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

**FULL PUBLIC REPORT**

**Polymer in Polyplex 3499**

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 the Environment, Water, Heritage and the Arts.

For the purposes of subsection 78(1) of the Act, this Full Public Report may be inspected at our NICNAS office by appointment only at 334-336 Illawarra Road, Marrickville NSW 2204.

This Full 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  
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**FULL PUBLIC REPORT****Polymer in Polyplex 3499****1. APPLICANT AND NOTIFICATION DETAILS**

## APPLICANT(S)

Nuplex Industries (Aust) Pty Ltd (ABN 25 000 045 572)  
49-61 Stephen Road, BOTANY NSW 2019

## NOTIFICATION CATEGORY

Limited: Synthetic polymer with  $M_n \geq 1000$  Da.

## EXEMPT INFORMATION (SECTION 75 OF THE ACT)

Data items and details claimed exempt from publication:

Chemical Name, Other Name, CAS Number, Molecular Formula, Structural Formula, Polymer Constituents, Molecular Weight, Spectral Data, Concentration and Identity of Impurities, Details of Use, Introduction Volume and Identity of Manufacturer

## VARIATION OF DATA REQUIREMENTS (SECTION 24 OF THE ACT)

Variation to the schedule of data requirements is claimed as follows:

Boiling Point, Vapour Pressure, Water Solubility, Hydrolysis as a Function of pH, Partition Co-efficient, Adsorption/Desorption, Dissociation Constant, Particle Size, Flash Point, Flammability Limits, Autoignition Temperature, Explosive Properties and Reactivity

## PREVIOUS NOTIFICATION IN AUSTRALIA BY APPLICANT(S)

None

## NOTIFICATION IN OTHER COUNTRIES

None

**2. IDENTITY OF CHEMICAL**

## MARKETING NAME(S)

Polymer in Polyplex 3499

## ANALYTICAL DATA

Reference IR and GC spectra were provided.

**3. COMPOSITION**

DEGREE OF PURITY > 99%

## ADDITIVES/ADJUVANTS

<i>Chemical Name</i>	Benzene, ethenyl-		
<i>CAS No.</i>	100-42-5	<i>Weight %</i>	10-40%

## LOSS OF MONOMERS, OTHER REACTANTS, ADDITIVES, IMPURITIES

Degradation of the polymer from depolymerisation, hydrolysis, photo and thermal degradation is not expected to occur during normal use.

## DEGRADATION PRODUCTS

If exposed to extreme conditions some degradation may happen but this is considered an unlikely event. Any degradation products generated from the polymer in its final state, a hardened coating, are not expected to have any adverse effects on human health and environment.

## 4. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE AT 20°C AND 101.3 kPa: clear yellow viscous liquid

Property	Value	Data Source/Justification
Melting Point	< 10°C	Estimated
Density	1350 kg/m <sup>3</sup> at 20°C	Measured
Vapour Pressure	Not determined	Based on the high molecular weight of the polymer the vapour pressure is expected to be low.
Water Solubility	Not determined	The notified polymer is expected to be insoluble in water based on its highly hydrophobic structure.
Hydrolysis as a Function of pH	Not determined	Hydrolysis is not expected to occur in the environmental pH range of 4-9 despite the presence of hydrolysable functionalities in the notified polymer.
Partition Coefficient (n-octanol/water)	Not determined	The notified polymer is expected to partition from water to octanol based on its highly hydrophobic structure.
Adsorption/Desorption	Not determined	The notified polymer is expected to partition to soil from water based on its hydrophobic structure.
Dissociation Constant	Not determined	The notified polymer does not contain readily dissociable functions.
Particle Size	Not determined	The polymer is never isolated from solution.
Flash Point	Not determined	The notified polymer is never isolated from the manufacturing solution.
Flammability Limits	Not determined	Not expected to be highly flammable.
Autoignition Temperature	Not determined	The notified polymer is not expected to autoignite under normal conditions of use.
Explosive Properties	Not determined	Expected to be stable under normal conditions of use. The notified polymer contains no functional groups that would imply explosive properties.

## DISCUSSION OF PROPERTIES

*Reactivity*

The polymer is stable under normal environmental and operating conditions.

## 5. INTRODUCTION AND USE INFORMATION

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

The notified polymer will be manufactured in Australia, or imported, as a 60-90% dispersion in styrene.

