File No: LTD/1008

5 July 2002

NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME (NICNAS)

FULL PUBLIC REPORT

Polymer in RE3195

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Director
Chemicals Notification and Assessment

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FULL PUBLIC REPORT

Polymer in RE3195

1. APPLICANT AND NOTIFICATION DETAILS

APPLICANT(S)
Akzo Nobel Pty Ltd
BASF Akzo Nobel Automotive OEM Coatings Pty Ltd
51 McIntyre Road, Sunshine VIC 3020

NOTIFICATION CATEGORY
Limited: Polymer with number average molecular weight > 1000

EXEMPT INFORMATION (SECTION 75 OF THE ACT)
Data items and details claimed exempt from publication:

Chemical Name
Molecular and Structural formulae
CAS Number
Molecular Weight
Spectral Data
Purity
Hazardous/non-hazardous impurities
Additives/adjuvants
Import/manufacture volume
Manufacturing process and site
Identity and composition of the polymer

NOTIFICATION IN OTHER COUNTRIES
No details provided

2. IDENTITY OF CHEMICAL

MARKETING NAME(S)
Polymer in RE3195

CAS NUMBER
None allocated

METHODS OF DETECTION AND DETERMINATION

ANALYTICAL METHOD IR and GPC data

3. INTRODUCTION AND USE INFORMATION

MODE OF INTRODUCTION OF NOTIFIED CHEMICAL (100%) OVER NEXT 5 YEARS
The polymer solution will be manufactured and reformulated at one site.

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

Year	*1*	*2*	*3*	*4*	*5*
Tonnes	<20	<20	<20	<20	<20

USE

The notified polymer is a component in an automotive pigment paste. The pigment paste will be supplied to a car manufacturer as part of a primer for application onto car bodies and parts.

4 PROCESS AND RELEASE INFORMATION

4.1. Distribution, Transport and Storage

PORT OF ENTRY

Not applicable – manufactured in Australia

IDENTITY OF MANUFACTURER/RECIPIENTS

The notified polymer will be manufactured as part of a polymer solution called RE3195 (intermediate) and re-formulated into pigment paste at one site. It will be applied as a surface coating to cars at a car manufacturing facility.

TRANSPORTATION AND PACKAGING

The blended polymer is transported in 200 kg drums by road from the manufacturing/formulation site to the customer site.

4.2. Operation Description

During manufacturing, the raw materials are charged into closed vessels for reaction. All processing takes place in the manufacturing facilities in enclosed and controlled environments. After manufacture, the polymer is blended with additional components to form a primer, which is placed into sealed 200 kg drums for storage and transport to the customer. At customer facilities, the primer is pumped into an application tank via a vacuum pump, mixed with finished emulsion and water. The primer is applied to cars and car parts by a dipping process, then cured by oven baking.

4.3. Release

RELEASE OF CHEMICAL AT SITE

Release of the notified polymer to the environment during manufacturing is expected to be minimal owing to the automated nature of the manufacturing processes. Spills occurring during manufacturing will be contained in a bunded area and collected for disposal. Waste water streams derived from the manufacturing process are passed through an interceptor pit and are contained in the pit for treatment prior to discharge to sewer as trade waste. Treatment involves adding a caustic agent to waste water, which flocculates the notified polymer into solid waste suitable for disposal. The notifier estimates that up to 80 kg of notified polymer waste may be generated for disposal during the formulation process. Under normal circumstances there will be no rejected product, however, in a rare event up to 2000 kg of rejected product may be present for disposal. This product is normally incinerated.

RELEASE OF CHEMICAL FROM USE

At the customer site, the application process is fully contained. Cars are coated in a dip tank, and excess paint is washed from the car after exiting the tank. These washings cascade back into the application tank, which is cleaned every year. Cleaning involves transferring the contents of the tank to storage, and then washing up to 1000 litres of bath paint to their trade waste pit. Spills and leaks occurring during normal operations are also washed into the trade waste pit. The notifier estimates that up to 130 kg per year of notified polymer may end up in the trade waste pit as a result of tank cleaning and operational spills and leaks. The waste is processed by flocculation and settling of the polymer. The polymer is not volatile and hence no release to the atmosphere is expected. Up to 100 kg of polymer may remain as residues in drums.

