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**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION
AND ASSESSMENT SCHEME**

FULL PUBLIC REPORT

Polymer in Aquabond 444A

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Director
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FULL PUBLIC REPORT**Polymer in Aquabond 444A****1. APPLICANT**

Rohm and Haas Australia Pty Ltd of Floor, 969 Burke Road CAMBERWELL VIC 3124 (ACN 004 513 188) and Coates Australia Pty Ltd of 323 Chisholm Road AUBURN NSW 2144 (ACN 000 079 550) have submitted a limited notification statement in support of their application for an assessment certificate for Polymer in Aquabond 444A.

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 and the Summary Report.

Marketing Name: Aquabond 444A (containing 40-50% the notified polymer).

3. PHYSICAL AND CHEMICAL PROPERTIES

The following physico-chemical data are from Aquabond 444A polymer emulsion, unless otherwise stated.

Appearance at 20°C & 101.3 kPa:	Milky white liquid.
Boiling Point:	100°C
Specific Gravity:	1.05
Vapour Pressure:	Not determined.
Water Solubility:	Not determined.
Partition Co-efficient (n-octanol/water):	Not determined.
Hydrolysis as a Function of pH:	The urethane groups may undergo hydrolysis under extreme temperature and pH.
Adsorption/Desorption:	The notified polymer is expected to be immobile in soil due to the high molecular weight, the monomer

composition and the expected low water solubility.

Dissociation Constant:	$pK_a = 10-11$ (estimated based on the primary and secondary amine groups).
Particle Size:	The product is an emulsion.
Flash Point:	Not flammable.
Autoignition Temperature:	Not determined.
Explosive Properties:	The polymer is stable and is not explosive.
Reactivity/Stability:	Not reactive.

3.1 Comments on Physico-Chemical Properties

Although no water solubility data is provided, the notifier expects the solubility of the notified polymer to be insignificant due to the high molecular weight and the high proportion of hydrophobic functional groups. The polymer in Aquabond 444A exists as an emulsion in water with an alkyl phenylethoxylate surface active agent to assist emulsification. The polymer is similar to the polymer in submission NA/870 with the difference being that it does not contain amine and the number average molecular weight is lower. Although this implies that the water solubility would be greater than 49 mg/L (solubility for NA/870 polymer), the notified polymer contains about 30% fewer amine groups, which would decrease the water solubility and support the claim of expected low water solubility.

The notified polymer contains urethane and carbanate groups that may undergo hydrolysis, but this is unlikely in the environmental pH range 4-9.

The partition coefficient has not been determined due to its expected low water solubility, and the likely hydrophobic nature.

The adsorption/desorption was not determined, but the notifier expects that the polymer will be immobile in soil due to its composition, molecular weight and low water solubility.

The notifier expects the notified polymer to have a pK_a similar to primary and secondary amines since it contains terminal amines.

The polymer is expected to remain stable under ambient conditions. The notified polymer is designed to cross-link with other polymers and laminating components.

4. PURITY OF THE CHEMICAL

Degree of Purity:	High.
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5. USE, VOLUME AND FORMULATION

The notified polymer is a component of a two pack laminating adhesive for polymer and/or aluminium films used to package dry food.

The notified polymer will not be manufactured in Australia, but will be imported as a component in the product, Aquabond 444A. The estimated import quantity of the notified polymer is approximately 3 tonnes in the first year increasing to 10 tonnes per annum in 5 years.

Aquabond 444A is formulated in water as an emulsion and packed in 100 kg plastic drums.

6. OCCUPATIONAL EXPOSURE

Transport and storage

The notifier estimated that 5 waterside workers and 5-10 transport drivers and warehouse workers will be involved in the transport and storage of the product containing the notified polymer. These workers could be exposed to the notified chemical only in the event of an accident where the packaging is breached.

Laminating machine operator

At the laminating site, Aquabond 444A is transferred by gravity via an attached tap from 100 L drums into a mixing vessel of 50-100 L capacity. It will be mixed with another component of the adhesive system in the mixing vessel and mechanically stirred for 15 minutes. The blended adhesive is pumped mechanically to a holding vessel (about 20 L) of the laminating machine and further pumped to an adhesive tray. The blended adhesive is applied by the gravure coating process where two polymers and/or aluminium film are laminated together with the adhesive between the films. Following completion of a run, unused adhesive in the laminating machine tray or reservoir is transferred to a waste drum manually. The adhesive residues on the machinery are washed off manually using rags and water.

There will be 2-4 laminating machine operators who may be exposed to the product containing the notified polymer and the blended adhesive. The maximum potential exposure for laminating machine operators is estimated to be 6-8 hours per day, 50 days per year. The main routes for occupational exposure to the polymer will occur through skin and eye contact. Laminating machinery operators wear safety glasses, impervious gloves, overalls and safety boots during blending of the adhesive, transfer of the adhesive to laminating machines, and cleaning of the machines. Blending vessels are situated in a bunded area with local exhaust ventilation, while laminating machinery is either fitted with exhaust ventilation ducts above the adhesive tray or in a wall or ceiling adjacent to the machinery.

7. PUBLIC EXPOSURE

The notified polymer is not available for sale to the public and will be used as an ingredient in laminating adhesive products for use in food packaging applications. The potential for public exposure to the notified polymer during transport, reformulation or disposal is assessed as negligible.

