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**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME
(NICNAS)**

PUBLIC REPORT

Aliphatic Urethane Acrylate Polymer

This Assessment has been compiled in accordance with the provisions of the *Industrial Chemicals (Notification and Assessment) Act 1989* (Cwlth) (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 Department of Health and Ageing, and conducts the risk assessment for public health and occupational health and safety. The assessment of environmental risk is conducted by the Department of Sustainability, Environment, Water, Population and Communities.

For the purposes of subsection 78(1) of the Act, this Public Report may be inspected at our NICNAS office by appointment only at Level 7, 260 Elizabeth Street, Surry Hills NSW 2010.

This Public Report is also available for viewing and downloading from the NICNAS website or available on request, free of charge, by contacting NICNAS. For requests and enquiries please contact the NICNAS Administration Coordinator at:

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**Director
NICNAS**

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SUMMARY

The following details will be published in the NICNAS *Chemical Gazette*:

| ASSESSMENT REFERENCE | APPLICANT(S) | CHEMICAL OR TRADE NAME | HAZARDOUS SUBSTANCE | INTRODUCTION VOLUME | USE |
|-------------------------|-----------------------------|--|------------------------|-------------------------|--|
| LTD/1550 | Karpelo Holdings Pty Ltd | Aliphatic Urethane Acrylate Polymer | ND* | ≤15 tonnes per annum | Component of industrial coatings, adhesives and inks |

*ND = not determined

CONCLUSIONS AND REGULATORY OBLIGATIONS

Hazard classification

As no toxicity data were provided for the notified polymer, it cannot be classified according to the *Approved Criteria for Classifying Hazardous Substances* [NOHSC:1008(2004)].

Human health risk assessment

Under the conditions of the occupational settings described, the notified polymer is not considered to pose an unreasonable risk to the health of workers.

When used in the proposed manner, the notified polymer is not considered to pose an unreasonable risk to public health.

Environmental risk assessment

On the basis of the assessed use pattern and assumed low hazard, the notified polymer is not considered to pose an unreasonable risk to the environment.

Recommendations

REGULATORY CONTROLS

Material Safety Data Sheet

- The MSDS for products containing the notifier polymer should reflect the hazards associated with the residual monomer, if appropriate based on the concentration.

CONTROL MEASURES

Occupational Health and Safety

- Employers should implement the following engineering controls to minimise occupational exposure to the notified polymer, as introduced and as reformulated for end-use:
 - Enclosed, automated processes
 - Spray booths during application
- Employers should implement the following safe work practices to minimise occupational exposure during handling of the notified polymer, as introduced and as reformulated for end-use:
 - Avoid skin contact
 - Avoid inhalation of aerosols during spray application
- Employers should ensure that the following personal protective equipment is used by workers to minimise occupational exposure to the notified polymer, as introduced and as reformulated for end-use:
 - Gloves, goggles, coveralls
 - Respiratory protection during spray applications

Guidance in selection of personal protective equipment can be obtained from Australian, Australian/New Zealand or other approved standards.

- Spray applications should be carried out in accordance with the Safe Work Australia *National Guidance Material for Spray Painting* [NOHSC (1999)] or relevant State and Territory Codes of Practice.
- 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 *Approved Criteria for Classifying Hazardous Substances* [NOHSC:1008(2004)] workplace practices and control procedures consistent with provisions of State and Territory hazardous substances legislation must be in operation.

Disposal

- The notified polymer should be disposed of to landfill.
- Emergency procedures
- Spills or accidental release of the notified polymer should be handled by physical containment, collection and subsequent safe disposal.

Regulatory Obligations

Secondary Notification

This risk assessment is based on the information available at the time of notification. The Director may call for the reassessment of the chemical under secondary notification provisions based on changes in certain circumstances. Under Section 64 of the *Industrial Chemicals (Notification and Assessment) Act (1989)* the notifier, as well as any other importer or manufacturer of the notified chemical, have post-assessment regulatory obligations to notify NICNAS when any of these circumstances change. These obligations apply even when the notified polymer is listed on the Australian Inventory of Chemical Substances (AICS).