No release of the polymer into the environment is expected once the primer is used to coat motor vehicles. The notified polymer will be incorporated into the primer matrix, which upon curing, will become inert.

4.4. Disposal

Solid wastes generated during manufacturing and formulation of the polymer product are removed from the interceptor pit and taken to an appropriate landfill site for disposal. The remaining waste water is released to the sewer in accordance with the statutory license requirements for the site.

Waste generated at customer sites during paint application will be disposed of by a licensed waste management company. It is expected that the company will separate the solids and liquids for disposal into landfill and by incineration, respectively. Drum residues are also disposed of through a waste disposal contractor, who normally incinerate any residues.

5. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE AT 20°C AND 101.3 kPa	The polymer solution RE3195 is an amber viscous liquid
MELTING POINT	Melting point is not determinable
BOILING POINT	The polymer decomposes before boiling
DENSITY	1050 kg/m^3 (polymer solution RE3195)
VAPOUR PRESSURE	Not determined
Remarks	The polymer is a solid and is not volatile.
WATER SOLUBILITY	84 mg/L at 20°C
Remarks	The notified polymer is deemed to be soluble in water, but its solubility is enhanced in water by the presence of co-solvents. The notified polymer is solubilised due to cationic nitrogen groups. At high pH, the aqueous solubility of these groups is reversed due to free amine formation. A water solubility test was conducted on a similar polymer (polymer in RE3200) to the notified polymer. This involved drawing a film of the polymer down a glass panel and drying the material in an oven. The dried film was removed from the glass plate and 300 mg was obtained. The 300 mg of polymer was added to deionised water and shaken vigorously for 5 minutes. The solution was allowed to sit for 5 minutes before filtering. The filtered sample was dried and weighed to calculated solubility.
TEST FACILITY	Sunshine Analytical R & D Laboratory, 2002
HYDROLYSIS AS A FUNCTION OF PH	Not determined
Remarks	The polymer contains ester and carbamate groups but appears to be stable in water and should not hydrolyse in the environmental pH range (4-9).
PARTITION COEFFICIENT (n-octanol/water)	Not determined
Remarks	The partition coefficient is expected to be low given the polymer's relatively high water solubility.
ADSORPTION/DESORPTION – screening test	Not determined
Remarks	The polymer has the potential to leach to ground water given its relatively

	high water solubility. However, given its high molecular weight, the mobility is expected to be low.
DISSOCIATION CONSTANT	Not determined
Remarks	The polymer is a fully dissociated cationic salt.
PARTICLE SIZE	
Remarks	Not applicable, as the polymer is always present in solution.
FLASH POINT	Not relevant - polymer manufactured as aqueous solution
FLAMMABILITY LIMITS	Not Flammable
AUTOIGNITION TEMPERATURE	Not provided
EXPLOSIVE PROPERTIES	None expected. The polymer does not exist as a powder, a dust of which could be expected to be combustible
REACTIVITY	
Remarks	No decomposition occurs up to 150ºC. Thermal degradation occurs above this but the specific temperature is unknown. It is incompatible with strong mineral acids, strong alkalis and strong oxidising agents.

6. TOXICOLOGICAL INVESTIGATIONS

None Provided.

7. ENVIRONMENT

7.1. Environmental fate

No environmental fate data were provided.

7.2. Environmental Effects

No ecotoxicological data were provided.

8. RISK ASSESSMENT

8.1. Environment

8.1.1. Environment – exposure assessment

No environmental exposure of the notified polymer is expected when the polymer is incorporated into the primer product and used to coat motor vehicles because the polymer will be cured to form a hard surface coating, which will be inert. The primer will also be covered by subsequent layers of surface coating. At the end of their useful life, the metal panels coated with the primer are likely to be either recycled for steel reclamation or placed into landfill.

Up to 200 kg of the notified polymer may be generated as waste each year during manufacturing, formulation, or application of the end coating product. Waste generated at both the production and application sites are passed through interceptor pits and contained for treatment prior to discharge to the sewer as trade waste.