8. ENVIRONMENTAL EXPOSURE

8.1 Release

The notifier has estimated the following amounts of the polymer solutions may be lost from the sources specified as a result of the formation and use of the adhesive:

Spills:	less than 60 kg/annum
Residues in the import containers:	less than 20 kg/annum
Equipment cleaning:	less than 150 kg/annum
Unused blend:	less than 40 kg/annum

The total amount of notified polymer that may be wasted during its use is likely to be less than 270 kg/year when 10 tonnes of Aquabond 444A are imported.

It is likely that the spilt Aquabond 444A (containing the notified polymer) and the associated clean-up materials will be disposed of to landfill.

The blending and laminating equipment will be cleaned daily with rags and solvents, which will be collected in the empty importation drums, along with any unused blended adhesive. The drums will then be collected by licensed waste contractors for disposal. The waste solvent and any liquid adhesive and Aquabond 444A will be incinerated. The empty drums and any solid Aquabond 444A or adhesive will then be disposed of to landfill.

The majority (97.3%) of the notified polymer will be incorporated into dry food packaging.

8.2 Fate

The notified polymer, either spilt or wasted during the formulation process, will be collected in the 100 L plastic importation drums. The drums of unused blended adhesive and waste solvent will be sent to incineration at a licensed facility. Other waste polymer from spills (contained in absorbent material) and on clean-up rags will be disposed of to landfill. If any leakage were to occur from the importation drums the notified polymer is likely to associate with the soil and would not be expected to leach into the aquatic environment.

The majority of the notified polymer, which is contained in dry food packaging, will ultimately make its way into domestic landfill as household garbage. The packaging material will not degrade readily but will ultimately degrade due to chemical and biological actions and degradation products are likely to associate with the soil and not be leached out by water.

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

9. EVALUATION OF TOXICOLOGICAL DATA

Toxicological data were not provided for assessment.

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

Ecotoxicological data were not provided for assessment.

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

Minimal release to the aquatic environment is expected during the use of the notified polymer in the formulation of the laminated adhesive. Small quantities of the notified polymer, derived from either spills or residue waste, will ultimately be released to landfill. In landfill, the polymer is unlikely to be mobile in the soil environment and would be expected 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. If incinerated, the polymer would be rapidly destroyed and converted to water vapour and oxides of carbon and nitrogen.

Release to the aquatic environment is expected through the disposal of food packaging to domestic landfill but this will be minimal. As the packaging gradually degrades the resulting end polymer is likely to associate with the soil, where it is unlikely to be leached out.

The Material Safety Data Sheet (MSDS) for the product has outlined the correct procedure to be followed if it is accidentally released onto soils or into waterways.

The notified polymer's molecular weight and expected low water solubility should prevent bioaccumulation.

The overall environmental hazard is therefore expected to be low.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

No toxicological information has been provided for the notified polymer and therefore the substance cannot be assessed against the NOHSC *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 1999). Since the notified polymer has high NAMW, absorption across biological membranes would be restricted.

The MSDS for Aquabond 444A lists a number of potential health effects, namely irritating to eyes, mouth, throat, gastrointestinal tract and respiratory system, nausea, vomiting, dizziness, and damage to liver and kidneys. These relate mainly to the other components in the product rather than the notified polymer.

Occupational health and safety

There is little potential for significant health risk to the notified polymer in the transport and storage of the product containing this polymer.

Potential exposure to the polymer in Aquabond 444A will be during the blending and transfer of adhesives, and when cleaning equipment. Exposure is most likely to be by skin contact as the exposure to the notified polymer via inhalation is expected to be low. However, laminating machine operators are instructed to wear safety glasses, impervious gloves, overalls and safety boots when handling Aquabond 444A and the blended adhesives. In addition, blending vessels are situated in a bunded area with local exhaust ventilation.

Laminating machinery is either fitted with exhaust ventilation ducts above the adhesive tray, or in a wall or ceiling adjacent to the machinery. The health risk for laminating machine operators is considered to be low.

The notified polymer becomes unavailable for absorption once it is incorporated in the laminated material. The health risk for workers in the dry food packaging industry, and in the distribution and retailing of dry food is considered to be negligible.

The notified polymer has been used commercially in Europe for a number of years. No adverse health effects arising from human exposure to the notified polymer have been observed or reported.

Public health

The notified polymer is not available for sale to the public and will be used in laminating adhesive products for use in dry food packaging. Although members of the public may consume food from laminated packages manufactured using the notified polymer, the risk to public health from the notified polymer would be low because the notified polymer is sandwiched between two impermeable layers and is unlikely to be bioavailable.

13. RECOMMENDATIONS

To minimise occupational exposure to Polymer in Aquabond 444A the following guidelines and precautions should be observed:

- Spillage of the notified chemical should be avoided. Spillages should be cleaned up promptly with absorbents which should be 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, 1999), workplace practices and control procedures consistent with State and Territory hazardous substances regulations must be in operation.

For product and formulations containing ethyl acetate, employers should ensure that NOHSC exposure standard is not exceeded in the workplace (NOHSC, 1995).

14. MATERIAL SAFETY DATA SHEET

The MSDS for the notified chemical was provided in a format consistent with the *National Code of Practice for the Preparation of Material Safety Data Sheets* (NOHSC, 1994).

This MSDS was provided by the applicant as part of the notification statement. It is reproduced here as a matter of public record. The accuracy of this information remains the responsibility of the applicant.

15. REQUIREMENTS FOR SECONDARY NOTIFICATION

Under the Act, the director must be informed if any of the circumstances stipulated under subsection 64(2) of the Act arise, and secondary notification of the notified chemical may be required. No other specific conditions are prescribed.

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 (1994) 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 (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 (1999) Approved Criteria for Classifying Hazardous Substances [NOHSC:1008(1994)]. Australian Government Publishing Service, Canberra.