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

Year	1	2	3	4	5
Tonnes	30-100	30-100	30-100	30-100	30-100

## PORT OF ENTRY

Sydney

## IDENTITY OF MANUFACTURER/RECIPIENTS

Nuplex Industries (Aust) Pty Ltd

## TRANSPORTATION AND PACKAGING

Following manufacture, the resin solution containing the notified polymer will be packed off to 1000 L Intermediate Bulk Containers (IBC's) or 200 L steel drums and then transferred to Nuplex Warehouse. Imported resin solutions in steel drums will be carted from the wharf to a Nuplex storage facility.

## USE

Component for composite fabrication.

## OPERATION DESCRIPTION

*Manufacturing*

At the manufacturing site, the raw materials will be charged to the reactor and stirred to manufacture the notified polymer. All monomer vapours will be condensed and returned through piping to the sealed reactor. Samples will be collected via a valve for quality control testing. After polymerisation is complete, the resulting dispersion containing 60-90% of the notified polymer will be pumped through a sealed filter into intermediate bulk containers or steel drums for distribution.

*Reformulation*

During reformulation the dispersion will be pumped to mixing tanks where it will be blended with other raw materials to produce the finished resin products containing the notified polymer at 60-90%. The reformulation process will be performed under controlled conditions. The product will then be packed off and distributed to customers.

*Composite Fabrication*

The finished resin containing the notified polymer at 60-90% will be poured into a dipping bath with a catalyst to initiate curing. Composite fabrication then occurs by passage of substrates through the dipping bath using automated machinery.

**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	1	1	10
Warehouse/Store	1-3	8	30
Manufacturing/Blending	1-3	2	50
QC/Testing	1	1	50
Packaging	1	1	50
Dispatch	1	< 1	200
End user - Industrial	3-4	8	200

## EXPOSURE DETAILS

Transport and distribution workers are not expected to be exposed to the notified polymer except in an unlikely event of an accident. In case of such accidental exposure, main routes of exposure would be dermal and ocular. However, the likelihood of such an accidental exposure is minimal.

*Manufacture and Reformulation*

Dermal and ocular exposure to the notified polymer may occur during certain processes involving the notified polymer at 60-90%, including manufacturing and blending, sampling and analysis, reactor cleaning and packaging. However, exposure to significant amounts of the notified polymer should be limited due to the expected use of engineering controls (automated manufacturing/blending process in an enclosed system and local exhaust ventilation) and personal protective equipment (overalls, face masks, gloves, boots and safety glasses) worn by workers. Inhalation exposure is unlikely due to expected low volatility of the notified

polymer.

#### *Composite Fabrication*

Dermal and ocular exposure may occur during addition of the finished resins (containing the notified polymer at 60-90%) to the dipping baths and composite fabrication. However, exposure should be reduced by the expected use of personal protective equipment and engineering controls (local exhaust ventilation and automated process).

After the resins containing the notified polymer are applied for glass fibre reinforced composites, no exposure to the notified polymer is expected as it will be entrapped and immobile as part of an inert and hardened coating.

#### **6.1.2. Public exposure**

The notified polymer will not be available to the public. Members of the public may make dermal contact with articles composed with the notified polymer. However, the risk to public health will be negligible because the notified polymer will be entrapped within a cured composite where it is considered immobile and inert.

### **6.2. Human health effects assessment**

No toxicity data were submitted.

#### *Toxicokinetics and Distribution*

Based on the high molecular weight ( $M_n > 1000$  Da), low water solubility and expected high lipophilicity, absorption across biological membranes is expected to be low. Systemic toxicity after dermal exposure to the notified polymer is therefore expected to be low.

#### *Irritation and Sensitisation*

The notified polymer contains a pendant acrylate group that is a structural alert for irritation and sensitisation (US EPA 2002). Given the notified polymer contains a high percentage of low molecular weight species ( $< 1000$  Da) it may possess some irritating and sensitising properties.

#### **Health hazard classification**

Based on a structural alert and high percentage of low molecular weight species, the notified polymer may have irritation and skin sensitisation properties.

Based on the information provided, the notified polymer cannot be classified as a hazardous substance according to the *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 2004).

### **6.3. Human health risk characterisation**

#### **6.3.1. Occupational health and safety**

The notified polymer may cause irritation and sensitisation.

Accidental oral and/or dermal exposure to the notified polymer (at 60-90%) may occur during manufacture, reformulation and composite fabrication. These processes will be largely automated and conducted in enclosed systems, and workers are expected to use personal protective equipment such as overalls and safety glasses. These control measures should reduce the potential for irritancy and sensitisation.

Overall, given the control measures in place, the risk to workers presented by the notified polymer is not considered unacceptable.

#### **6.3.2. Public health**

Risk for public health is not considered unacceptable due to the negligible exposure.

