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**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION  
AND ASSESSMENT SCHEME**

**FULL PUBLIC REPORT**

**URETHANE ND4642B**

This Assessment has been compiled in accordance with the provisions of the *Industrial Chemicals (Notification and Assessment) Act 1989*, and Regulations. This legislation is an Act of the Commonwealth of Australia. The National Industrial Chemicals Notification and Assessment Scheme (NICNAS) is administered by Worksafe Australia which also conducts the occupational health & safety assessment. The assessment of environmental hazard is conducted by the Department of the Environment, Sport, and Territories and the assessment of public health is conducted by the Department of Health, Housing, Local Government and Community Services.

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, Worksafe Australia, 92-94 Parramatta Road, Camperdown NSW 2050, between the hours of 10.00 a.m. and 12.00 noon and 2.1 p.m. and 4.00 p.m. each week day except on public holidays.

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Director  
Chemicals Notification and Assessment

**FULL PUBLIC REPORT****URETHANE ND4642B****1. APPLICANT**

Taubmans Pty Ltd, 51 McIntyre Rd, Sunshine, Victoria.

**2. IDENTITY OF THE CHEMICAL**

Urethane ND4642B is not considered to be hazardous based on the nature of the chemical and the data provided. Therefore the chemical name, CAS number, molecular and structural formulae and spectral data, have been exempted from publication in the Full Public Report and the Summary Report.

**Trade name:** Urethane ND4642B

**Number-average molecular weight:** 2046

**Weight-average molecular weight:** 13726

**Maximum percentage of low  
molecular weight species  
(molecular weight < 1000):** 19%

**Method of detection and determination:**

Infra-red spectroscopy

**3. PHYSICAL AND CHEMICAL PROPERTIES**

**Appearance at 20°C and 101.3 kPa:** Yellow-brown solid

**Melting Point:** < 135-140°C

**Density:** 1150 kg/m<sup>3</sup>

**Decomposition Temperature:** Approximately 300°C

**Reactivity/Stability:** Will thermally degrade above 300°C and is known to be stable up to 150°C. It is incompatible with strong acids, bases and oxidising agents

**Pyrolysis products:** Isocyanate vapours,  
miscellaneous hydrocarbons,  
carbon monoxide, carbon  
dioxide, water, nitrogen  
oxides

**Combustion products:** Water, carbon dioxide and  
nitrogen oxides

#### **Comments on physico-chemical properties**

##### **• Water Solubility**

Water solubility data were not provided. By analogy with similar polymers, it is not expected to be soluble in water as water insolubility is a functional requirement.

##### **• Hydrolysis**

Significant hydrolysis is not expected under environmentally relevant conditions due to its water insolubility.

##### **• Partition Co-efficient**

The partition co-efficient was not provided on the grounds that the polymer is not expected to cross biological membranes due to its high molecular weight.

##### **• Adsorption/desorption**

Adsorption/desorption data were not provided. Upon drying the polymer polymerises to form an insoluble clear solid that would be immobile in soils.

##### **• Dissociation constant**

There are no readily dissociable groups in the polymer, thus the dissociation constant is not applicable.

#### **4. PURITY OF THE CHEMICAL**

**Degree of purity:** > 99%

**Toxic or hazardous impurities (> 0.1% by weight):** None

**Non-hazardous impurity/impurities (> 1% by weight):** None

**Maximum content of residual monomers:** 0.7%

##### **Additives/Adjuvants:**

<b>Chemical name:</b>	Dibutyltin dilaurate
<b>CAS No.:</b>	77-58-7
<b>Weight percentage:</b>	0.003%

## **5. INDUSTRIAL USE**

Urethane ND4642B is to be used as a component of an industrial coating. It will be manufactured at the rate of > 1 tonne per year for the first five years.

The notified chemical has been produced and used overseas for approximately 9 years.

## **6. OCCUPATIONAL EXPOSURE**

Each of the monomers of Urethane ND4642B is added gradually over time through enclosed pipelines from drums to a closed reactor vessel. When the reaction is complete, as confirmed by infrared analysis, the polymer is diluted to 65%(w/w) with monomethyl ether of propylene glycol. A small amount of methyl isobutyl ketone, used as a line rinse, is added to the reactor vessel. After cooling to 50-70°C, the polymer solution is then discharged into a bulk storage tank through closed lines. In the event of unscheduled surplus conditions, excess polymer solution will be stored in drums.

The Urethane ND4642B is precharged to a discharge tank. From the discharge tank, it is added to a reactor vessel containing a second resin. This mixture is then added to a tank containing water for emulsification. The emulsion is now approximately 11%(w/w) of Urethane ND4642B. The emulsion is then discharged from the tank to bulk storage prior to transport by bulk tanker to a single customer.