Therefore, the Director of NICNAS must be notified in writing within 28 days by the notifier, other importer or manufacturer:

- (1) Under Section 64(1) of the Act; if
 - the polymer has a number-average molecular weight of less than 1000;
- or
- (2) Under Section 64(2) of the Act; if
 - the function or use of the polymer has changed from a component of industrial coatings, adhesives and inks, or is likely to change significantly;
 - the amount of polymer being introduced has increased from 15 tonnes per annum, or is likely to increase, significantly;
 - the polymer has begun to be manufactured in Australia;
 - additional information has become available to the person as to an adverse effect of the polymer on occupational health and safety, public health, or the environment.

The Director will then decide whether a reassessment (i.e. a secondary notification and assessment) is required.

Material Safety Data Sheet

The MSDS of a product containing the notified polymer provided by the notifier was reviewed by NICNAS. The accuracy of the information on the MSDS remains the responsibility of the applicant.

ASSESSMENT DETAILS

1. APPLICANT AND NOTIFICATION DETAILS

APPLICANT(S)

Karpelo Holdings Pty Ltd (ABN: 79 003 741 035)
Suite 2B, 14 Glen Street
Eastwood, NSW 2122

NOTIFICATION CATEGORY

Limited: Synthetic polymer with Mn \geq 1000 Da.

EXEMPT INFORMATION (SECTION 75 OF THE ACT)

Data items and details claimed exempt from publication: chemical name, CAS number, molecular and structural formulae, molecular weight, analytical data, degree of purity, polymer constituents, residual monomers, impurities, additives/adjuvants, use details and import volume.

VARIATION OF DATA REQUIREMENTS (SECTION 24 OF THE ACT)

Variation to the schedule of data requirements is claimed for all physico-chemical endpoints.

PREVIOUS NOTIFICATION IN AUSTRALIA BY APPLICANT(S)

None

NOTIFICATION IN OTHER COUNTRIES

None

2. IDENTITY OF CHEMICAL

MARKETING NAME(S)

Aliphatic Urethane Acrylate Polymer

MOLECULAR WEIGHT

>1,000 Da

ANALYTICAL DATA

Reference GPC spectrum was provided.

3. COMPOSITION

DEGREE OF PURITY >95%

HAZARDOUS IMPURITIES/RESIDUAL MONOMERS

One hazardous impurity/residual monomer is present at a level above the concentration cut-off for classification. The impurity is present at a concentration of <1% and may be harmful in contact with skin or result in sensitisation by skin contact (R21 and R43 classification).

4. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE AT 20 °C AND 101.3 kPa: liquid

| Property | Value | Data Source/Justification |
|--------------------------------|----------------------------------|--|
| Boiling Point | Not determined | Expected to decompose prior to boiling |
| Density | 1080 kg/m ³ at 25 °C* | MSDS |
| Vapour Pressure | Not determined | Based on the high molecular weight, vapour pressure is expected to be low. |
| Water Solubility | Not determined | Expected to have limited solubility based on its predominantly hydrophobic structure |
| Hydrolysis as a Function of pH | Not determined | Contains hydrolysable functionality. However, due to its limited water solubility, it is expected to hydrolyse very slowly in the environmental pH range |

| | | |
|--|----------------|--|
| Partition Coefficient (n-octanol/water) | Not determined | (4-9) at ambient temperature Expected to partition from water to n-octanol on the basis of its hydrophobicity |
| Adsorption/Desorption | Not determined | Expected to adsorb to soil, sediment and sludge and have low mobility in soil based on its hydrophobicity |
| Dissociation Constant | Not determined | Does not contain any readily dissociable functional groups |
| Flash Point | >100 °C* | MSDS (closed cup) |
| Autoignition Temperature | Not determined | Not expected to autoignite |
| Explosive Properties | Not determined | Contains no functional groups that would imply explosive properties. |

*For the imported product containing 80-90% notified polymer.

DISCUSSION OF PROPERTIES

Reactivity

The notified polymer is expected to be stable under normal conditions of use. It contains functional groups that may crosslink in the presence of photo-initiators and UV light.

