9.2. Fate**

The majority of the notified polymer from spills, cleaning, and in wash water will go to landfill where is expected to be immobile due to the low water solubility in its acid form and will become part of the soil matrix. In the salt form, as found in the alkaline basecoat prior to application, the polymer is soluble and is therefore expected to be more mobile with the potential to leach. This would also occur if the polymer encounters alkaline soils and water.

Polymer entering waterways would be expected to associate with the sediments if in the acid form. However, if the polymer is present as the salt which is soluble in water it would be expected to dilute and disperse and eventually partition to the sediments due to its polyanionic nature. The polymer is not expected to cross biological membranes due to its

high molecular weight. Therefore the notified substance is not expected to bioaccumulate (Connell, 1990).

The majority of the notified polymer will be released into the environment through disposal of leather products in landfill. The notified polymer in these products will slowly degrade through abiotic and biotic processes to oxides of nitrogen and carbon.

## 10. EVALUATION OF HEALTH EFFECTS DATA

No toxicological data were submitted.

The notified polymer is not classified as a hazardous substance according to the NOHSC *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 1999b). It contains low level of residual monomers. No hazardous impurities are present at above the cutoffs for classification of the notified polymer as a hazardous substance.

The health hazard of an additive is tabulated below.

| <i>Chemical</i>        | <i>Health hazards</i>        | <i>Regulatory controls</i>                             |
|------------------------|------------------------------|--|
| N-methyl-2-pyrrolidone | Irritating to eyes and skin. | On the NOHSC Hazardous Substances List (NOHSC, 1999a). |

## 11. EVALUATION OF ENVIRONMENTAL EFFECTS DATA

No ecotoxicological data were provided for assessment.

## 12. ENVIRONMENTAL RISK ASSESSMENT

The majority of the notified polymer will be released into the environment through disposal of leather products in landfill. The notified polymer in these products will slowly degrade through abiotic and biotic processes to oxides of nitrogen and carbon.

The notifier estimates that less than 10 tonnes per annum will be released to the environment from the importation, formulation and use of the notified polymer. Most of this will be from overspray where the majority will be disposed of in landfill, but there will be some release into the sewer. The majority of the notified polymer from spills, cleaning, and in wash water will also go to landfill where is expected to be immobile due to the low water solubility of its acid form and will become part of the soil matrix. In the salt form, as found in the alkaline basecoat prior to application, the polymer is soluble and is therefore expected to be more mobile with the potential to leach. This would also occur if the polymer encounters alkaline soils and water.

Polymer entering waterways would be expected to associate with the sediments if in the acid form. However if the polymer is present as the salt which is soluble in water, it would be expected to dilute and disperse and eventually partition to the sediments due to its polyanionic nature. The polymer is not expected to cross biological membranes due to its



high molecular weight. Therefore the notified polymer is not expected to bioaccumulate (Connell, 1990).

## **13. HEALTH AND SAFETY RISK ASSESSMENT**

### **13.1. Hazard assessment**

No toxicological data have been supplied for the notified polymer, therefore the substance cannot be assessed against the NOHSC *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 1999b). Since the notified polymer has a high NAMW and a low percentage of low molecular species, absorption across biological membranes would be restricted.

The supplied MSDS provides brief health hazard information on Primal Binder U-51 polymer solution. It may be a slightly irritant to the eyes by direct contact. Prolonged or repeated skin contact can cause slight skin irritation. Inhalation of vapour or mist may irritate the nose and throat and cause headache, and nausea. Chronic exposure may cause adverse reproductive effects. These effects relate mainly to N-methyl-2-pyrrolidone present in Primal Binder U-51 polymer solution rather than the notified polymer.

### **13.2. Occupational health and safety**

Transport and storage workers are unlikely to be exposed with the notified polymer unless the drums containing the polymer solution are breached. The health risk to these workers is considered to be negligible.

Formulators will handle both the undiluted (35% notified polymer) and diluted solutions (7% notified polymer). Repeated dermal exposure to the notified polymer is expected for these workers. However, the occupational health risk in dealing with the notified polymer is considered to be low based on its expected low toxicity. Engineering controls include local exhaust ventilation in the mixing areas. In order to minimise the occupational exposure to the solvent N-methyl-2-pyrrolidone, workers should wear overalls, chemically resistant apron or other impervious clothing, safety goggles, safety boots and neoprene or butyl rubber gloves to prevent skin and eye contamination. A respiratory protection program must be followed when the workplace risk assessment indicates that inhalation of vapour/spray mist may occur.

Spray operators will handle the diluted form of the notified polymer. Exposure will mainly be via dermal contact. In addition, the spray operators may experience inhalational exposure if spray mists are generated in this process. Engineering controls include using enclosed rotary spray units, and exhaust ventilation system in the mixing area and above spray machines. Any overspray is filtered and caught in a water curtain filtering system. No exposure to the notified polymer is expected when leather handlers feed in the leather for treatment. The leather collector may contact the notified polymer, however, by this stage, the polymer is fixed to the treated leather and therefore not bioavailable. The same personal protective equipment as for the formulators should be used for the spray operator and leather handlers. However, safety goggles are not needed for leather handlers.

Considering the engineering controls and personal protective equipment (PPE) used by formulators and spray operators, the risk of adverse health effects in these workers is low.

### 13.3. Public health

Neither the imported polymer solution nor the finished basecoats will be sold to the public. The public will come into contact with finished leather products (furniture, upholstery and sport shoes) which have been treated with the basecoat containing the notified polymer and covered with 2 to 3 polymer topcoats. In view of its high molecular weight, physical and chemical properties, and its use pattern, the notified polymer is unlikely to pose a significant risk to public health.

## 14. MSDS AND LABEL ASSESSMENT

### 14.1. MSDS

The MSDS of the product containing the 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 product containing the 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*

#### Occupational Health and Safety

- Employers should implement the following engineering controls to minimise occupational exposure to Primal Binder U-51:
  - -enclosure of mixing tanks during formulation and spray units to prevent exposure to aerosols
  - -local exhaust ventilation during transfer of notified polymer from drum to mixing tank and spraying basecoat on leather.
- Employers should implement the following safe work practices to minimise occupational exposure during handling of Primal Binder U-51:
  - -during transfer to mixing tank, avoid splashing and generation of aerosols
- Employers should ensure that the following personal protective equipment is used by workers to minimise occupational exposure to Primal Binder U-51:
  - overalls, chemically resistant apron or other impervious clothing
  - safety goggles
  - neoprene or butyl rubber gloves

- safety boots
- respirator, when use is indicated by workplace risk assessment.

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 Primal Binder U-51 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.

#### Emergency procedures

- Spillages should be cleaned up promptly with absorbents which should be put into containers for disposal.

#### Secondary notification

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

- (1) Under Section 64(1) of the Act; if
    - the notified polymer is introduced in a chemical form that does not meet the PLC criteria.
- or
- (2) Under Section 64(2) of the Act:
    - if any of the circumstances listed in the subsection arise.

The Director will then decide whether secondary notification is required.

## 16. 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 (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.

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