File No PLC/460

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**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME (NICNAS)**

# FULL PUBLIC REPORT

## Polymer in Abex 26S

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**Director**
**Chemicals Notification and Assessment**

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## 1. APPLICANT AND NOTIFICATION DETAILS

APPLICANT(S)
Rhodia Australia Pty Ltd, of 352 Ferntree Gully Road, Notting Hill, Victoria, 3168

and

Rohm and Haas Australia Pty Ltd, of 969 Burke Rd, Camberwell, Victoria, 3124

NOTIFICATION CATEGORY
Synthetic Polymer of Low Concern

EXEMPT INFORMATION (SECTION 75 OF THE ACT)
Data items and details claimed exempt from publication:
Chemical Name, Other Names, CAS Number, Molecular and Structural Formulae, Molecular Weight, Polymer Constituents, Detailed Use

VARIATION OF DATA REQUIREMENTS (SECTION 24 OF THE ACT)
No variation to the schedule of data requirements is claimed.

PREVIOUS NOTIFICATION IN AUSTRALIA BY APPLICANT(S)
No

NOTIFICATION IN OTHER COUNTRIES
Yes, US (TSCA), Canada (DSL), Japan (METI) and Korea KECL

## 2. IDENTITY OF CHEMICAL

MARKETING NAME(S)
Polymer in Abex 26S

## 3. COMPOSITION

PLC CRITERIA JUSTIFICATION

| *Criterion* | *Criterion met (yes/no/not applicable)* |
|---|---|
| Molecular Weight Requirements | Yes |
| Functional Group Equivalent Weight (FGEW) Requirements | Yes |
| Low Charge Density | Yes |
| Approved Elements Only | Yes |
| No Substantial Degradability | Yes |
| Not Water Absorbing | Yes |
| Low Concentrations of Residual Monomers | Yes |
| Not a Hazard Substance or Dangerous Good | Yes |

The notified polymer meets the PLC criteria.

## 4. INTRODUCTION AND USE INFORMATION

MAXIMUM INTRODUCTION VOLUME OF NOTIFIED CHEMICAL (100%) OVER NEXT 5 YEARS

| *Year* | *1* | *2* | *3* | *4* | *5* |
|---|---|---|---|---|---|
| *Tonnes* | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 |

USE

The notified polymer is a component (30-60%) of Abex 26S. Abex 26S is used in the manufacture of acrylic copolymer emulsions which are subsequently used in the manufacture of aqueous house paints.

## 5. PROCESS AND RELEASE INFORMATION

### 5.1. Operation Description

Import, transport and distribution

The notified polymer is imported as a component (30 – 60%) of Abex 26S in 200kg polyethylene drums. Approximately 0.5 tonnes is imported as a component (<1%) of acrylic emulsion polymers. The product is then transported by road either to Rohm and Haas' plant at Geelong or a Rhodia warehouse close to their customer.

Emulsion Manufacture

The final emulsion is made in two stages via the production of an intermediate. The polymer emulsion intermediate will be produced via an exothermic polymerisation reaction of acrylic monomers. The monomers are charged via a hard piped system to a pressure rated reaction vessel vented to a scrubber. Minor components including the product containing the notified polymer are added manually. The reaction vessel is sealed during the polymerisation process. Following polymerisation, the polymer emulsion intermediate is transferred via a hard piped system to a holding tank where other ingredients, usually water are added. A batch sample is taken and sent to the QC laboratory for testing. The polymer emulsion intermediate (containing approximately <5% w/w notified polymer) will be transferred from the holding tank via a hard piped system and filled via hoses into semi-bulk containers or 200 litre steel drums. When required the intermediate will be pumped from the drums or containers to a holding vessel and then transferred by a hard pipe system to the blend tank where it is mixed with other polymer emulsions to produce the final emulsion product.

Paint manufacture

The polymer emulsion containing the notified polymer at <1% is distributed to several paint manufacturers in Australia. These will vary in size and have varying equipment. Typically, the emulsion is transferred to the mixing vessel by either pumping it from bulk storage tanks via a hard piped transfer system or from 200 litre drums by placing a spear into the drum and sucking the contents out. Manufactured paint is filled via a semi-automated process under exhaust ventilation into 1, 4, 15 and 20 litre epoxy lined steel cans. Manual intervention will vary from site to site. Batch samples will be tested by paint technicians.

Selling

Tinting of paints containing the notified polymer at <0.05% could occur at retail outlets.

End Use

The majority of paint applied by contractors and Do-It-Yourself painters will be by brush or roller. Some may be applied by spray application.

