File No: NA/874

January 2001

NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME

FULL PUBLIC REPORT

Polymer in Adcote E718A

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

Polymer in Adcote E718A

1. APPLICANT

Rohm and Haas Australia Pty Ltd of 969 Burke Road CAMBERWELL VIC 3124 (ACN 004 513 188) and Coates Australia Pty Ltd of 323 Chisholm Rd AUBURN NSW 2144 have submitted a limited notification statement in support of their application for an assessment certificate for Polymer in Adcote E718A.

2. IDENTITY OF THE CHEMICAL

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

Marketing Name: Adcote E718A (containing notified polymer)

3. PHYSICAL AND CHEMICAL PROPERTIES

The following physicochemical data are from the product containing the notified polymer and ethyl acetate, Adcote E718A, unless otherwise stated.

Appearance at 20°C & 101.3 kPa: Amber coloured viscous liquid.

Boiling Point: 77°C (ethyl acetate).

Specific Gravity: 1.1

Vapour Pressure: 10.13 kPa at 20°C (ethyl acetate).

Water Solubility: Insignificant water solubility on account of the high molecular weight of the polymer and the high proportion of hydrophobic monomers.

Partition Co-efficient (n-octanol/water): Not determined due to the reaction of NCO groups with water.

Hydrolysis as a Function of pH: Cannot be determined due to the reaction of NCO groups with water. The notified polymer contains urethane groups that may undergo hydrolysis under

	extreme temperature and pH.
Adsorption/Desorption:	Expected to be immobile in soil due to the high molecular weight, the monomer composition, and the expected low solubility in water.
Dissociation Constant:	The polymer does not contain any groups which can undergo dissociation.
Particle Size:	Not determined, the notified polymer is imported as a solution.
Flash Point:	-4°C (ethyl acetate).
Flammability Limits:	Upper Explosive Limit = 11.5%, Lower Explosive Limit = 2.2% (ethyl acetate).
Autoignition Temperature:	426°C (ethyl acetate).
Explosive Properties:	The notified polymer is stable and not explosive.
Reactivity/Stability:	The notified polymer is not reactive.

3.1 Comments on Physico-Chemical Properties

Tests were performed according to EEC/OECD test guidelines at facilities complying with OECD Principles of Good Laboratory Practice.

Although no water solubility data is provided, the solubility of the notified polymer will be insignificant due to the high molecular weight of the polymer and the high proportion of hydrophobic functional groups.

The notified polymer contains terminal isocyanate groups that may undergo reaction with water suggesting it will be slightly susceptible to hydrolysis. The remainder of the notified polymer contains urethane and ester linkages that could be expected to undergo hydrolysis under extreme pH. However, as the notified polymer is formulated under mild pH, significant hydrolysis of the urethane and ester linkages is unlikely.

The notified polymer contains terminal isocyanate functional groups, classified as highly reactive functional groups. The material safety data sheet (MSDS) indicates that the polymer is stable under normal conditions.

The notifier indicated that the dry form of the polymer can burn. Adcote E718A is classified as a class 3 dangerous good in accordance with the Australian Code for the Transport of Dangerous Goods by Rail and Road.

4. PURITY OF THE CHEMICAL

Degree of Purity: High.

Additives/Adjuvants:

Chemical name:	4,4'-diphenylmethane diisocyanate (MDI)
Synonyms:	1,1'-methylenebis[4-isocyanatobenzene]
CAS No.:	101-68-8
Weight percentage:	2.4%
Toxic properties:	At concentrations ≥1% to <5%, MDI is classified as harmful (NOHSC, 1999a). The NOHSC exposure standard for isocyanates is 0.02 mg/m^3 (TWA) and 0.07 mg/m^3 (as –NCO) (NOHSC, 1995).

Chemical name:	Ethyl acetate
Synonyms:	Acetic acid, ethyl ester
CAS No.:	141-78-6
Weight percentage:	30-60%
Toxic properties:	The NOHSC exposure standard for ethyl acetate is 200 ppm or 720 mg/m^3 (TWA) (NOHSC website).

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 snack foods (eg potato crisps) and other general packaging.

The notified polymer will not be manufactured in Australia. It will be imported as a component (30-60%) in Adcote E718A polymer solution. It is estimated that the import volume is 2 tonnes in the first year increasing to 5 tonnes per annum by the fifth year.

Adcote E718A is formulated in a liquid form and packed in 200 L drums.

6. OCCUPATIONAL EXPOSURE

Transport and storage

The notifier estimated that 5 waterside workers and 10-15 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.

Adcote E718A is classified as a class 3 dangerous good in accordance with the Australian Code for the Transport of Dangerous Goods by Rail and Road. There are special requirements for its transportation and storage in accordance with regulations.

Laminating machine operator
At the laminating site, Adcote E718A is transferred by gravity via an attached tap from 200 L drums into a mixing vessel of 40-60 L capacity. It will be mixed with a second component (an epoxy resin) of the adhesive system in the mixing vessel and mechanically stirred for 15 minutes. The blended adhesive containing the notified polymer 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 ethyl acetate.

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, 100 days per year. The majority of worker 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

Adcote E718A polymer solution containing the notified polymer will not be sold to the public. The public will frequently handle packagings which contains the notified polymer as a component of adhesive. However, since the notified polymer is "sandwiched" between two impervious polymer and/or aluminium films, food contact with the notified polymer is unlikely and the potential for the public exposure is minimal.

