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October 2001

**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION
AND ASSESSMENT SCHEME**

FULL PUBLIC REPORT

Fomrez XE2968/B

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

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FULL PUBLIC REPORT**Fomrez XE2968/B****1. APPLICANT**

Crompton Specialties Pty Ltd of 13 Stanton Road SEVEN HILLS NSW 2147 (ACN 005 225 507) has submitted a notification statement in support of their application for an assessment certificate for the synthetic polymer of low concern (PLC) Fomrez XE2968/B.

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.

Marketing names: Fomrez XE2968/B

3. POLYMER COMPOSITION AND PURITY

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

The notified polymer is a polyester with all monomer reactants listed as low concern monomers in the polyester monomer list.

4. PLC JUSTIFICATION

The notified polymer meets the PLC criteria.

5. PHYSICAL AND CHEMICAL PROPERTIES

Property	Result	Comments
Appearance	Clear viscous liquid	The polymer has a viscosity 2600-3400 mPa.s at 25°C.
Boiling point	Not determined	The polymer is a liquid at room

		temperature.
Density	Not determined	
Water solubility	Not determined	The polymer is not expected to have significant water solubility, as it is a polyester, which are generally not soluble in water.
Particle size	Not applicable	
Flammability	>250°C	Not flammable.
Autoignition temperature	Not determined	
Explosive properties	Not determined	
Stability/reactivity	Not determined	The MSDS indicates that the polymer is stable under normal conditions of storage, and is not expected to undergo degradation.
Hydrolysis as function of pH	Not determined	The polymer is not expected to be water soluble. The ester functionalities are not expected to hydrolyse in the environment in the pH range of 4-9.
Partition coefficient	Not determined	The polymer is expected to partition in the octanol phase due to its low water solubility.
Adsorption/desorption	Not determined	The polymer is not expected to be mobile in soils given its insolubility in water.
Dissociation constant	Not determined	The notified polymer does not contain any reactive functional groups, which are able to undergo dissociation or further reaction.

Comments on physical and chemical properties

The notified polymer is hygroscopic.

6. USE, VOLUME AND FORMULATION

Use:

The notified polymer will be used in the synthesis of an isocyanate-capped pre-polymer that is used in the manufacture of moulded shoe soles.

Manufacture/Import volume:

The notified polymer will not be manufactured in Australia, but will be imported in 200 L drums.

The estimated quantity of the notified polymer to be imported will be up to 200 metric tonnes per annum. The drums will be transported from the docks to one manufacturing site where it will be used in the synthesis of the pre-polymer.

Formulation details:

The notified polymer will be reacted in an enclosed reactor with an intermediate, methylene diisocyanate (MDI), to effect capping of the notified polymer.

During isocyanate capping process, the notified polymer will be loaded directly from the drums, by suction pipe, into a pressurised reactor (kettle) where it will be reacted with highly reactive isocyanate. The resulting isocyanate capped pre-polymer will then be loaded into 200 L steel drums, under a blanket of nitrogen. The capped polymer will be subsequently formulated into another polymer product, Witcothane EAP 2000D, for use in the manufacture of moulded shoe soles.

7. OCCUPATIONAL EXPOSURE

There will be one site in Australia for capping the notified polymer with isocyanate. Exposure data are summarised in the following table:

Exposure route	Exposure details	Controls indicated by notifier
<i>Isocyanate capping of pre-polymer</i>		
<i>Kettle operator (1 worker, 6 hrs/day, 52 days/year)</i>		
Dermal and ocular	Possible skin and eye contamination when connecting and disconnecting pipes and during cleaning and repair of the equipment.	<ul style="list-style-type: none">• Automated and enclosed transfer and mixing operations• Enclosed reaction vessels• Personal protective equipment (PPE) – gloves, overalls and goggles.
<i>Quality control personnel (1 worker, 6 hrs/day, 52 days/year)</i>		
Dermal	Skin contamination from drips and spills	<ul style="list-style-type: none">• PPE – laboratory coats, gloves and goggles

Production supervisor (1 worker, 6 hrs/day, 52 days/year)

Dermal	Possible skin contamination if containers overfilled.	<ul style="list-style-type: none">• Automated transfer and drumming operations• Air exhaust system• PPE - gloves, overalls and goggles.
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Transport and storage

Storage and transport of notified polymer

Dermal	Possible skin contamination if accidental spillage occurs or the packaging is breached	<ul style="list-style-type: none">• PPE – none specified
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8. PUBLIC EXPOSURE

The notified polymer will not be sold to the public. However, public exposure to moulded shoe soles made from the notified polymer is likely to be high. Public contact to the notified polymer in this form gives very little exposure as the polymer is trapped within a matrix.

9. ENVIRONMENTAL EXPOSURE

9.1. Release

The notifier anticipates that release into the environment could occur at the manufacturing site during operational activities by: (1) spills, (2) and residue remaining in drums and filling lines. Other means by which release to the environment could occur is through accidental spills at the docks or during transport of the notified polymer.