Dangerous Goods classification

Based on the submitted physical-chemical data in the above table the notified polymer is not classified according to the Australian Dangerous Goods Code (NTC, 2007). However, the data above do not address all Dangerous Goods endpoints. Therefore consideration of all endpoints should be undertaken before a final decision on the Dangerous Goods classification is made by the introducer of the polymer.

5. INTRODUCTION AND USE INFORMATION

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

The notified polymer will be imported at 80-90% concentration

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

| <i>Year</i> | <i>1</i> | <i>2</i> | <i>3</i> | <i>4</i> | <i>5</i> |
|---------------|----------|----------|----------|----------|----------|
| <i>Tonnes</i> | <15 | <15 | <15 | <15 | <15 |

PORT OF ENTRY

Brisbane, Sydney, Melbourne, Perth

IDENTITY OF MANUFACTURER/RECIPIENTS

Karpelo Holdings Pty Ltd

TRANSPORTATION AND PACKAGING

The notified polymer will be imported in 200 kg drums or 20 kg pails. The imported and reformulated products will be transported within Australia by road or rail.

USE

The notified polymer will be used as a component (<30%) of industrial coatings, adhesives and inks.

OPERATION DESCRIPTION

Coatings

At coating formulation sites, the notified polymer (at 80-90% concentration) will be manually weighed from the storage drums into a stainless steel blending tank and mixed with pigments, solvent and resin to form the mill base. The mill base will then be pumped into a large mixing vessel and mixed with additives and resin to form the finished product (<30% notified polymer). Following quality control analysis, the product coatings will be gravity fed into containers through a filter and filling lines.

On occasion, the coatings may be manufactured in batch mixers, where addition of the notified polymer will be semi-automated. This process will involve workers opening the pails or drums, weighing the required amount of notified polymer and manually charging the blending vessels. All processes will occur under exhaust ventilation.

The commercial/industrial coatings containing <30 % notified polymer may be applied by roller, brush or spray. Prior to application, the paint will be stirred and poured into trays or spray equipment.

Inks

At ink formulation sites, the notified polymer (at 80-90% concentration) will be manually weighed from the storage drums into a stainless steel blending tank and mixed with pigments and varnish (resin and solvent). The formulation processes will, in general, occur in a closed automated system with dedicated transfer lines. On occasion, ink manufacture may occur in batch mixers where addition of the polymer will be semi-automated. Following quality control analysis, the ink (<30% notified polymer) will be gravity fed into containers through a filter and filling lines. All processes will occur under local exhaust ventilation.

The ink containing the notified polymer at <30% concentration will be transferred directly from the containers to printing machines via automated lines. The printing machine will be fully automated and the printer is supplied with local fume extraction. An operator will connect and disconnect the ink containers and will also handle the printed substrate, once the ink is fully dried and cured.

Adhesives

At adhesive formulation sites, the notified polymer (at 80-90% concentration) will be manually weighed from the storage drums into a stainless steel blending tank and mixed with the other additives to form the finished product (<30% notified polymer). Following quality control analysis, the adhesive will be gravity fed into containers through a filter and filling lines. All processes will occur under exhaust ventilation.

The adhesives containing the notified polymer at <30% concentration may be applied by manual or automated means and by brush, roller or spray.

6. HUMAN HEALTH IMPLICATIONS

6.1. Exposure Assessment

6.1.1. Occupational Exposure

NUMBER AND CATEGORY OF WORKERS

| <i>Category of Worker</i> | <i>Number</i> | <i>Exposure Duration (hours/day)</i> | <i>Exposure Frequency (days/year)</i> |
|---------------------------|---------------|--|---|
| Transport and storage | 6-8 | 2-3 | 10-15 |
| Product formulation | 4 | 8 | 50 |
| Product application | 100 | 6 | 260 |

EXPOSURE DETAILS

Transport and storage workers may come into contact with the notified polymer as imported (80-90% concentration), or reformulated products (<30% notified polymer) only in the event of accidental rupture of containers.

