File No: LTD/1256

November 2006

NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME (NICNAS)

FULL PUBLIC REPORT

Polymer in CNUVE151

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Director
NICNAS

TABLE OF CONTENTS

FULL PUBLIC REPORT

Polymer in CNUVE151

1. APPLICANT AND NOTIFICATION DETAILS

APPLICANT(S)
T R (Chemicals Australia) Pty Ltd (ABN 57 001 268 06)
195 Briens Rd
NORTHMEAD NSW 2152

and

Intergraphic Technologies Pty Ltd (ABN 21 111 990 017)
26 Ovata Dr
TULLAMARINE VIC 3043

NOTIFICATION CATEGORY
Limited: Polymer with NAMW ≥ 1000 (greater than 1 tonne per year).

EXEMPT INFORMATION (SECTION 75 OF THE ACT)
Data items and details claimed exempt from publication: Chemical name, CAS No., molecular and structural formulae, spectral data, molecular weight, purity, impurities, identity of recipients.

VARIATION OF DATA REQUIREMENTS (SECTION 24 OF THE ACT)
Variation to the schedule of data requirements is claimed as follows: melting point, boiling point, hydrolysis as a function of pH, partition coefficient, adsorption/desorption, dissociation constant, particle size, flammability limits, autoignition temperature and explosive properties.

PREVIOUS NOTIFICATION IN AUSTRALIA BY APPLICANT(S)
None

NOTIFICATION IN OTHER COUNTRIES
Korea (2005) and US (1999) PMN

2. IDENTITY OF CHEMICAL

OTHER NAME(S)
SK6500
SK6502
SK421-S2

MARKETING NAME(S)
CNUVE 151 (containing the notified polymer at 10-65% concentration.

MOLECULAR WEIGHT
Number Average Molecular Weight (Mn) > 1000

METHODS OF DETECTION AND DETERMINATION

METHOD Infrared spectroscopy
Remarks A reference spectrum was provided.

3. COMPOSITION

DEGREE OF PURITY
High

4. INTRODUCTION AND USE INFORMATION

MODE OF INTRODUCTION OF NOTIFIED CHEMICAL (100%) OVER NEXT 5 YEARS
The notified polymer will not be manufactured in Australia.but will be imported at 10-65% concentration in a finished UV Curable adhesive product which will be transported in 20 L screw top plastic containers or 205 L lined steel drums.

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

Year	*1*	*2*	*3*	*4*	*5*
Tonnes	100	100	100	100	100

USE
A component of a UV curable adhesive for optical disc manufacture.

5. PROCESS AND RELEASE INFORMATION

5.1. Distribution, transport and storage

PORT OF ENTRY
The notified polymer will be imported through Melbourne by wharf.

IDENTITY OF MANUFACTURER/RECIPIENTS
Optical disc manufacturers.

TRANSPORTATION AND PACKAGING
The finished adhesive product containing the notified polymer will be imported at 10-65% concentration in 20 L plastic drums or 205 L lined steel drums. The product containing the notified polymer will be stored in dry and well-ventilated areas at the notifier's site before it is sold to the DVD and optical disc manufacturing industry.

5.2. Operation description

Transport and storage
The finished adhesive product containing the notified polymer will be imported in 20 L plastic drums at a concentration of 10-65%. The product containing the notified polymer will be stored in dry and well-ventilated area at the notifier's site before it is sold to the DVD and optical disc manufacturing industry.

Manufacture of DVDs
The DVD consists of 2 layers or disc substrates with the capacity to accept digital information in the form of pits and lands, applied by a stamper mechanism fitted to an injection molding system. At the manufacturing site, the DRI-3400 is used to manufacture DVDs. This is a fully automatic digital versatile disc (DVD) production line system. It manages and performs a range of processes, from the initial molding of the disc substrate to the final stacking of DVD's onto spindles. An overview of the process is described below:

Molding – Stampers are set in molds and used to create transparent DVD substrates.

Cooling – The disc substrates are cooled down.

Sputtering – The surface of the disc substrate is coated with aluminum or silicon.

