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NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME (NICNAS)

FULL PUBLIC REPORT

Polymer in Setalux 1157 XS-54

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Street Address:	334 - 336 Illawarra Road MARRICKVILLE NSW 2204, AUSTRALIA.
Postal Address:	GPO Box 58, SYDNEY NSW 2001, AUSTRALIA.
TEL:	+ 61 2 8577 8800
FAX	+ 61 2 8577 8888.
Website:	www.nicnas.gov.au

Director
NICNAS

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1. APPLICANT AND NOTIFICATION DETAILS

APPLICANT(S)
Nuplex Industries (Australia) Pty Ltd (ABN 25 000 045 572) of 49-61 Stephen Rd, Botany, NSW 2019

Akzo Nobel Car Refinishes Pty Ltd (ABN 26 087 571 882) of 269 Williamstown Rd, Port Melbourne, VIC 3207

NOTIFICATION CATEGORY
Polymer of Low Concern

EXEMPT INFORMATION (SECTION 75 OF THE ACT)
Data items and details claimed exempt from publication:
Chemical Name, Other Names, Molecular and Structural Formulae, Molecular Weight, Polymer Constituents, Residual Monomers/Impurities, specified Use Details, and Manufacture/Import Volume.

VARIATION OF DATA REQUIREMENTS (SECTION 24 OF THE ACT)
No variation to the schedule of data requirements is claimed.

PREVIOUS NOTIFICATION IN AUSTRALIA BY APPLICANT(S)
None

NOTIFICATION IN OTHER COUNTRIES
None

2. IDENTITY OF CHEMICAL

MARKETING NAME(S)
Polymer in Setalux 1157 XS-54

CAS NUMBER
None allocated

MOLECULAR WEIGHT (MW)
Number Average Molecular Weight (Mn) >1,000 Da

REACTIVE FUNCTIONAL GROUPS
The notified polymer contains only low concern functional groups.

3. PLC CRITERIA JUSTIFICATION

Criterion	*Criterion met*
Molecular Weight Requirements	Yes
Functional Group Equivalent Weight (FGEW) Requirements	Yes
Low Charge Density	Yes
Approved Elements Only	Yes
Stable Under Normal Conditions of Use	Yes
Not Water Absorbing	Yes
Not a Hazard Substance or Dangerous Good	Yes

The notified polymer meets the PLC criteria.

4. PHYSICAL AND CHEMICAL PROPERTIES

Appearance at 20°C and 101.3 kPa	Clear and clean liquid (Solution polymer Setalux 1157 XS-54)
Melting Point/Glass Transition Temp	75°C
Density	1,000 kg/m^3 at 25°C (Setalux 1157 XS-54)
Water Solubility	≤1.0 mg/L at 20°C (LOD) Flask Method based on EU and OECD guidelines. Non-Purgeable Organic Carbon (NPOC) analysis was used to quantify the mass concentration of the substance in aqueous solutions at pH 4, 7 and 9, and was found to be less than or equal to the limit of detection (1.0 mg/L).
Dissociation Constant	Not determined. The notified polymer is expected to have a pKa of about 4.66 based on the small amount of relevant functional groups present.
Reactivity	Stable under normal environmental conditions. Depolymerisation, hydrolysis, photodegradation or thermal degradation may occur under extreme conditions.
Degradation Products	None under normal conditions of use

5. INTRODUCTION AND USE INFORMATION

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

Year	*1*	*2*	*3*	*4*	*5*
Tonnes	10-50	10-50	10-50	10-50	10-50

USE AND MODE OF INTRODUCTION AND DISPOSAL

Mode of Introduction

The notified polymer will be imported by Akzo Nobel Car Refinishes Pty Ltd as a component of finished solvent-based paint and paint-related products in 1 L, 3 L or 3.75 L steel cans.

Nuplex Industries (Australia) Pty Ltd does not intend to import, manufacture or reformulate the notified polymer in the immediate future, although local manufacture may occur in the future if there is sufficient market demand. This manufacture would occur at the Nuplex facility in Botany, NSW.

Reformulation/manufacture processes

No reformulation will take place in Australia.