At reformulation sites, dermal or ocular exposure to the notified polymer (at 80-90% concentration as imported or <30% concentration following formulation) may occur during transfer processes, when taking samples, during cleaning and maintenance of equipment and on occasions where manual mixing/dispensing is required. Exposure will be mitigated by the use of exhaust ventilation and personal protective equipment (PPE), including chemical goggles, impervious gloves and appropriate industrial clothing. Due to the nature of the processes and the expected low volatility of the notified polymer, inhalation exposure during reformulation is not anticipated.

At end-use sites, exposure to the inks containing the notified polymer (at <30% concentration) is expected to be limited by the automated and enclosed nature of the printing processes, the exhaust ventilation that will be in place and the PPE that will be worn by workers, such as goggles, impervious gloves and coveralls. Dermal or ocular exposure may occur during transfer processes and cleaning and maintenance. Inhalation exposure is not anticipated. Once cured, the notified polymer is not expected to be bioavailable and further dermal contact should not lead to exposure.

At end-use sites, exposure to the coatings and adhesives containing the notified polymer (at <30%

concentration) may occur during transfer, application and cleaning processes. The potential for exposure should be minimised through the use of PPE (goggles, impervious gloves, coveralls) by workers and use of respiratory protection during spray application. Inhalation exposure should be further mitigated through the use of spray booths. Once cured, the notified polymer is not expected to be bioavailable and further dermal contact should not lead to exposure.

6.1.2. Public Exposure

The notified polymer is intended for industrial use only. Therefore, the public may be exposed to the notified polymer (at up to 90% concentration) only in the event of a transport accident. The public may be exposed to the manufactured articles to which the inks/coatings/adhesives have been applied. However, once the material is cured, it will be unavailable for exposure.

6.2. Human Health Effects Assessment

No toxicity data were submitted.

Based on the high molecular weight (>1000 Da) of the notified polymer, the potential of the notified polymer to cross the gastrointestinal (GI) tract by passive diffusion or to be dermally absorbed after exposure is limited. However, the polymer contains a proportion of low molecular weight species (<1000 Da) that may be absorbed. In addition, given the hydrophobic nature of the polymer (and the lower molecular weight species), absorption across the respiratory tract is possible.

The notified polymer contains a functional group that has been associated with irritation and sensitisation effects (US EPA, 2010). The potential for these effects is likely to be limited by the high molecular weight of the polymer. However, sensitisation and/or irritant effects following exposure to the notified polymer cannot be completely ruled out, particularly due to the presence of low molecular weight species. In addition, the notified polymer contains a hazardous impurity/residual monomer at a concentration of <1%, which may be harmful in contact with skin or result in sensitisation by skin contact.

Health hazard classification

As no toxicity data were provided for the notified polymer, it cannot be classified according to the *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 2004).

Formulations containing the notified polymer may be classified as follows, based on the presence of a residual monomer:

R21 Harmful in contact with skin

R43 May cause sensitisation by skin contact

6.3. Human Health Risk Characterisation

6.3.1. Occupational Health and Safety

No toxicological data were provided for the notified polymer. However, due to the presence of a residual monomer, the imported product (80-90% notified polymer) may be harmful in contact with skin or result in sensitisation by skin contact. In addition, sensitisation and/or irritant effects following exposure to the notified polymer, as imported and in end-use products (at <30% concentration) cannot be ruled out. Therefore, steps should be taken to avoid exposure to the notified polymer.

Provided that control measures are in place to minimise worker exposure, including the use of automated processes, spray booths and the wearing of PPE when handling the notified polymer, the risk to the health of workers from use of the notified polymer is not considered to be unreasonable.

6.3.2. Public Health

The notified polymer is intended for use in industrial applications by qualified operators. The public may come into contact with products to which the inks/coatings/adhesives have been applied and cured. However, the notified polymer will be unavailable for exposure. Therefore, when used in the proposed manner, the risk to public health from the notified polymer is not considered to be unreasonable.

7. ENVIRONMENTAL IMPLICATIONS

7.1. Environmental Exposure & Fate Assessment

7.1.1. Environmental Exposure

RELEASE OF CHEMICAL AT SITE

The notified polymer is not manufactured in Australia; therefore there will be no release from this activity. The release of the notified polymer to the environment during importation, storage, and transport is unlikely. The most likely source of release to the environment during these activities will be a transport accident. Releases that do occur as a result of accidents are expected to be physically contained, absorbed on inert material, and either reused or sent for safe disposal.