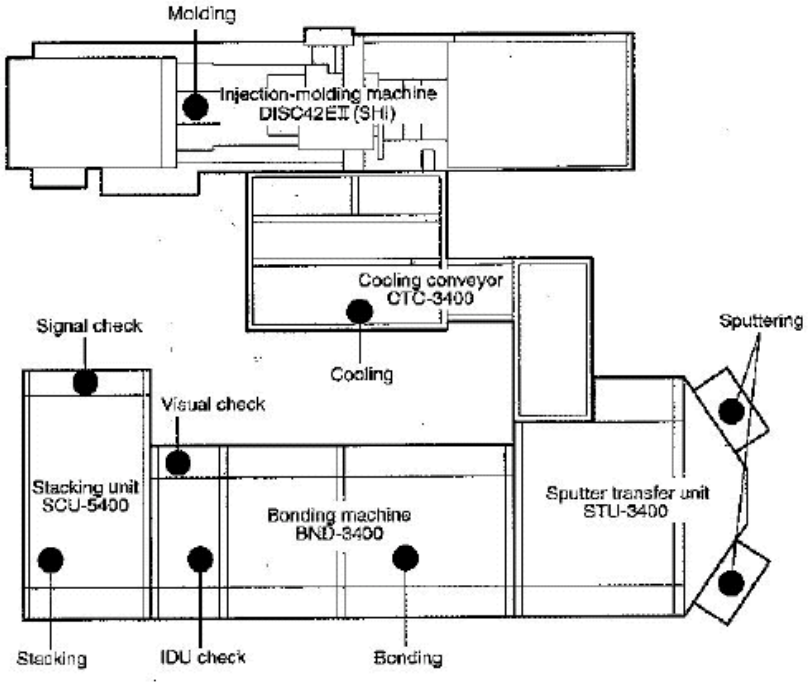
Bonding – Bonding resin containing the notified polymer is drawn from the 20 L supply into a holding tank in the bond unit. The supply drum is replaced when the bonding resin is depleted. During the bonding process, the bonding resin containing the notified polymer is dispensed via the ink

nozzle, which is supplied from the bonding resin supply line. The two substrates are bonded together. A pop up arm then joins the two disc substrates together. The paired disc substrates are presented for the pressing process. The purpose of this process is to remove any bubbles. The distribution arm then picks up the paired disc substrates and introduces them to the disc spinner. The disc spinner works in centrifugal force and causes the adhesive to spin outward and spread evenly between the disc substrates. The near vacuum draws the bonding resin in toward the centre of the paired disc substrates to ensure an even distribution of adhesive between the two substrates. The centering chuck then aligns the disc substrates concentrically, prior to bonding the central area (UV spot). Then the UV curing takes place, where the centered disc is picked up and placed in the UV curing tray. There are 7 pockets in the tray. The tray rotates and exposes the discs seated in the pockets to UV light. This causes the UV resin to cure.

Inspections – The discs are inspected by the visual checker.

Stacking – The finished discs are stacked.

Figure 1. Overview of DRI-3400 machine used to manufacture DVDs



5.3 Occupational Exposure

Number and Category of Workers

Category of Worker	*Number*	*Exposure Duration (hours per day)*	*Exposure Frequency (days per year)*
Transport and storage	10-15	1-10 hours/day	20 days/year
Manufacture of DVDs			
Replication Operators.- operate DVD Replication Machines	9	8 hours/day	75 days/year
Replication Operators – replacement of empty adhesive drum	9	5 min/day	75 days/year
End users	> 1000	6-8 hours/day	300 days/year

Exposure Details

Transport and storage
Transport and warehouse workers will be exposed to the notified polymer only in the event of a spill or if packaging is accidentally breached.

Manufacture of DVD and optical disc products
Dermal and ocular exposure may occur when opening drums, connecting and disconnecting automated pumps during transfer operations. This will occur once per day and will take around 5 minutes to complete. The DVD manufacturing process is fully enclosed and automated, therefore further exposure would be limited. All of the workers involved in the production of DVDs will wear personal protective equipment including safety glasses, gloves and overalls.

Dermal exposure may also result from workers cleaning drums. These workers will wear personal protective equipment including safety glasses, gloves and overalls to minimize any exposure.

5.4. Release

RELEASE OF CHEMICAL AT SITE
The notified polymer will not be manufactured in Australia. Local operation will include transport storage and manufacture of DVD products.

The adhesive product (bonding rising) containing the notified polymer will be transported to Australia by ship in 20 L plastic drums and will be transported directly to the notifier's warehouse for housing before being sold to manufacturing companies.

Release to the environment may occur at the notifier's site in the event of an accident, during transport or if the packaging is damaged

The residues in the drums are expected to account for up to 1 % of the import volume (< 300 kg/year). The drums are treated with UV light to cure the resin before collection by waste disposal contractors.

