

File No: NA/191

May 2001

**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION  
AND ASSESSMENT SCHEME**

**FULL PUBLIC REPORT**

**Polymer in Bayhydrol 123**

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:

|                    |                   |
|--------------------|-------------------|
| Monday - Wednesday | 8.30 am - 5.00 pm |
| Thursday           | 8.30 am - 8.00 pm |
| Friday             | 8.30 am - 5.00 pm |

Copies of this full public report may also be requested, free of charge, by contacting the Administration Coordinator on the fax number below.

For enquiries please contact the Administration Coordinator at:

*Street Address:* 92 -94 Parramatta Rd CAMPERDOWN NSW 2050, AUSTRALIA  
*Postal Address:* GPO Box 58, SYDNEY NSW 2001, AUSTRALIA  
*Telephone:* (61) (02) 9577 9514 FAX (61) (02) 9577 9465

Director  
Chemicals Notification and Assessment

## TABLE OF CONTENTS

|   |    |
|---|----|
| FULL PUBLIC REPORT.....                           | 3  |
| 1. APPLICANT .....                                | 3  |
| 2. IDENTITY OF THE CHEMICAL.....                  | 3  |
| 3. POLYMER COMPOSITION AND PURITY.....            | 3  |
| 4. PLC JUSTIFICATION.....                         | 4  |
| 5. PHYSICAL AND CHEMICAL PROPERTIES.....          | 4  |
| 6. USE, VOLUME AND FORMULATION.....               | 4  |
| 7. OCCUPATIONAL EXPOSURE .....                    | 5  |
| 8. PUBLIC EXPOSURE .....                          | 5  |
| 9. ENVIRONMENTAL EXPOSURE.....                    | 5  |
| 10. EVALUATION OF HEALTH EFFECTS DATA .....       | 7  |
| 11. EVALUATION OF ENVIRONMENTAL EFFECTS DATA..... | 7  |
| 12. ENVIRONMENTAL RISK ASSESSMENT.....            | 7  |
| 13. HEALTH AND SAFETY RISK ASSESSMENT.....        | 7  |
| 14. MSDS AND LABEL ASSESSMENT .....               | 8  |
| 15. RECOMMENDATIONS .....                         | 9  |
| 16. REQUIREMENTS FOR SECONDARY NOTIFICATION.....  | 9  |
| 17. REFERENCES.....                               | 10 |

**FULL PUBLIC REPORT****Polymer in Bayhydrol 123****1. APPLICANT**

Bayer Hodgsons Pty Ltd of Unit 1, 31 Hill Rd HOMEBUSH BAY NSW 2127 (ACN 071 919 116) has submitted a notification statement in support of their application for an assessment certificate for the synthetic polymer of low concern (PLC) Polymer in Bayhydrol 123.

**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.

**Trade names:** Bayhydrol 123 is an aqueous dispersion containing the notified polymer at a concentration of 35%.

**Molecular weight (MW):**

| Number-average MW | Weight-average MW | % MW < 1000 | % MW < 500 | Method |
|-------------------|-------------------|-------------|------------|--------|
| > 10000           | > 10000           | 0%          | 0%         | GPC    |

**Reactive functional groups:** No groups of medium or high concern.

**Functional Group Equivalent Weight (FGEW):** Not applicable.

**3. POLYMER COMPOSITION AND PURITY**

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

**Purity (%):** 100%

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

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

**Additives/adjuvants:** None.

#### 4. PLC JUSTIFICATION

The notified polymer meets the PLC criteria.