## **7. ENVIRONMENTAL IMPLICATIONS**

### **7.1. Environmental Exposure & Fate Assessment**

#### **7.1.1 Environmental Exposure**

##### **RELEASE OF CHEMICAL FROM SITES**

The notified polymer will be both imported and manufactured in Australia. Releases from the local manufacture of dispersions of the notified polymer in styrene will mainly occur from the cleaning of equipment. Cleaning will be carried out by flushing with styrene and is estimated to result in losses of < 0.5% of the notified polymer produced. The resulting waste dispersion of styrene and the notified polymer will be transferred to settling tanks where the notified polymer will precipitate to form sludge, followed by collection and disposal to landfill.

The produced polymer will be further formulated with solvents and additives to produce finished resin dispersions for use in the composite industry, which will be performed in closed systems. Releases as trade waste can only occur from the cleaning of pumps, lines and mixing vessels and are estimated to be < 1%. Again styrene will be used to flush equipment and the waste notified polymer will be collected and disposed of to landfill. The used packaging will be sent to a registered drum facility where it is recycled for further use, and the residues will be most likely collected and sent to landfill.

##### **RELEASE OF CHEMICAL FROM USE**

Given the engineering controls in place no direct environmental release of the notified polymer from end use is predicted. Any composite fragments or solid waste containing the notified polymer (from the used filters and empty packaging etc) are expected to be disposed of to landfill. The cleaning of equipment and of containers is expected to release < 3% of the notified polymer into the sewer system. In the sewage treatment plant, the notified polymer is expected to absorb to sediment sludge (based on its hydrophobicity), and be removed and sent to landfill.

##### **RELEASE OF CHEMICAL FROM DISPOSAL**

Most of the notified polymer will be irreversibly bound within a hardened composite coating following the composite fabrication, becoming immobile and inert, and ultimately end up in landfill at the end of its useful life.

#### **7.1.2 Environmental fate**

No environmental fate data were submitted. The notified polymer is not expected to be readily biodegradable. In landfill, the notified polymer will bind to soil and undergo slow biotic and abiotic degradation processes, forming water, inorganic acid and oxides of carbon and nitrogen.

#### **7.1.3 Predicted Environmental Concentration (PEC)**

As there are no significant releases of the notified polymer to the aquatic environment, a PEC has not been calculated.

### **7.2. Environmental effects assessment**

No ecotoxicity data were submitted

#### **7.2.1 Predicted No-Effect Concentration**

A PNEC could not be calculated in the absence of ecotoxicity data for the notified polymer.

### 7.3. Environmental risk assessment

Based on the proposed use, the release of the notified polymer to the environment is expected to be very low. The use pattern of the notified polymer in the manufacture of hardened composite mouldings will result in limited exposure to the aquatic environment. While no ecotoxicity data are available, due to limited release to water it is unlikely that the notified polymer would exist at levels that could pose a risk to aquatic organisms. The high molecular weight indicates a low potential for bioaccumulation and bioavailability.

Based on the limited potential for exposure and the expected low ecotoxicity, the notified polymer is not considered to pose a risk to the environment when it is imported, manufactured, reformulated, transported and used in the proposed manner.

## 8. CONCLUSIONS AND REGULATORY OBLIGATIONS

### Hazard classification

Based on the available data the notified polymer cannot be classified as hazardous 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 unacceptable risk to the health of workers.

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

### Environmental risk assessment

On the basis of the reported use pattern, the notified polymer is not considered to pose a risk to the environment.

### Recommendations

#### CONTROL MEASURES

##### Occupational Health and Safety

- Employers should implement the following safe work practices to minimise occupational exposure during handling of the notified polymer during manufacture, reformulation and composite fabrication:
  - Avoid skin and eye contact
- Employers should ensure that the following personal protective equipment is used by workers to minimise occupational exposure to the notified polymer during manufacture, reformulation and composite fabrication:
  - Protective gloves
  - Long-sleeved protective clothing
  - Safety glasses

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 chemical 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 chemical 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(2) of the Act; if
  - the function or use of the chemical has changed from component for composite fabrication, or is likely to change significantly;
  - the amount of chemical being introduced has increased from 100 tonne per year, or is likely to increase, significantly;
  - the method of manufacture of the chemical in Australia has changed, or is likely to change, in a way that may result in an increased risk on occupational health and safety, or the environment;
  - additional information has become available to the person as to an adverse effect of the chemical 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.

No additional secondary notification conditions are stipulated.

### *Material Safety Data Sheet*

The MSDS of the products 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.

**BIBLIOGRAPHY**

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