RELEASE OF CHEMICAL FROM USE
At the manufacturing site, the resin containing the notified polymer is used to manufacture DVDs. This is a fully automatic digital versatile disc production line system.

Bonding resin containing the notified polymer is drawn from the 20 L supply into a holding tank in the bond unit. The supply drum is replaced when the bonding resin is depleted. During the bonding process the bonding resin containing the notified polymer is dispensed via the ink nozzle, which is supplied from the bonding resin supply line. The two substrates are bonded together. A pop up arm then joins the two disc substrates together. The paired disc substrates are presented for the pressing process. The purpose of this process is to remove any bubbles. The distribution arm then picks up the paired disc substrates and introduces them to the disc spinner. The disc spinner works in centrifugal force and causes the adhesive to spin outward and spread evenly between the disc substrates. The near vacuum draws the bonding resin in toward the centre of the paired disc substrates to ensure an even distribution of adhesive between the two substrates. The centering chuck then aligns the disc substrates concentrically, prior to bonding the central area (UV spot). Then the UV curing takes place, when the centered disc is picked up and placed in the UV curing tray. There are pockets in the tray, which rotates and exposes the discs seated in the pockets to UV light. This causes the UV resin to cure.

Very little release of the polymer is anticipated during manufacture of DVDs. If accidental spillage occurs during replacement of empty 20 L drums with full drums of the product containing the notified polymer in the bonding unit, it will be contained and soaked up with inert absorbent material (sand) and placed in a sealable container for disposal. Waste material is disposed of to landfill.

The majority of the imported polymer will be discarded with old DVDs at the end of their useful lives, and these are likely to be either incinerated or placed into landfill.

5.5. Disposal
The manufacture of DVDs results in a certain amount of waste being generated.

Waste Stream	*Collection Method*	*Disposal Method*

Chemical waste – Empty UV Resin drums	Following the changing of the resin drum, the empty drums are placed on a trolley located near the DVD manufacturing machine and treated with UV to cure the resin.	Empty drums are collected by waste contractors for disposal to landfill.
Uncured discs/wet discs from bonding area. Discs to which the bonding resin has been applied but not cured	These discs are placed in a dedicated bin with foot operated lid.	The bins are collected by waste contractors for disposal to landfill.

5.6. Public exposure

The public will not be exposed to the notified polymer as it is a fully cured adhesive, inside a DVD. Therefore, the public will not contact the uncured polymer during normal use.

6. PHYSICAL AND CHEMICAL PROPERTIES

Appearance at 20°C and 101.3 kPa Clear, light green to grey, viscous liquid

Melting Point/Freezing Point Not determined

Remarks The notified polymer is a viscous liquid, physical state transition is not noticeable.

Boiling Point Not determined

Remarks The notified polymer will polymerise before the boiling point is reached.

Density 1210 kg/m^3 at 20°C

METHOD OECD TG 109 Density of Liquids and Solids.
EC Directive 92/69/EEC A.3 Relative Density.
Remarks Pycnometer method.
TEST FACILITY SafePharm Laboratories Ltd (2003a)

Vapour Pressure 5.4 x 10^{-6} kPa at 25°C.

METHOD OECD TG 104 Vapour Pressure.
EC Directive 92/69/EEC A.4 Vapour Pressure.
Remarks Vapour pressure balance used. A series of tests were undertaken after the test material had been held under vacuum for ~185 hours. Temperature and pressure readings were taken at 190-200°C with a one hour dwell at 190°C. The notified polymer is only very slightly volatile (Mensink *et al*., 1995).
TEST FACILITY SafePharm Laboratories Ltd (2003b)

Water Solubility 1.31 x 10^{-3} g/L at 20°C

METHOD OECD TG 105 Water Solubility.
EC Directive 92/69/EEC A.6 Water Solubility.
Remarks Flask method. Preliminary and definitive tests were conducted. Analytical Method: HPLC. The notified polymer is only slightly soluble in water (Mensink *et al*., 1995).
TEST FACILITY SafePharm Laboratories Ltd (2003a)

Hydrolysis as a Function of pH Not determined

Remarks Due to low water solubility this test was not done. The notified polymer has ester groups which could hydrolyse but not at the environmentally relevant pH range of 4-9.