## 6. EXPOSURE INFORMATION

### 6.1. Summary of Environmental Exposure

Since the notified polymer will not be manufactured locally, there will be no environmental exposure associated with this process in Australia.

Release during emulsion manufacture

Washings from reaction vessels and piping will be transferred via piping to the plant's concrete lined flocculation pits where the polymer emulsion is flocculated with addition of ferrous sulphate and sodium hydroxide. The majority of the notified polymer is expected to precipitate during this process. The supernatant wastewater is adjusted to neutral pH and pumped to a lagoon for evaporation and some is used to irrigate the on-site vegetation. The final concentration of the notified polymer in the irrigation

water is expected to be less than 1 mg/L. The flocculated polymer is transferred to settling pits until dry and then disposed of to a licensed waste landfill site.

The notifier estimates that up to 118 kg per annum (including up to 5 kg remaining in empty import drums and up to 112.5 kg resulting in washings) of the notified polymer will be released during the manufacture of emulsions. The empty drums will be either disposed of to a licensed drum reconditioner or to a licensed waste landfill site. Minor spills will be taken up by absorbent material, transferred to the on-site settling pit to dry and sent to landfill as above.

Release during paint manufacture
The potential for spillage of polymer emulsion containing the notified polymer during the paint manufacturing process is expected to be minimal due to the hard piped system. The spills (expected to be containing less than 1 kg/annum of the notified polymer) will be taken up by adsorbent material and disposed of through industrial solid waste contractor to a licensed waste landfill site.

Wash water from equipment cleaning will be treated in the on-site effluent treatment plant. It is estimated that the effluent will contain less than 1 kg of the notified polymer per annum, which will be precipitated with flocculants. More than 95% of the notified polymer in the effluent is expected to precipitate. The precipitated sludge will be disposed of to a licensed waste landfill site. Treated supernatant liquid will be released to the sewer.

The notifier indicated that the amount of the notified polymer left in the paint drums would be small. This is assumed to be less than 5 kg per annum.

Tinting of paint at points of sale
The notifier did not indicate the amount of the notified polymer to be released during tinting at the retail outlets and is assumed to be less than 1 kg.

Release during paint application and cleanup
The notifier estimated that approximately 2.5% of the paint will be lost during application by DIY painters (including the losses due to cleaning of application equipment and residue in empty cans). The wash water containing the notified polymer is expected to be released to the sewer via the domestic drains and the empty paint cans will be disposed of to landfill with domestic garbage. It is estimated that a total of up to 85 kg of the notified polymer will be released to the environment during application.

Accordingly, the notifier estimates that a total of up to 210 kg of the notified polymer will be released to the environment. Due to its water solubility, the notified polymer is expected to partition primarily to the aqueous phase and is likely be mobile in soil.

**6.2. Summary of Occupational Exposure**

Import, transport and distribution
During transport and storage, workers are unlikely to be exposed to the notified polymer except when packaging is accidentally breached.

Emulsion Manufacture
Dermal and ocular exposure to the notified polymer could occur during the manual addition (concentration 30 - 60%), the removal of a QC sample (concentration <5%), the QC testing of the sample (concentration <5%), and the connection and disconnection of filling and pumping hoses (concentration < 5 % or <1%).

Plant workers must wear safety helmets, safety glasses, impervious gloves, coveralls and safety boots. Laboratory technicians must wear safety glasses, protective coats and safety boots as a minimum.

Overall, exposure to plant workers is expected to be low due to limited exposure time and the use of engineering controls and/or PPE. Exposure to laboratory technicians is expected to be low due to limited contact time, low concentration of notified polymer and the use of PPE.

Paint manufacture
Incidental dermal or ocular exposure with the notified polymer could occur during initial transfer of the

polymer emulsion containing the notified polymer (concentration <1%) and during the filling of the final paint product (concentration <0.05%). Workers must wear impervious gloves, coveralls and safety glasses as a minimum. Overall exposure is expected to be low due to the low concentration of the notified polymer and the use of engineering controls and PPE.

Selling
Workers may come into contact with paint (concentration <0.05%) when tinting with colourants. Personal protective equipment used by these workers would vary considerably. Any skin contact with the paint would generally be washed off immediately. Overall exposure is expected to be low due to the low concentration of the notified polymer.

End Use
Conditions under which the paint is handled and applied should be in accordance with the safety instructions on the manufacturers paint can, however this is difficult to control. Exposure is expected to be minimal due to the low concentration of the notified polymer (<0.05%).

### 6.3. Summary of Public Exposure

The public will come into occasional contact with paint and regular contact with painted substrates containing the notified polymer. Exposure to the notified polymer will be minimal due to its low concentration in paints (<0.05%) and because in dried paint films it is bound into the polymer matrix.