A maximum of 61 workers are involved in Urethane ND4642B manufacture. The duration of exposure is expected to be up to 12 days per year, 1-2 hours per day involving collection and testing of samples for quality control and equipment maintenance.

Manufacture is performed in a fixed area of the notifier's factory and local exhaust ventilation is used for sampling, laboratory testing, bulk filling and drum filling in the event that drums are used.

The user will transfer the emulsion into bulk storage tanks. When required, the emulsion will be pumped to a tank and mixed with paint for application onto the substrate, resulting in a final product with a Urethane ND4642B content of < 20%. This surface coating mixture is applied to the substrate prior to curing in an oven.

Of the 31 workers involved in application of the coating, the 2 maintenance personnel may be exposed for 1-2 hours per day, 14 days per year and the 5 laboratory staff (quality control and troubleshooting) may be exposed for about 1 hour per day, 210 days per year in total.

## **7. PUBLIC EXPOSURE**

There is low potential for public exposure to the notified polymer during manufacturing operations, which are conducted in enclosed equipment within banded or sealed locations. Off-specification batches would be disposed of by incineration at a licensed facility, while small spills and waste residues (estimated to be 50 kg/month) will be consigned to landfill. The polymer is non-volatile. Given that the expected frequency of transport is only 1-2 loads/month, the probability of public exposure arising from a transport accident is also low. Although there will be widespread public contact with articles painted with the notified polymer, it will be cured and sealed under other layers of paint. Under these conditions, absorption of the notified polymer should not occur.

## **8. ENVIRONMENTAL EXPOSURE**

### **. Release**

Urethane ND4642B is to be manufactured in Australia at Taubmans Sunshine (Vic.) in a closed reaction vessel. It will initially exist as a molten solid, to be dissolved in propylene glycol monomethyl ether and then stored as a solution. All waste water etc. from the processing area is treated (interceptors pits) prior to discharge to the sewer as trade waste. The interceptor pits should trap most of the polymer. The solution of ND4642B is to be mixed with two other resins, then emulsified prior to bulk storage. This emulsion is then transported to the customer. The emulsion contains < 20% of the polymer. All the storage areas are completely sealed and banded.

The customer will mix the polymer emulsion with paint for application onto the substrate. When required, the polymer emulsion will be pumped to a holding tank and mixed with paint before application giving a final concentration of < 10%. The application to the substrate has a high level of efficiency. The notifier claims that efficiencies of up to 98% paint usage are achieved. Wastes from the process are flocculated with alkali, then neutralised before discharge to sewer. The solids that settle out are disposed of according to Victorian State Environmental Legislation. After coating, the coated articles are baked to cure the polymer.

Apart from accidents during transport, the possible release of uncured polymer to the environment is negligible. The cured polymer will be further coated with paint etc. before release to the environment.

### **. Fate**

The ultimate fate of the majority of ND4642B is landfill. The small amount of waste polymer generated in the manufacturing process, estimated at 50 kg per month, will be disposed of by landfill. Any rejected batches, estimated at 1 per 8000, will

be disposed of by incineration. As ND4642B is a polymer with expected low water solubility leaching from landfill sites is not anticipated. Incineration of the notified substance is expected to produce water, and oxides of carbon and nitrogen.

Waste containing the polymer generated in the coating of articles is to be treated by flocculation, with the solids being disposed of according to Victorian State Environmental Legislation (landfill).

The cured polymer on the coated articles will be disposed of with the articles. The current practice is to dispose of coated articles at the end of their useful life by landfill.

## **9. ASSESSMENT OF ENVIRONMENTAL EFFECTS**

No ecotoxicity data were provided, but none are required according to the Act, since the notified polymer has a number average molecular weight (NAMW) > 1000.

Due to its high NAMW the polymer is not expected to cross biological membranes.

## **10. ASSESSMENT OF ENVIRONMENTAL HAZARD**

The polymer is unlikely to present a hazard to the environment at any stage of its use. Of the original quantity of polymer emulsion manufactured (<100 tonnes) it is expected that most will not be released from the production/application site until it has been cured. The ultimate fate of all cured polymer is not known but most likely the majority will be disposed of by landfill. Leaching of the cured polymer from landfill is not expected due to the chemical and physical bonding which occurs during the surface coating process.