#### 5. PHYSICAL AND CHEMICAL PROPERTIES

The polymer is never isolated from the product Bayhydrol 123 in which it is present at approximately 35% aqueous dispersion, and the following listed properties are for this product.

| Property                | Result                                | Comments                |
|-------------------------|---------------------------------------|-------------------------|
| <b>Appearance</b>       | Milky white liquid.                   |                         |
| <b>Boiling point</b>    | Approximately 100°C.                  | Boiling point of water. |
| <b>Density</b>          | Approximately 1.060 kg/m <sup>3</sup> |                         |
| <b>Water solubility</b> |                                       | Dispersible in water.   |
| <b>Particle size</b>    | Not applicable.                       |                         |

##### 5.1 Comments on physical and chemical properties

No quantitative water solubility data was provided, but the polymer contains a high proportion of hydrocarbon and few polar urethane and urea linkages which may have some affinity for water, and consequently the polymer is expected to have low water solubility. In Bayhdrol 123 the polymer is dispersed (35%) in water with 15% of N-methyl-2-pyrrolidone co-solvent.

#### 6. USE, VOLUME AND FORMULATION

**Use:** The notified polymer is contained in a dispersion used in the formulation of ambient cure or bake coatings for a wide range of rigid or flexible substrates such as leather, vinyl-coated fabric, textiles, plastics and metals. The use identified in this notification is as an anti-slip coating for textiles further used in the paper manufacturing process.

**Manufacture/Import volume:** The notified polymer will be imported in 200 kg polyurethane drums with a cork style lid containing a 5 cm bung and a 2 cm vented bung. The import volume is approximately 420 kg per year for the first five years.

**Formulation details:** Bayhydrol 123 contains the notified polymer (35%), water (50%), n-methylpyrrolidone (14%) and triethylamine (1%) as a neutralising agent.

## **7. OCCUPATIONAL EXPOSURE**

Six 200 kg drums of the polymer dispersion will be imported and transported to a single customer site each year. Exposure of workers can occur in the event of accidental spillage through rupture of the containers.

The polymer dispersion is pumped from the drum to a mixing vessel under local exhaust ventilation. Dermal exposure to the dispersion is possible from drips and spills during this operation. Exposure is controlled by the wearing of gloves and goggles. Other ingredients are added to the mixing vessel and the formulated mix is pumped via an enclosed system to a trough where it is transferred onto textile fabrics. This is accomplished by transfer to a “kiss roll” which turns in the same direction as the fabric loaded on a drier under local exhaust ventilation. After transfer the fabric is cured and transferred to the warehouse. There is no exposure to the polymer after it has been transferred to the mixing vessel. Two factory workers (6 hours per year) are involved in the formulation process, four workers (3 hours per year) loading fabric to the drier, and four workers (12 hours per year) in drying and curing operations. The treatment process takes place approximately once every 2 months.

## **8. PUBLIC EXPOSURE**

The imported product containing 35% of the notified polymer is not reformulated in Australia, and is not sold to or used by the public. The coating formulation once applied to fabric, is cured and becomes a thin, solid and inert film. The coated textile is used in another industrial plant. Therefore, there is little potential for public exposure to the notified polymer.

## **9. ENVIRONMENTAL EXPOSURE**

### **9.1. Release**

The imported polymer dispersion as imported will be stored in a bunded area at the customer’s site until required. The method of pumping Bayhydrol 123 to the mixing vessel will minimise any losses. If a spill occurs it will be contained by the bunding and directed to treatment ponds. Less than 1% (4.2 kg) of the notified polymer is expected to be lost from spills or leaks.

The method of application of the notified polymer to textile necessitates production of large batches of coating mixture as the take-up rate on the fabric is low (a few grams per square metre). The resulting high volume of excess coating mixture will be retained for future use or disposed of with other site effluent to on-site treatment ponds. The notifier has indicated that approximately 50 kL of effluent is generated at the end user’s site each day. The two wastewater treatment ponds allow the anaerobic and aerobic breakdown of any chemicals present. The effluent from the treatment ponds is released to municipal sewer.

The notifier has not estimated how much Bayhydrol 123 is left in the import container, but has indicated that the drums will be rinsed with water and the rinsewater added to the treatment

ponds. It is likely that approximately 1% of the contents will remain as residue, ie approximately 4.2 kg of notified polymer.