Partition Coefficient (n-octanol/water) Not determined

Remarks Due to low water solubility this test was not done. The notified polymer is expected to favour the octanol phase.

Adsorption/Desorption log Koc range = <1.25 to >5.63

METHOD OECD TG 121 Method.
Remarks HPLC Screening Method.

Approximately 80% of the material has a log Koc of >5.63 and ~97% of the material has a log Koc >1.25. The notified polymer is expected to have a high affinity to organic matter and is not expected to be mobile in soils.
TEST FACILITY SafePharm Laboratories Ltd (2003a)

Dissociation Constant Not determined

Remarks Due to low water solubility this test was not done. The notified polymer contains non-ionisable functionality and is unlikely to dissociate.

Particle Size Not relevant

Remarks Liquid polymer

Flash Point 151 ± 2°C at 101.325 kPa

METHOD EC Directive 92/69/EEC A.9 Flash Point.
Remarks Closed cup equilibrium method.
TEST FACILITY SafePharm Laboratories Ltd (2003b)

Flammability Limits Not determined

Remarks Minimally combustible based on flash point results

Autoignition Temperature Not determined

Remarks Not determined based on flash point results

Explosive Properties Not determined

Remarks No component of the polymer has a functionality which could be potentially explosive.

Reactivity

Remarks The polymer contains an inhibitor to keep it stable, and is thus not reactive until reacted under controlled processing condition (during manufacture of product).

7. TOXICOLOGICAL INVESTIGATIONS

No toxicity data were submitted.

8. ENVIRONMENT

8.1. Environmental fate

No environmental fate data were submitted.

8.2. Ecotoxicological investigations

No ecotoxicity data were submitted.

9. RISK ASSESSMENT

9.1. Environment

9.1.1. Environment – exposure assessment

The notified polymer will not be manufactured in Australia. Local operation will include transport, storage and manufacture of DVD products.

Release to the environment may occur at the notifier's site in the event of an accident, during transport or if the packaging is damaged

The residues in the drums are expected to account for up to 1% of the import volume (< 300 kg/year). The drums are treated with UV light to cure the resin before collection by waste disposal contractors.

At the manufacturing site, the resin containing the notified polymer is used to manufacture DVDs. This is a fully automatic digital versatile disc production line system. Very little release of the polymer is anticipated during manufacture of DVDs. If accidental spillage occurs during replacement of empty 20 L drums with full drums of the product containing the notified polymer in the bonding unit, it will be contained and soaked up with inert absorbent material (sand) and placed in a sealable container for disposal. Waste material is disposed of to landfill.

The majority of the imported polymer will be discarded with old DVDs at the end of their useful lives, and these are likely to be either incinerated or placed into landfill.

9.1.2. Environment – effects assessment

No ecotoxicity data were submitted. However, aquatic exposure is expected to be minimal during normal usage of the coating. Aquatic toxicity is also likely to be limited by the expected low water solubility and nonionic form of the polymer.

9.1.3. Environment – risk characterisation

The majority of the notified polymer will be incorporated at a low concentration level into DVDs and, once applied and dried, poses little risk to the environment since a cured and inert matrix will be formed. Wastes generated during repackaging and applications are expected to be landfilled or incinerated.

If spilt on land, the notified polymer is expected to become immobilised in the soil layer. Due to its expected low water solubility, the polymer will remain bound within the soils and sediments of the landfill and be slowly degraded the abiotic processes. If wastes are incinerated, the notified polymer would be destroyed with the production of water vapour, and oxides of carbon.

Furthermore, the limited exposure of the notified polymer to the aquatic compartment due to its industrial settings, nonionic form, expected low water solubility and the relatively high molecular weight, is unlikely to have an adverse effect on aquatic organisms.

The majority of the notified polymer will be applied to DVDs and either shares the fate of the product at the end of its useful life (most likely to landfill or incineration).

9.2. Human health

9.2.1. Occupational health and safety – exposure assessment

Exposure of transport and storage workers may occur in the event of an accident where the import containers are breached.

For workers involved in manufacturing DVDs exposure to the notified polymer at 10-65% can occur on opening import drums and connecting them to the fully enclosed and automated DVD manufacturing machine for 5 minutes a day on 75 days a year. The expected low level of exposure is further minimised by the use of standard PPE (gloves, safety glasses and overalls). Once cured the notified polymer is not bioavailable and in any case is containing with the hard plastic DVD disk. Exposure at and after this point is expected to be low.