8. ENVIRONMENTAL EXPOSURE

8.1 Release

During formulation the notifier estimates that up to 225 kg per annum of notified polymer waste will be generated. This will be derived from:

Spills:	100 kg/annum
Residues in the import containers:	50 kg/annum
Equipment cleaning:	25 kg/annum
Unused blend:	50 kg/annum

Any unused blended adhesive on the blending equipment, adhesive trays and laminating machinery is manually transferred to a waste adhesive and solvent drum or wiped up using rags and ethyl acetate. Waste in the drums will be sent for incineration, and the waste or split adhesive contained on rags and absorbent material will be sent to landfill.

The remainder of the notified polymer, some 1.8–4.8 tonnes/annum, will be incorporated into snack food and other packaging.

8.2 Fate

The notified polymer, either spilt or wasted during the formulation process, will be disposed of to landfill by licensed hazardous waste contractors in the 200 L steel importation drums. If any leakage were to occur from the importation drums the notified polymer is expected to become associated with the soil matrix and would not be expected to leach into the aquatic environment.

The majority of the notified polymer, which is contained in packaging, will ultimately make its way into domestic landfill as household garbage. Upon eventual degradation of the packaging films the notifier expects that the resulting end polymer would become part of the soil matrix and would not be leached from the soil by water due to its high molecular weight and hydrophobicity.

The polymer is not expected to cross biological membranes, due to its high molecular weight and predicted 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 the event of a leak 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.

Minimal release to the aquatic environment is expected through the disposal of snack food packaging to domestic landfill. As the packaging gradually degrades the resulting end polymer is likely to become part of the soil matrix and not leach from the soil by water due to its high molecular weight and hydrophobicity.

In the event of accidental release of the notified polymer into soils or waterways, the correct Material Safety Data Sheet (MSDS) procedures should be followed.

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

Given the above considerations, the overall environmental hazard is 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, 1999b). Since the notified polymer has high NAMW, absorption across biological membranes would be restricted. The notified polymer in Adcote E718A is considered stable under normal conditions of use. However, the notifier indicated that the dry form of the notified polymer can burn.

The product Adcote E718A is a hazardous substance because of the content of MDI. The MSDS for Adcote E718A lists a number of potential health effects, namely irritating to eyes, mouth, throat, gastrointestinal and respiratory tracts, skin and respiratory sensitisation, diarrhea, dizziness, nausea, vomiting, and damage to liver and kidneys. These relate mainly to MDI rather than the notified polymer. NOHSC has established an Exposure Standard for MDI. Adcote E718A also contains a solvent, ethyl acetate which has a NOHSC Exposure Standard (NOHSC website).

Adcote E718A is classified as a class 3 dangerous good in accordance with the Australian Code for the Transport of Dangerous Goods by Rail and Road.

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. However, Adcote E718A is classified as Dangerous Goods. There are special requirements for its transportation and storage in accordance with State and Territory regulations.

Potential exposure to the polymer in Adcote E718A will occur 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, coveralls and safety boots when handling Adcote E718A and 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 adverse health risk due to the notified polymer to these workers is considered to be low.

MDI and ethyl acetate in the imported polymer solution present a risk of toxic effects via inhalation, irritation to skin, eyes and respiratory system and respiratory sensitisation. It is the employer's responsibility to maintain atmospheric levels of MDI and ethyl acetate below the NOHSC exposure standards (NOHSC website). The risk of occupational asthma from repetitive exposure to isocyanates is well known. Therefore, respiratory protection during decanting and machine clean-up is indicated. The use of self-contained breathing apparatus should be considered to prevent worker exposure. Precautions to prevent exposure must be

taken by all personnel, but especially those who either have had prior contact with isocyanates or suffer from any form of compromised respiratory function (NOHSC, 1990). Health surveillance is recommended for isocyanates under State and Territory hazardous substances legislation (NOHSC, 1994a)

The notified polymer becomes unavailable for absorption once it is incorporated in the laminated material. The health risk for workers in the food packaging industry, and in the distribution and retailing snack food and other packaging 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 will not be sold to the general public. After completion of the packaging manufacture, the notified polymer in the laminating adhesive is "sandwiched" between two impervious polymers and/or aluminium films, and direct human exposure to, or food contact with, the notified polymer is unlikely. Hence, the potential for public exposure to the notified polymer is considered to be low.

13. RECOMMENDATIONS

To minimise occupational exposure to Polymer in Adcote E718A 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, 1999b), workplace practices and control procedures consistent with State and territory hazardous substances regulations must be in operation.

For products and formulations containing free MDI and ethyl acetate the following guidelines and precautions should be observed:

- Employers should ensure that NOHSC exposure standards are not exceeded in the workplace;

- Safety goggles, chemical resistant industrial clothing and footwear and impermeable gloves should be used during occupational use of products containing the notified polymer; where engineering controls and work practices do not reduce vapour and particulate exposure to safe levels, an air fed respirator should also be used.

- Guidance in selection of goggles 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/NZS 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)

14. MATERIAL SAFETY DATA SHEET

The MSDS for Adcote E718A containing the notified polymer was provided in a format consistent with the *National Code of Practice for the Preparation of Material Safety Data Sheets* (NOHSC, 1994b).

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 DW (1990) General Characteristics of Organic Compounds Which Exhibit Bioaccumulation. In: Bioaccumulation of Xenobiotic Compounds, pp. 47-57. CRC Press, Boca Raton, USA.

National Occupational Health and Safety Commission (1990) Worksafe Australia Guide - Isocyanates. Australian Government Publishing Service, Canberra.

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 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 (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 website: www.nohsc.gov.au/databases/exp/az/ethyl_acetate.htm.

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.