Local manufacture may occur at the Nuplex site in Botany, NSW. Manufacture would take place by polymerisation in closed vessels, and the completion of each batch will take approximately 16 hours. Monomers and solvents would be charged to the reactor (up to 1,000 L) either via pumping equipment (from bulk tanks) or via vacuum-operated drum spears. The mixture would be stirred, and controlled thermal conditions applied to ensure appropriate polymerisation. Solvent and monomer fumes would be passed through a condenser and returned to the reaction through sealed piping. Once polymerisation was complete, the polymer dispersion would be pneumatically pumped through a sealed filter into intermediate bulk storage tanks (20-30 tonnes) or directly into 1,000 L IBCs or 200 L drums. The filter would be equipped with an extraction system to capture solvent vapours. Quality control technicians would sample the product to ensure that it is within specification.

The filters, reactor and product tanks would be cleaned after manufacture and packing was complete. This would be carried out using solvents, which would be collected for re-use in later batches.

After packing, the containers would be transferred to a warehouse for storage prior to dispatch to customer sites. At customer sites, the dispersion would be pumped from its container into mixing

tanks, where it would be blended with other ingredients to produce paints.

Use
The notified polymer will be used in solvent-based paint and paint-related products for automotive applications.

6. HUMAN HEALTH IMPLICATIONS

6.1. Exposure Assessment

OCCUPATIONAL EXPOSURE
Imported paints containing the notified polymer will not be repackaged or reformulated in Australia. Paints containing the notified polymer will be used in automotive repair shops and by car manufacturers. The notified polymer is formulated with hazardous organic solvents (butyl acetate, xylene, ethyl benzene and others). Application of paints containing the notified polymer to surfaces will be primarily by spray painting. Spray painters may be exposed to the notified polymer through dermal, inhalation and ocular routes, and generally wear a breathing mask, safety goggles, gloves, safety shoes, and painting overalls. Exposure to the notified polymer is possible through splashes, inhalation of spray mist and/or solvent/monomer vapour, and through dermal contact with wet paint. However, under conditions where spray paint is applied in a ventilated spray booth by trained workers wearing protective equipment, the extent of possible exposure will be minimal. In automotive repair shops, it is estimated that an individual spray-painter might be exposed to the notified polymer for a maximum of 5 hours/week with each exposure lasting <1 hour, as each painter spends considerable time engaged in surface preparation.

During the drying of surfaces coated with paint containing the notified polymer, exposure to vapours containing residual monomers and hazardous solvents is also possible.

Dermal and ocular exposure may potentially occur during any possible manufacturing of dispersions of the notified polymer. Additionally, inhalation exposure to residual monomer vapours is possible during manufacture. However, exposure to significant amounts of the notified polymer or residual monomers is limited because of the closed vessels and vapour extraction used during manufacture, and because of the engineering controls and personal protective equipment worn by workers. Exposure is possible at four points during the manufacturing process:

1. Sampling of the notified polymer dispersion from the reactor will be carried out through sampling valves after polymerisation is complete. Workers will wear protective overalls, gloves, safety boots and safety glasses.
2. During the cleaning of manufacturing equipment, including filters, reactor and product tanks, workers will wear protective overalls, gloves, safety boots and safety glasses.
3. Accidental spills during filtration and packing. Workers in these areas will wear protective equipment to prevent possible exposure.
4. Quality control technicians may experience dermal exposure to the notified polymer during analytical work. Technicians will wear laboratory coats, safety glasses, safety footwear and gloves.

Workers at all stages of the paints' life cycle will make dermal contact with dried paint containing the notified polymer. However, in this state the notified polymer will be cured into an inert matrix from which it will be unavailable to cause exposure. Exposure to residual monomers from dried paint is expected to be negligible, as the monomeric species are at low levels in the polymer, are volatile and would be lost from the surface during drying.

PUBLIC EXPOSURE
The notified polymer is intended only for use in the automotive industry and as such, direct exposure of the public to the notified polymer is not expected. Members of the public will make dermal contact with dried paint containing the notified polymer, such as on automotive body panels. However, in this state the notified polymer will be cured into an inert matrix from which it will be unavailable to cause exposure. Exposure to residual monomers from dried paint is expected to be negligible, as the

monomeric species are at low levels in the polymer, are volatile and would be lost from the surface during drying.