## 9.2. Fate

A large proportion of the imported polymer solution ends up in the treatment ponds and the remainder shares the fate of the coated fabric. The coating containing the notified polymer, when applied and allowed to dry, becomes a thin, solid, inert film on the fabric. When the fabric is disposed of to landfill, the notified polymer is unlikely to be mobile and is not expected to leach out.

The following annual Predicted Environmental Concentration (PEC) has been calculated on the basis that 50% of the notified polymer will end up in the treatment ponds (worst case), and that no degradation of the polymer occurs in the ponds or in the metropolitan sewer system. It is assumed that the total contents of the treatment ponds are released daily to the Gosford sewage treatment plant, which has the capacity for treating 5 ML of sewage each day.

|  |          |
|--|----------|
| Quantity of notified polymer entering the treatment pond over a year                           | 210 kg   |
| Number of days the coating is made each year   | 6 days   |
| Quantity of notified polymer entering treatment ponds each day usage occurs (6 days each year) | 35 kg    |
| Quantity of effluent/washwater generated per day   | 50 000 L |
| PEC in treatment ponds (6 days each year)  | 700 mg/L |
| Quantity of effluent handled by country sewage treatment plant                                 | 5 ML/day |
| PEC in effluent leaving treatment pond   | 700 mg/L |
| PEC in sewer (assume 100:1 dilution)   | 7 mg/L   |
| PEC in country sewage treatment plant effluent (assuming no degradation)                       | 7 mg/L   |
| Assume dilution in receiving water (ocean) is 10:1 PEC in ocean receiving water                | 0.7 mg/L |

It should be emphasised that the PEC has been calculated using conservative assumptions, and would only be reached on 6 days each year in the ocean receiving waters (ie 0.7 mg/L). The PEC would be reduced by the fact that some of the notified polymer may be degraded in the on-site treatment ponds and at the sewage treatment plant, and some of the remainder may become assimilated into sewage sludge. Further, it is unlikely that the whole plant treatment pond volume would be discharged in a single day and consequently the actual PEC in the ocean near the sewage plant outfall is expected to be very much less than 0.7 mg/L.

Polymers of high molecular weight are considered to be impermeable to biological membranes (Connell, 1990) and consequently bioaccumulation of the notified polymer is not expected.

## **10. EVALUATION OF HEALTH EFFECTS DATA**

No toxicological data were submitted.

## **11. EVALUATION OF ENVIRONMENTAL EFFECTS DATA**

No ecotoxicological data were submitted.

## **12. ENVIRONMENTAL RISK ASSESSMENT**

A large proportion of the notified polymer is likely to end up in on-site treatment ponds at the end use textile plant. A worst case PEC based on a scenario where 50% of the material is released on six days each year (35 kg on each of the six days) and none is degraded in either the on-site treatment ponds or the sewage works leads to a PEC near the ocean outfall of the sewage treatment plant of 0.7 mg/L. However, in reality some biological degradation of the polymer is likely in the plant treatment ponds and at the sewage plant, and some may also become assimilated into sewage sludge leading to significantly lower PECs. In any case, the worst case PEC of 0.7 mg/L would occur on six days each year.

No toxicity data were provided by the notifier, so no safety margins for aquatic species can be estimated. However, the polymer contains no functional groups likely to be toxic to aquatic organisms so toxic effects are considered to be unlikely. The high molecular weight indicates that bioaccumulation is also unlikely.

Some of the notified polymer is likely to be disposed of to landfill along with the coated fabric at the end of its useful life. The polymer is bound in an inert film and will not leach into groundwater. In landfill the film is expected to slowly degrade by biotic and abiotic processes, and mineralise to water and oxides of carbon and nitrogen.

When used as a coating for specialised industrial fabrics as indicated, the environmental hazard from use of the notified polymer is assessed as low.