## 7. PHYSICAL AND CHEMICAL PROPERTIES

The following information was provided for Abex 26S (30 -60% aqueous solution of notified polymer).

| | |
|---|---|
| **Appearance at 20°C and 101.3 kPa** | Clear viscous liquid with a phenolic odour |
| **Freezing Point** | 10°C |
| **Density** | 1052 kg/m$^3$ at 25°C |
| **Water Solubility** | Not determined.<br>The notifier indicates that the notified polymer is soluble in water based on the product containing a 30-60% solution in water. |
| **Dissociation Constant** | Not determined.<br>As a salt of a very strong acid, the notified polymer is expected to be completely dissociated in water. |
| **Reactivity** | Expected to be stable under normal conditions of storage and use. |
| **Degradation Products** | Oxides of carbon and sulfur, and hydrogen sulfide. |

## 8. HUMAN HEALTH IMPLICATIONS

### 8.1. Toxicology

No toxicological data were submitted.

### 8.2. Human Health Hazard Assessment

The notified polymer meets the PLC criteria and can therefore be considered to be of low hazard. The notified polymer is an anionic surfactant, prolonged skin contact may result in skin irritation leading to dermatitis and prolonged eye contact may cause redness.

## 9. ENVIRONMENTAL HAZARDS

### 9.1. Ecotoxicology

No toxicological data were submitted. However, according to Madsen *et al*. 2000, alkyl ether sulphates (AES) that have structures similar to that of the notified polymer (and therefore may be used as surrogates) are shown to have considerable toxicity towards aquatic organisms. The toxicity varies between the AES, but in general, changes in EO numbers tend to affect toxicity more than changes in the alkyl chain length. In AES with alkyl chains of less than $C_{16}$, the toxicity tended to decrease with increasing numbers of EO, but this was reversed for alkyl chain lengths above $C_{16}$. The toxicity seems to peak at alkyl chain lengths of $C_{16}$.

For the notified polymer, where both numbers are large, the following results are most representative. The $EC_{50}$ values of $C_xAE_9S$ to the algae *Selenastrum capricornutum, Nitzschia fonticula* and *Microcystis aeruginosa* were shown to vary between 4 to 50 mg/L. An $EC_{50}$ of 0.37 mg/L for $C_{13.67}AE_{2.25}S$ was observed in a 21-day reproduction test with *Daphnia magna* and an LOEC of 0.77 mg/L for $C_{14\text{-}15}AE_{2.17}S$ was observed on both mayfly and bivalve populations during an 8-week mesocosm study. However, these structures have very low EO numbers and may not be suitable surrogates. For fathead minnow, an LC50 value of 0.8 mg/L for $C_{16}AE_6S$ (24 hour) and 2.1 mg/L for $C_{18}AE_6S$ (24 hour) were observed (Madsen *et al*. 2000).

## 10. RISK ASSESSMENT

### 10.1. Environment

The majority of the notified polymer imported (>90%) will be contained in the dried paint film, which will be bound within an inert polymer matrix. The polymer will share the fate of the substrate onto which the paint is applied. Some of these substrates will be incinerated, some will be disposed of to landfill and others will be eroded. Any fragments, chips or flakes of the paint will be of little concern as they are expected to be inert and not present a significant hazard. When bound into the paint matrix, the notified polymer is not expected to leach into the aquatic environment.

The major environmental exposure of the notified polymer is via that disposed of to the landfill. When incinerated, the notified polymer will be converted to water vapour and oxides of carbon and sulphur. The notified polymer in waste material, flocculated sludge, polymer emulsion and paint residues in empty containers disposed of to landfill or leached out from paint films would degrade very slowly into water vapour and gases such as carbon dioxide via the abiotic processes.

Less than 100 kg of the imported volume of the notified polymer is expected to enter the sewer or storm water drains Australia wide. This is mainly due to DIY applications and minor amounts from the emulsion and paint manufacturing processes. Due to the limited and dispersed release to water it is unlikely that the polymer would exist at levels that could pose a threat to aquatic organisms. However, considering the potential toxicity of the notified polymer to aquatic organisms, a worst-case scenario is considered assuming that 100 kg of the notified polymer is released Australia wide to sewer annually and not removed during sewage treatment processes.

Assuming a national population of 20 million and that each person contributes an average 200L/day to overall sewage flows, the daily release on a nationwide basis to receiving waters is estimated to be 0.27 kg/day, the predicted concentration in sewage effluent on a nationwide basis is estimated as 0.0685 µg/L. Based on the respective dilution factors of 1 and 10 for inland and ocean discharges of effluents, the PECs of the notified polymer in freshwater and marine water may approximate 0.0685 and 0.0068 µg /L, respectively.