The notified polymer is water soluble due to the presence of cationic nitrogen groups. Its solubility is enhanced in water by the presence of co-solvents. However, at alkaline pH, the aqueous solubility of these groups is reversed. Consequently, in the interceptor pits, which are treated with caustic agents, the polymer is not expected to remain in the water compartment, but rather is expected to flocculate and form solids. These can be removed for disposal in landfill, where the polymer is not expected to leach into the soils as it will occur in a dried and polymerised form. While the substance is not expected to be readily degradable, it will undergo slow degradation through both biotic and abiotic processes.

Some of the notified polymer may be destroyed by incineration. For example, on rare occasions, up to 2000 kg of rejected product may be present for disposal, normally by incineration. Container residues, disposed of through a licensed waste disposal contractor, are also expected to be incinerated. Recycled car panels containing the polymer are likely to be destroyed in blast furnaces thereby incinerating the polymer in the primer. Incineration of the polymer is expected to destroy the polymer, producing water vapour and oxides of carbon and nitrogen.

Given its high molecular weight, the polymer is not expected to cross biological membranes and bioaccumulate (Connell, 1990).

8.1.2. Environment – effects assessment

No ecotoxicological data were provided. However, under normal usage, the polymer is not expected to enter the aquatic compartment or pose a threat to aquatic organisms

8.1.3. Environment – risk characterisation

The notified polymer will be used as a component in a primer coating for cars. Consequently, most of the polymer will be incorporated into the primer matrix which, upon curing, will become inert. The metal panels coated with the primer are likely to be either recycled for steel reclamation or placed into landfill at the end of their useful life. When recycled the polymer would be destroyed in blast furnaces.

Approximately 200 kg of polymer waste may be generated during manufacturing, formulation, and application of the primer product each year. These wastes will be disposed of in landfill or by incineration. Incineration will destroy the polymer producing water vapour and oxides of carbon, nitrogen and sulphur. In landfill, the polymer will undergo slow degradation through both biotic and abiotic processes. Under normal usage, the notified polymer is not expected to enter the aquatic environment and to pose a hazard to aquatic organisms. In any case, its high molecular weight would preclude movement across biological membranes, and the polymer should not bioaccumulate. As such the level of risk posed by use of the notified polymer is expected to be low.

8.2. Human health

8.2.1. Occupational health and safety- exposure assessment

Manufacture of Polymer Solution and Final Paint Pigment
Although the notified polymer and final pigment paste are manufactured in closed vessels, several groups of workers may receive transient dermal and/or ocular exposure to the notified polymer during routine operations. Ten reactor operators working 8 hours/day for 25-35 days/year may be exposed by skin contact to the polymer during quality control sampling of the RE 3195 emulsion (containing <50% notified polymer) and pigment paste (containing <10% polymer). Exposure may also occur from inadvertent leaks and during the transfer of the pigment paste to 200 kg drums. Quality control sampling is conducted under exhaust ventilation so inhalation exposure is unlikely. Two maintenance personnel working 1 hour/day for 5 days/year may be exposed via skin and eyes during routine equipment upkeep.

Four on-site storage/transport personnel working 2-4 hours/day for 25-35 days/year may be exposed to the polymer during storage prior to bulk transport. Drum filling will be conducted under exhaust ventilation. Again, exposure to the pigment paste containing <10% polymer is likely to be limited to splashes to skin and eyes as a result of manipulation of transfer lines. Enclosed vessels, transfer lines and local exhaust ventilation will control exposure during the manufacture process, and plant personnel will wear chemical resistant gloves, coveralls and goggles. Organic vapour respirators may be used if required. This personal protective equipment will be worn to minimise exposure to the notified polymer and other components of the paint additive emulsion.

Laboratory Analysis – Emulsion and Pigment Paste
Seven laboratory technicians/chemists working 2-4 hours/day for 10 days/year may be exposed to the notified polymer during sample analysis. Exposure to the notified polymer and other ingredients in the laboratory environment will be controlled through the use of ventilated fume cupboards and personal protective equipment consisting of coveralls/laboratory coats, gloves and safety glasses conforming to recognised standards.