A maximum of 400 kg of the notified polymer is expected to be lost per annum due to spills. Another 1-2% of the notified polymer will be lost as a result of residues remaining in drums. Assuming a maximum loss to residue of 2%, and an import volume, the loss due to residue will be approximately 4.0 tonnes per year.

The majority of the notified polymer will be further reacted and incorporated into footwear.

9.2. Fate

The notified polymer will be capped with isocyanate at the manufacturing site, hence operational spills containing the notified polymer will be limited to this site. When spills occur, the spilled polymer will be collected on absorbent materials or in acetone solvent. All solid and solvent wastes collected will be sent for treatment outside the manufacturing plant.

Normal waste treatment operations involve removal of solvents from wastes for recycling. The remaining viscous material will be used as feedstock.

Residue in drums will be recycled by licensed drum recycler who will collect the waste for treatment processing.

The majority of the reacted notified polymer will follow the fate of the shoes into which it is incorporated. It is anticipated that most of the shoes will eventually be disposed of in domestic landfill sites. In landfill, the polymer is expected to slowly degrade through biotic and abiotic processes. It is unlikely that the notified polymer will leach from the soil or reach natural water compartments given its expected low water solubility.

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

10. EVALUATION OF HEALTH EFFECTS DATA

No toxicological data were submitted.

11. EVALUATION OF ENVIRONMENTAL EFFECTS DATA

No ecotoxicological data were provided.

12. ENVIRONMENTAL RISK ASSESSMENT

Release of the notified polymer to the aquatic environment from spills during the manufacturing process is not expected because most of the manufacturing will occur at one site. All spills will be collected on site for recycling. Release to the aquatic environment of residues left in drums is also not expected, as the residue will be collected by a licensed drum dealer for recycling.

The majority of the reacted notified polymer will follow the fate of the shoes into which it is incorporated. It is expected that most of the shoes will eventually be disposed of in widely distributed landfill sites. In landfill, the polymer is expected to slowly degrade. Once the shoes are degraded, the polymer is unlikely to pose any hazard. It does not contain any reactive functional groups able to undergo dissociation or further reaction. Moreover, it is not expected to reach natural water compartments, for example, via leaching from the soil at disposal sites.

Given the above considerations, the overall environmental hazard is expected to be low.

13. HEALTH AND SAFETY RISK ASSESSMENT

13.1 Hazard assessment

No toxicological information has been provided for the notified polymer. The notified polymer contains low concentrations of residual monomers and has no high concern reactive functional groups. Since the notified polymer has high molecular weight, absorption across biological membranes and resultant systemic toxicity would be limited. The polymer meets the PLC criteria and is unlikely to be hazardous substance according to the NOHSC *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 1999).

13.2 Occupational health and safety

The notified polymer will be synthesised in a closed system with an air exhaust system to remove any fumes. All ingredients including the notified polymer are loaded mechanically. The most likely points at which exposure may occur are during connecting and disconnecting the suction pipes, through incidental skin and eye contact. Inhalation exposure is unlikely to the notified polymer. The notifier states that workers at the manufacturing site wear gloves, overalls, eye and respiratory protection. The latter being required to minimise exposure to MDI. Given the engineering controls and supplementary personal protective clothing (PPE), the health risk for workers at the manufacturing site is expected to be low.

Exposure of transport and storage workers is only possible in the event of accidental spillage. The health risk for transport and storage workers handling the notified polymer is expected to be negligible.

Conclusion

The notified polymer is of low hazard to human health and safety. The control measures in place during isocyanate capping and protective measures during quality control and transfer operations will ensure sufficient protection against the notified polymer. Therefore, the notified polymer is of low concern to human health and safety and no specific risk reduction measures are necessary.

13.3 Public health

The notified polymer will not be sold to the public, consequently, it is expected that public exposure to the notified polymer in its liquid state will be limited, except in the case of accidental spill. The notified polymer in the shoe sole will be encapsulated within an inert, high molecular weight matrix, rendering the notified polymer biologically unavailable. The public hazard from exposure to the notified polymer through all phases of its life cycle is considered to be low.

14. MSDS AND LABEL ASSESSMENT

14.1. MSDS

The MSDS of 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 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

Control Measures

No specific precautions are required to control exposure to the notified polymer. However, in the interests of good occupational health and safety, the following guidelines and precautions should be observed:

- Employers should implement the following engineering controls to minimise occupational exposure:
 - Exhaust ventilation during manufacture, blending and filling processes
 - Enclosed and automated manufacture process
- Employers should implement the following safe work practices to minimise occupational exposure:
 - During transfer of notified polymer into reactor, avoid spills and splashing
- Employers should ensure that the following personal protective equipment is used by workers to minimise occupational exposure to the notified polymer:
 - Chemical resistant gloves
 - Protective clothing which protects the body, arms and legs
 - Eye protection when splashes are generated

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.

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.

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.

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.

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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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