Waste generated by manufacture of the polymer (<50 kg per month) will be disposed of by landfill. Any liquid wastes or spills generated during manufacture, formulation or storage is to be treated by passage through interceptor pits, with the waste water to be discharged to the sewer as trade waste. The notifier states that the interceptor pits would trap most of the polymer. The waste generated from coating the articles will be collected and treated by flocculation before discharge to the sewer as trade waste. The flocculation should remove almost all of the polymer. In the event that a small amount of the notified polymer is released to the sewer, it will be further treated at the municipal sewage treatment works before discharge to the aquatic environment. At the treatment works most of the polymer should be contained in the sludge, which will be incinerated or sent to landfill. Therefore the potential for release to the aquatic compartment is minimal and the associated environmental hazard negligible.

The low level environmental exposure of the polymer as a result of normal use, together with its expected lack of biological

activity, indicate that the overall environmental hazard should be negligible.

#### **11. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS**

As the notified chemical is a polymer of high number average molecular weight ( $> 1000$ ), it is not expected to be able to cross biological membranes and should not be considered a health hazard for this reason. Low levels of residual monomers also make it unlikely that the notified polymer will present a health hazard.

There is a relatively high level (19%) of species with a molecular weight  $< 1000$  of unknown toxicity. However, it is expected that any toxic effects would be dependent on leaching of the low molecular weight species from the polymer.

Exposure of manufacturing personnel is largely controlled by sealed systems and local exhaust ventilation and is limited to a maximum of about 12 days per year, 1-2 hours per day. Sealed systems are used during manufacture of the notified polymer to minimise exposure to hazardous monomers and to the monomethyl ether of propylene glycol added to the reactor vessel to dilute the finished polymer. The solvent is a mild skin and a moderate to severe eye irritant and may cause a range of symptoms on exposure to the vapour as outlined in the MSDS.

The customer for the notified chemical receives it as a water emulsion containing  $< 20\%$  Urethane ND4642B and exposure is limited to a maximum of about 1 hour per day, 210 days per year.

It is expected that the risk of adverse health effects from exposure to the polymer during manufacture is low given the containment procedures in use. At the customer's site the risk of adverse health effects from exposure to the polymer may also be considered low because it is now at a low percentage in the final product and the coating process is a high efficiency process with little waste.

Under normal conditions, there is low potential for public exposure to the notified polymer during manufacture, transport and application. Although widespread public contact will occur with coated articles treated with the notified polymer, absorption should not occur because the material will be cured and sealed under other layers of paint. The use pattern outlined by the notifier and the relatively low hazard associated with the notified polymer suggests that it does not pose a significant public or occupational health risk.

#### **13. RECOMMENDATIONS**

To minimise occupational exposure to Urethane ND4642B the following guidelines and precautions should be observed:

- . if engineering controls and work practices are insufficient to reduce exposure to Urethane ND4642B to a safe level, then personal protective devices which conform to and are used in accordance with Australian Standards (AS) for eye protection (AS 1336, AS 1337) (1,2), impermeable gloves (AS 2161) (3) and protective clothing (AS 3765.1, 3765.2) (4,5) should be worn;
- . a copy of the Material Safety Data Sheet should be easily accessible to employees.

#### **14. MATERIAL SAFETY DATA SHEET**

The attached Material Safety Data Sheets (MSDS) for Urethane ND4642B and the applied coating were provided in Worksafe Australia format (6).

These MSDS were provided by Taubmans Pty Ltd as part of their notification statement. The accuracy of this information remains the responsibility of Taubmans Pty Ltd.

#### **15. REQUIREMENTS FOR SECONDARY NOTIFICATION**

Under the *Industrial Chemicals (Notification and Assessment) Act 1989*, secondary notification of Urethane ND4642B shall be required if any of the circumstances stipulated under subsection 64(2) of the Act arise. No other specific conditions are prescribed.

#### **16. REFERENCES**

1. Australian Standard 1336-1982, *Recommended Practices for Eye Protection in the Industrial Environment*, Standards Association of Australia Publ., Sydney, 1982.
2. Australian Standard 1337-1984, *Eye Protectors for Industrial Applications*, Standards Association of Australia Publ., Sydney, 1984.
3. Australian Standard 2161-1978, *Industrial Safety Gloves and Mittens (excluding Electrical and Medical Gloves)*, Standards Association of Australia Publ., Sydney, 1978.
4. Australian Standard 3765.1-1990, *Clothing for Protection Against Hazardous Chemicals, Part 1: Protection Against General or Specific Chemicals*, Standards Association of Australia Publ., Sydney, 1990.
5. Australian Standard 3765.2-1990, *Clothing for Protection Against Hazardous Chemicals, Part 2: Limited Protection Against Specific Chemicals*, Standards Association of Australia Publ., Sydney, 1990.



6. National Occupational Health and Safety Commission,  
*Guidance Note for the Completion of a Material Safety Data  
Sheet*, 2nd. edition, AGPS, Canberra, 1990.