6.2. Toxicological Hazard Characterisation

No toxic effects are known, and no toxicological data were provided by the notifier for a PLC notification. Given the fact that the notified polymer meets the PLC criteria, it is unlikely to cause significant toxicity. The notified polymer is not known to cause health conditions or to exacerbate any existing health conditions.

Given its relatively high polydispersity index, a wide molecular weight range is present in the notified polymer contained in imported paint products (<500 to >10,000 Da). Thus, generalisations regarding its potential toxicological properties based on its molecular weight should only be made with justification. Only a small proportion of the notified polymer is within the bioavailable size range: <5% is of molecular weights <1,000 Da, and <1% is <500 Da. Given the small proportion of methacrylic acid monomer in the notified polymer, these low molecular weight species are likely to be unionised at physiological pH, and insoluble in water. Absorption following oral, dermal or inhalation exposure is unlikely.

The notified polymer solution also contains a high level of residual methacrylate monomers (total concentration of "esters of methacrylic acid" is 0-10%, according to the Nuplex MSDS). According to the HSIS (http://www.nohsc.gov.au/applications/hsis), individual methacrylates are classified as Hazardous at ≥1%: Xi; R43 (may cause sensitisation by skin contact). Cross-sensitisation reactions between different methacrylate monomers is documented, and can arise from exposures to residual monomers below 1% (Kanerva L. *Acta Odontol Scand*. 2001; 59(5):320-9). Therefore, while the individual concentrations of residual methacrylate monomers are insufficient for the notified polymer solution to be classified as a sensitisation hazard, repeated exposure could potentially lead to sensitisation.

6.3. Human Health Risk Assessment

OCCUPATIONAL HEALTH AND SAFETY

The OHS risk from the notified polymer itself is unlikely to be significant, as it corresponds to the PLC criteria, and because it is comprised of a high proportion of species with molecular weights >1,000 Da. However, the notified polymer solution contains significant levels of residual methacrylate monomers, which are potentially a risk to workers. The Nuplex MSDS for the notified polymer solution describes the notified polymer solution as R43, due to "esters of methacrylic acid, 0-10%".

Sensitisation due to residual methacrylate monomers is a possible health risk for workers who are routinely exposed to paints containing methacrylate monomers. Workers may be exposed to methacrylate monomers primarily through dermal contact and inhalation exposure (vapour). Dermal exposure that could lead to sensitisation can be easily controlled with the use of appropriate PPE such as gloves and overalls.

The NOHSC exposure standards for exposure to methyl methacrylate (MMA) vapour are an 8-hour TWA of 50 ppm (208 mg/m^3) and a 15-min STEL of 100 ppm (416 mg/m^3). While the vapour concentration of a single residual monomeric species in the notified polymer solution is unlikely to reach these limits, the combined presence of several monomeric species may, especially under conditions of poor ventilation.

An extreme example: paint containing 70% notified polymer × 1% residual methacrylate monomer concentration (g/100ml) × 10 × 3.75 L container = 37.5 g residual methacrylate monomer per 3.75 L container. If a whole container of paint is used in a closed room of dimensions 5×5×3 m = 75 m^3, the airborne concentration of methacrylates could potentially reach 37,500 mg/75 m^3 = 500 mg/m^3, which exceeds both the 8-hour TWA and the 15-min STEL for MMA.

This is an extreme situation, as some sort of ventilation is also likely to be applied, due to the organic solvents used. Vapours of methacrylate esters have a distinctive odour (generally detectable below 4 mg/m^3), so high concentrations are unlikely to be well tolerated by workers. In addition, the use of such a high volume of paint in a closed space of this volume is unlikely to be a usual use scenario, given that spray painting is only likely to be carried out for <1 hour each day.

Appropriate local ventilation (such as a spray booth) and general ventilation should be applied at sites

where paints containing the notified polymer are handled and used. In addition, respiratory protection should be worn by spray applicators, such as an activated carbon mask or full-face respirator. Such respiratory protection is expected to be available at professional spray painting facilities, as it is required for protection of workers against many of the solvents present in paint formulations. Other PPE should also be used during spray painting, including safety goggles, latex gloves, boots and overalls. Given the use of these controls, the expected risk to spray painting workers from the use of paints containing the notified polymer is likely to be low.