Transport to End-user.
Ten transport personnel working 1-2 hours/day for 25-35 days/year will be responsible for transporting the pigment paste to the end-user. The notified polymer is transported for end-use in the form of a pigment paste to be added to automotive primer paint. The pigment paste will be transported in drums. Exposure to the notified polymer during and transport would be considered low and would only be envisaged following accidental puncture of the bulk containers.

End Use (Paint Mixing and Application)
At the car manufacturing facility, the pigment paste will be unloaded by up to 10 tank operators working 1-2 hours/day for 20 days/year. The pigment paste is transferred from 200 kg drums through enclosed transfer lines to a tank where it is mixed with other paint components prior to application to automotive bodies. At this point, the polymer is present at <10%. Skin contact with the notified polymer may occur during transfer and mixing operations. Ten application/curing operators working 1-2 hours/day for 20 days/year may be exposed to the notified polymer during application of the final paint to automotive bodies and parts by dipping. Subsequent curing of the paint by oven baking will occur under exhaust ventilation. Although this is a totally enclosed automated process, dermal and ocular exposure of these workers may occur as a result of accidental splashes. Two maintenance personnel working 1-2 hours/day for 15 days/year who will conduct routine equipment upkeep may be exposed. Tank operators, application/curing operators and maintenance personnel will wear chemical resistant gloves, coveralls, and goggles. Organic vapour respirators may also be used.

After curing, the notified polymer will be locked in a paint matrix and so worker exposure at this stage is not possible.

Laboratory Analysis – Final Paint
Five laboratory technicians/chemists working 1-2 hours/day for 50 days/year may be exposed

to the notified polymer (at <10%) during sampling of final paint. Exposure to the polymer and other paint ingredients will be controlled through the use of ventilated fume hoods and personal protective equipment consisting of coveralls/laboratory coats, gloves and safety glasses conforming to recognised standards.

8.2.2. Public health- exposure assessment

The notified polymer is manufactured as part of an aqueous solution, which is used with other materials to make a pigment paste. The paste in turn is transported to user premises. The notified polymer is not isolated at any point in its life cycle. Members of the public may be exposed to the pigment paste containing the notified polymer following transport accidents en route from the manufacturing to user facilities. Such accidents are unlikely. The manufacture and application of the material containing the notified polymer is conducted only in enclosed and controlled environments. These well engineered processes and the regulated disposal of any waste containing the notified polymer means that public contact with substances in the environment containing the notified polymer is also unlikely. The products containing the notified polymer are not available to the public. In its end use, the notified polymer becomes an integral part of a hard durable coating on motor vehicles and is not accessible to human contact. The potential for public exposure to the notified polymer is assessed as negligible.

8.3. Human health –hazard assessment

No toxicological data have been provided for the notified polymer. It has a NAMW of greater than 1000, contains low levels of residual monomers and low levels of low molecular weight species. In addition, the polymer contains a low proportion of reactive functional groups. The high molecular weight of the polymer indicates that it would be unlikely to cross biological membranes readily. Therefore, the systemic toxicity of the polymer is anticipated to be low. The notified polymer is not likely to be a hazardous substance in accordance with the National Occupational Health and Safety Commission (NOHSC) *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 1999b).

The polymer solution RE 3195 (Grind Resin) is classified by the notifier as a hazardous substance according to NOHSC approved criteria (NOHSC, 1999b) based on the presence of a hazardous substance above the cut-off level (2-butoxyethanol present at 10-30%). The pigment paste is classified as a hazardous substance according to NOHSC Approved Criteria (NOHSC, 1999b), as it contains the following hazardous substances (carbon black, zinc oxide and 2-butoxyethanol). The Material Safety Data Sheet (MSDS) for RE3195 states that it is harmful if swallowed and by inhalation. It may cause moderate to severe eye irritation. Prolonged repeated skin contact may cause mild irritation. Chronic exposure may cause nose, throat and gastrointestinal tract irritation. These effects are based on the butoxyethanol content.

NOHSC has allocated an exposure standard for the 2-butoxy ethanol[ϕ] contained in the polymer solution and pigment paste (NOHSC, 1995): 25 ppm TWA sk[1].