Based on the toxicity results quoted in Madsen *et al*. 2000, an $EC_{50}$ value of 1 mg/L is assumed to be the worst-case end point for aquatic organisms. A predicted no effect concentration (PNEC for aquatic ecosystems) of 1 µg/L was derived by dividing this EC50 value by a worst-case scenario uncertainty (safety) factor of 1000 (as actual toxicity data are not available with this value being assumed based on those for similar chemicals).

The resulting worst-case risk quotients for the aquatic environment are 0.07 and 0.01 for freshwater and marine water, respectively. These values are considerably less than 1 and can be expected to be lowered further due to adsorption of some of the polymer to sludge both during use and effluent treatment. The high molecular weight and water solubility of the notified polymer indicate a low potential to bioaccumulate.

Based on its reported exposure levels and use pattern, the polymer is not considered to pose a risk to the environment when it is used in the proposed manner. The above risk assessment demonstrates that the current safety margin is adequate. However, if uses are proposed leading to greater release to water, consideration should be given to provision of aquatic toxicity data.

### 10.2. Occupational health and safety

Prolonged skin contact with the notified polymer may result in skin irritation leading to dermatitis and prolonged eye contact may cause redness. Incidental exposure to the notified polymer could occur during emulsion manufacture, paint manufacture, tinting of paints and end use of paints. Where the notified polymer is handled at its greatest concentration (emulsion manufacture) the use of engineering controls and/or PPE will limit exposure. Overall, the OHS risk presented by the notified polymer is expected to be low.

### 10.3. Public health

The notified polymer will be available to the public at very low concentrations (<0.05%) in aqueous house paints. The public health risk from the notified polymer will be low due to the low concentration in paint, infrequent contact with wet paint and the lack of bioavailability of the polymer in dried films.

## 11. CONCLUSIONS – ASSESSMENT LEVEL OF CONCERN FOR THE ENVIRONMENT AND HUMANS

### 11.1. Environmental risk assessment

The polymer is not considered to pose a risk to the environment based on its reported use pattern.

### 11.2. Human health risk assessment

#### 11.2.1. Occupational health and safety

There is Low Concern to occupational health and safety under the conditions of the occupational settings described.

#### 11.2.2. Public health

There is Negligible Concern to public health based on its reported use pattern.

## 12. MATERIAL SAFETY DATA SHEET

### 12.1. Material Safety Data Sheet

The notifier has provided MSDS as part of the notification statement. The accuracy of the information on the MSDS remains the responsibility of the applicant.

## 13. RECOMMENDATIONS

CONTROL MEASURES

Occupational Health and Safety

- Employers should ensure that the following personal protective equipment is used by workers to minimise occupational exposure to the notified polymer as introduced:
  - Protective eyewear, protective clothing and impermeable gloves.
  - 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.

Disposal

- The notified polymer should be disposed of in accordance with the relevant local, state and federal government regulations and undertaken by a registered chemical disposal company. Disposal of to landfill is acceptable.

Emergency procedures

- Spills/release of the notified polymer should be handled by containing the spill/ stopping the leak if possible (for example, turn the leaking containers leak-side up) or by bunding for a large spill.
- Place inert absorbent material such as vermiculite, sand or dirt onto spilled material and recover by vacuuming, shovelling or sweeping and place into a suitable labelled container for disposal.
- Wash the floor with plenty of water and recover the cleaning water for disposal.
- If large quantities of the material enter waterways, contact the Environmental Protection Authority and the local waste management authority.

### 13.1. 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 subsection 64(1) of the Act; if
- the notified polymer is introduced in a chemical form that does not meet the PLC criteria.
- uses are proposed leading to greater release to water

or

(2) Under subsection 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.

Any Secondary Notification should include:
- aquatic toxicity data.

## 14. REFERENCES

Madsen T, Boyd HB, Nylen D, Pedersen, AR, Petersen GI and Simonsen F (2000) Environmental and health assessment of substances in household detergents and cosmetic detergent products. Environmental Project No. 615 2001, Centre for Integrated Environment and Toxicology, Horsholm, Denmark.

University of Nijmegen (2002) Experimental techniques: MALDI-TOF Mass spectrometry, Department of Microbiology, The University of Nijmegen, Nijmegen, The Netherlands. <http://www.micrbiol.sci.kun.nl/tech/malditof.html>, Accessed 19 April 2004.