9.2.2. Public health – exposure assessment

Once cured the notified polymer is not bioavailable and in any case is containing with the hard plastic DVD disk. Exposure of the public is expected to be low.

9.2.3. Human health – effects assessment

No toxicity data were provided. The notified polymer is of high molecular weight (NAMW > 1000) and contains low levels of residual monomers and low MW species. However, it is designed to be reactive and the imported solution contains an inhibitor to prevent hazardous polymerisation. Given the reactive functional groups, it is predicted to be a potential eye and skin irritant and a potential skin sensitiser.

Despite the reactivity of the notified polymer, there are insufficient data to classify it as a hazardous substance in accordance with the NOHSC *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 2004).

9.2.4. Occupational health and safety – risk characterisation

Workers will most likely only be exposed to the imported adhesive containing the polymer (at 10-65%) for a brief period while connecting drums to the DVD manufacturing machine and possibly in drum cleaning. Any low level exposure will be minimised by the use of appropriate PPE (gloves, safety glasses and overalls). Transport and storage workers will only be exposed to the imported polymer solution in the event of a transport accident involving breach of import containers. Overall, the risk to workers from importation, use and disposal of the notified polymer is expected to be low given that exposure is limited to a maximum of 10-65% and engineering controls are used.

In addition to the above, the adhesives containing the notified polymer appear to be hazardous (irritant, sensitising) due to components other than the notified polymer. The controls required to minimise exposure to hazardous components of these adhesives during transfer operations (primarily appropriate PPE) will also serve to minimise exposure to the notified polymer.

Skin and eye protection is recommended when handling the notified polymer as introduced (at 10-65%) to protect against potential sensitising and irritant effects.

9.2.5. Public health – risk characterisation

The risk to public health is expected to be low given that the public will not be exposed to the adhesive except when cured.

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

10.1. Hazard classification

Based on the available data the notified polymer cannot be classified as hazardous under the NOHSC *Approved Criteria for Classifying Hazardous Substances*.

10.2. Environmental risk assessment

The chemical is not considered to pose a risk to the environment based on its reported use

pattern.

10.3. Human health risk assessment

10.3.1. Occupational health and safety

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

10.3.2. Public health

There is Low Concern to public health when used as described.

11. MATERIAL SAFETY DATA SHEET

11.1. Material Safety Data Sheet

The MSDS for products containing 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, 2003). They are published here as a matter of public record. The accuracy of the information on the MSDS remains the responsibility of the applicant.

11.2. Label

The labels for products containing the notified polymer provided by the notifier were in accordance with the NOHSC *National Code of Practice for the Labelling of Workplace Substances* (NOHSC, 1994). The accuracy of the information on the label remains the responsibility of the applicant.

12. 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 chemical as introduced:
  - Impervious gloves, safety goggles and protective clothing

  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.

Environment

Disposal

- The notified polymer should be disposed of to landfill in solid form and to licensed waste contractors if in liquid form.

Emergency procedures

- Spills or accidental release of the notified polymer should be contained by soaking up with inert absorbent material and disposed of as special waste in compliance with local and State regulations as recommended in the MSDS.

- Use detergent in cleaning up
- Prevent product from entering drains.

12.1. 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 Section 64(1) of the Act; if
  - Adverse health effects are reported or
  - Toxicological studies become available regarding irritation or sensitisation potential.

or

(2) Under Section 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.

13. BIBLIOGRAPHY

NOHSC (1994) National Code of Practice for the Labelling of Workplace Substances [NOHSC:2012(1994)]. National Occupational Health and Safety Commission, Canberra, Australian Government Publishing Service.

NOHSC (2004) Approved Criteria for Classifying Hazardous Substances [NOHSC:1008(2004)]. National Occupational Health and Safety Commission, Canberra, AusInfo.

NOHSC (2003) National Code of Practice for the Preparation of Material Safety Data Sheets, 2nd edn [NOHSC:2011(2003)]. National Occupational Health and Safety Commission, Canberra, Australian Government Publishing Service.

Safepharm Laboratories (2003a) Determination of General Physico-chemical Properties. Project No 638/005, Safepharm Laboratories Ltd, Derby, UK. (unpublished report provided by notifier).

Safepharm Laboratories (2003b) Determination of Hazardous Physico-chemical Properties. Project No 638/006, Safepharm Laboratories Ltd, Derby, UK. (unpublished report provided by notifier).