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

### **13.1. Hazard assessment**

The notified polymer fulfils the criteria for a synthetic polymer of low concern and can be considered not to be a health hazard. The polymer dispersion contains triethylamine at a concentration of 1% bound as a salt. Triethylamine is listed on the NOHSC *List of Designated Hazardous Substances* (NOHSC, 1999a) and is classified as Harmful (Xn), Flammable (F) and Corrosive (C). The risk phrases assigned are R20/21/22: Harmful by inhalation, in contact with skin and if swallowed, R11: Highly flammable and R35: Causes severe burns. At a concentration of 1%, a solution of triethylamine is classified as Irritant (Xi) and assigned the risk phrases R36/37/38: irritating to eyes respiratory system and skin. As triethylamine is a neutralising agent for the polymer, these irritant effects would be a worst

case. The n-methylpyrrolidone content would render the polymer dispersion, Bayhydrol 123, irritating to the eyes and skin according to the NOHSC *List of Designated Hazardous Substances* (NOHSC, 1999a).

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

During import and transport of the notified polymer, worker exposure is unlikely except in the event of a spill. Exposure after a spill would be controlled by use of the recommended practices for spillage clean up outlined in the Material Safety Data Sheet (MSDS) supplied by the notifier.

Following transportation to a single customer site, the polymer dispersion is pumped to a mixing vessel. Exposure to drips and spills is possible during this procedure. There is no risk of adverse health effects arising from exposure to the notified polymer and a risk of skin or eye irritation from the triethylamine and n-methylpyrrolidone content of the dispersion. Personal protective equipment recommended in the MSDS for the polymer dispersion comprises natural latex or neoprene gloves and liquid chemical goggles or full face shield.

Once the polymer dispersion is in the mixing vessel worker exposure is unlikely. The formulated product from the mixing vessel is coated on fabric by a roller and is dried and cured in a closed system. Exposure to fumes from the drying is controlled by local exhaust ventilation. Once the polymer is cured to the fabric, no further exposure of workers should occur and the risk to workers should be low.

#### *Conclusion*

Polymer in Bayhydrol 123 is of low concern to human health and safety and no specific risk reduction measures are necessary when handling the imported dispersion. However, the dispersion is irritating to eyes, respiratory system and skin and necessitates the use of personal protective equipment during transfer of the dispersion to the mixing vessel used to produce and apply the fabric coating of which the notified polymer is the main component.

### **13.3. Public health**

The imported product containing the notified polymer or the end use products described will not be sold to the public. Therefore, public exposure to the notified polymer is unlikely and the risk of adverse public health effects is low.

## **14. MSDS AND LABEL ASSESSMENT**

### **14.1. MSDS**

The MSDS of the imported dispersion containing 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 imported dispersion containing 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

No special precautions are required for the notified polymer, however, in the interests of good OHS, the following practices and guidelines should be observed:

- Protective eyewear, chemical resistant industrial clothing and footwear and impermeable gloves should be used during occupational use of products containing the notified polymer;
- Spillage of the notified polymer should be cleaned up promptly with absorbents and put into containers for disposal;
- A copy of the MSDS should be easily accessible to employees.

If products containing the notified chemical are hazardous to health in accordance with the NOHSC *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 1999b), workplace practices and control procedures consistent with State and Territory hazardous substances regulations must be in operation.

- 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 acceptable 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 chemical) 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

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 (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.

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.

Standards Australia/Standards New Zealand (1994b) Australian/New Zealand Standard 1715-1994, Use and Maintenance of Respiratory Protective Devices. Standards Association of Australia/Standards Association of New Zealand.

Standards Australia/Standards New Zealand (1994c) Australian/New Zealand Standard 1716-1994, Respiratory Protective Devices. Standards Association of Australia/Standards Association of New Zealand.

Standards Australia/Standards New Zealand (1998) Australian/New Zealand Standard 2161.2-1998, Occupational protective gloves, Part 2: General requirements. Standards Association of Australia/Standards Association of New Zealand.