An estimated 1% of annual import volume of notified polymer (150 kg) may be lost as result of spillages that occur during reformulation. The spillages are expected to be absorbed onto suitable materials and disposed of to landfill. Less than 1% of the notified polymer is estimated to remain as residues in import containers that will be collected by licensed waste contractors. The residues are expected to be cured prior to disposal to landfill. Equipment used to reformulate the notified polymer will be washed with water and equipment washes are estimated to contain up to 1% of the notified polymer. These washes are expected to undergo a treatment whereby the notified polymer will be removed and disposed of to landfill prior to release to sewers.

RELEASE OF CHEMICAL FROM USE

When coating formulations containing the notified polymer are applied by spray techniques, it is anticipated that approximately 20-30% of the coating product will form overspray and be collected as waste material. As the application of coatings will be conducted at industrial sites in designated spray booths, the overspray will be captured in the spray booth and on kraft paper or newspaper and is expected to be disposed of to landfill.

During industrial use (in coatings, inks and adhesives) of the notified polymer, it is estimated that <1% of the notified polymer will be spilt. These spills are expected to be contained and disposed to landfill. Less than 1% of the notified polymer may remain as residues in the end-use containers. These are expected to be disposed of to landfill.

Equipment used to apply coating and adhesive formulations may be rinsed with water or other appropriate solvent. It is estimated that up to 1% of notified polymer used in coatings (up to 70 kg), may be released to sewers in equipment washings. Equipment used to apply ink formulations is expected to be rinsed with recycled solvent. Equipment washings for inks are expected to be collected by solvent recyclers.

RELEASE OF CHEMICAL FROM DISPOSAL

Notified polymer in coatings is expected to share the fate of the substrate to which it has been applied and is predominantly expected to be disposed of to landfill. Notified polymer in coatings applied to metal articles may be thermally decomposed during metal reclamation processes at the end of the articles useful life. Notified polymer in inks applied to articles may be separated from the substrate during recycling processes, in which case the polymer is expected to partition to sludge and be disposed of to landfill.

7.1.2. Environmental Fate

No environmental fate data were submitted. The majority of the notified polymer is expected to be cured within an inert polymer matrix adhering to articles following its use in coating, ink and adhesive applications. Notified polymer that is disposed of to landfill is expected to remain associated with the substrate to which it has been applied and in its cured form it is not expected to be bioavailable or biodegradable. Notified polymer in solid waste disposed of to landfill is not likely to be mobile due to its expected limited water solubility. Any notified polymer that may be released to sewers, or separated from paper substrates during recycling, is expected to mainly partition to the solid phase due to its limited water solubility and high molecular weight, and be disposed of to landfill. The notified polymer will eventually degrade in landfill, or by thermal decomposition during metal reclamation processes, to form water, oxides of carbon and nitrogen.

7.1.3. Predicted Environmental Concentration (PEC)

The predicted environmental concentration (PEC) was not calculated as, based on its reported use pattern, ecotoxicologically significant quantities are not expected to be released to the aquatic environment.

7.2. Environmental Effects Assessment

No ecotoxicity data were submitted. Polymers without significant ionic functionality are generally of low concern to the environment. The notified polymer is not expected to cross biological membranes due to its high molecular weight and it is therefore not expected to bioaccumulate.

7.2.1. Predicted No-Effect Concentration

A predicted no-effect concentration (PNEC) has not been calculated for the notified polymer as, based on its reported use pattern, ecotoxicologically significant quantities are not expected to be released to the aquatic environment.

7.3. Environmental Risk Assessment

The risk quotient ($Q = PEC/PNEC$) for the notified polymer has not been calculated as release to the aquatic environment in ecotoxicologically significant quantities is not expected based on its reported use pattern. The majority of the notified polymer will eventually be disposed to landfill following its use in industrial coatings, inks and adhesives. In its cured state the notified polymer will be irreversibly bound into an inert matrix and is unlikely to leach or be bioavailable. On the basis of the assessed use pattern and assumed low hazard, the notified polymer is not considered to pose an unreasonable risk to the environment.

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