During manufacture of notified polymer dispersions, the likely exposure of workers at the various stages of the process is likely to be low, as a result of emission controls, manufacturing in a closed system and as a result of the PPE worn by workers. Exposure to residual monomers is expected to be low, as these workers will be trained in the handling of the monomeric raw materials that are used to manufacture the notified polymer.

PUBLIC HEALTH

The notified polymer is intended for use by professional spray painters in the automotive industry, and will not be sold to the public. With the exception of transport accidents, the public will only be exposed to the notified polymer within dried paint on vehicles. However, in this state, the notified polymer will be bound within an inert matrix and unavailable to cause any risk to public health. Therefore, for the notified use, the introduction of the notified polymer is unlikely to present any risk to public health.

7. ENVIRONMENTAL IMPLICATIONS

7.1. Exposure Assessment

ENVIRONMENTAL RELEASE

Environmental release of the notified polymer is summarised in the following table:

Source of release	% Annual Volume	Released to
Residual notified polymer within 1, 3, and 3.75 L Steel Import Containers	≤5%	Landfill
Accidental Spills	≤1%	Landfill
Overspray from application	≤30%	Landfill
Cleaning of application equipment	≤1%	Landfill
Applied notified polymer	>63%	Landfill or Incinerator

ENVIRONMENTAL FATE

According to the proposed use pattern of the notified polymer, release to the aquatic environment is not expected. Rather, it is expected that the total quantity of release notified polymer (37% of total annual import volume) would be disposed of to landfill. The main portion of this is from overspray, where traditional methods will be used to trap and remove the polymer. In landfill, the cured notified polymer is expected to be immobile and remain associated with soil and sediment. Eventually, the notified polymer should degrade by biotic and abiotic processes to form simple carbon based compounds.

Any notified polymer that is disposed of by incineration is expected to be thermally decomposed to form various oxides of carbon and water.

The majority of the notified polymer used in automotive finishes will eventually be incorporated in metal recycling programs or sent to landfill for disposal following its lifecycle. During reclamation, the notified polymer would be destroyed in furnaces and converted to water vapour and oxides of carbon.

7.2. Environmental Hazard Characterisation

No ecotoxicological data were submitted. PLCs without significant ionic functionality are of low concern to the aquatic environment.

7.3. Environmental Risk Assessment

A low potential for release of the notified polymer to the aquatic environment is expected, with most

wastes generated being landfilled or incinerated. Within the landfill environment, the notified polymer is likely to degrade over time to simpler compounds of carbon. Given the lack of release to the aquatic environment, a PEC/PNEC ratio cannot be determined.
In conclusion, the risk posed to the environment by the notified polymer is expected to be low when used in the manner and levels indicated by the notifier.

8. CONCLUSIONS

8.1. Level of Concern for Occupational Health and Safety

The notified polymer does not pose a significant risk to occupational health and safety under the conditions of the occupational settings described.

8.2. Level of Concern for Public Health

There is no significant risk to public health when used in the proposed manner.

8.3. Level of Concern for the Environment

The notified polymer is not considered to pose a risk to the environment based on its reported use pattern.

9. MATERIAL SAFETY DATA SHEET

9.1. Material Safety Data Sheet

The notifier has provided MSDS as part of the notification statement. The accuracy of the information on the MSDS remains the responsibility of the applicant.

10. RECOMMENDATIONS

CONTROL MEASURES
Occupational Health and Safety

- During spray application of the notified polymer, the following personal protective equipment (PPE) should be worn:
  - *Respiratory protection, such as an activated carbon mask or full-face respirator.Safety goggles, latex gloves, boots and overalls.*

- Workers directly involved in the manufacturing of the notified polymer should wear the following PPE:
  - *Safety goggles, latex gloves, boots and overalls*

- Adequate local and general ventilation should be applied wherever:
  - *Open containers of paints containing the notified polymer are handled.*
  - *Spray or other method of application of products containing the notified polymer is carried out.*
  - *Painted surfaces are dried.*
  - *The notified polymer is manufactured, or handled.*

- 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.

Disposal

- The notified polymer should be disposed of by incineration or to landfill after curing.

Emergency procedures

- Spills/release of the notified polymer should be handled by physical containment, collection and subsequent safe disposal.

10.1. 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 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.