The MSDS for 'E/COAT GREY PASTE' states that it is moderately toxic when ingested and may cause kidney and liver damage. Direct eye contact may cause moderate to severe irritation. Inhalation of solvent vapour may cause nose and throat irritation. Chronic extended exposures may be harmful and inhalation of excessive concentrations of vapours may produce effects on the central nervous system. These health effects are based on the additives rather than the notified polymer.

8.4. Human health – Risk Characterisation

8.4.1 OCCUPATIONAL HEALTH AND SAFETY

The notified polymer is manufactured and emulsified in closed vessels. The resulting polymer

[ϕ] ACGIH revised the exposure standard for 2-butoxy ethanol to 20 ppm (TWA) (ACGIH, 2001)
[1] Skin notation

emulsion is then transferred to a closed blend tank where additional components are added to form the final pigment paste. After sampling for quality analysis, the paint pigment is then stored prior to transport in 200 kg drums.

The notified polymer is never isolated and therefore exposure to the polymer for process, maintenance and laboratory workers would only occur from contact with polymer emulsion (containing <50% notified polymer) or final paint pigment containing <10% notified polymer. For example, exposure may occur when drumming off the emulsion and pigment paste. Given the engineering controls and personal protective equipment worn by the manufacturing workers, the low probability of exposure and likely low systemic toxicity of the notified polymer renders the overall health risk for workers involved in polymer manufacture low.

The notified polymer is transported in drums for end-use in the form of a paste to be added to automotive primer paint. The potential for exposure to the notified polymer during storage and transport would be considered low and would only be envisaged following accidental puncture of the bulk containers. Therefore, the health risk for transport workers would be assessed as low.

The pigment paste containing the notified polymer will be mixed in a tank, which will be used to coat automotive bodies and parts by dipping. At this point, exposure to diluted notified polymer would only occur as a result of contact with the final paint. As this process is automated, the possibility of exposure is low and would be envisaged only following accidental spillage during routine operations, maintenance or laboratory analysis. Given the likely low toxicity of the notified polymer, and the low concentration of the notified polymer in the paint mix, the health risk to workers involved in end use would be assessed as low.

Following curing of the paint, the polymer will be cross-linked with other paint components to form a high molecular weight stable film. In this form, the polymer is essentially unavailable for absorption and thus the health risk to workers from the notified polymer after paint curing would be negligible.

8.4.2 PUBLIC HEALTH

The low likelihood of exposure to the notified polymer and the low toxicity of the notified polymer suggest that the notified polymer will not pose a significant risk to public health when used in the proposed manner.

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

9.1. Hazard classification

Based on the available data, the notified polymer is not classified as hazardous under the NOHSC *Approved Criteria for Classifying Hazardous Substances*. However, the polymer solution RE3195 is classified as hazardous according to NOHSC *Approved Criteria for Classifying Hazardous Substances.*

9.2. Environmental risk assessment

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

9.3. Human health risk assessment

9.3.1. Occupational health and safety

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

9.3.2. Public Health

There is Negligible Concern to public health when used in the proposed manner.

10. RECOMMENDATIONS

CONTROL MEASURES
Occupational Health and Safety

- Employers should implement the following engineering controls to minimise occupational exposure to the notified polymer in the product RE3195:
    - Good ventilation;

- Employers should ensure that the following personal protective equipment is used by workers to minimise occupational exposure to the notified polymer (as introduced in the product RE3195):
    - Protective eyewear, impermeable gloves and chemical resistant industrial clothing and footwear.

  Guidance in the 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.

Environment

Disposal
- The waste notified chemical should be disposed of to landfill.

Emergency procedures
- Spills/release of the notified chemical should be handled according to procedures outlined in the MSDS

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(2) of the Act:
- if any of the circumstances listed in the subsection arise.

The Director will then decide whether secondary notification is required.

No additional secondary notification conditions are stipulated.

11. MATERIAL SAFETY DATA SHEET

The MSDS for the Polymer in RE3195 was provided in a format consistent with the *National Code of Practice for the Preparation of Material Safety Data Sheets* (NOHSC, 1994).

This MSDS was provided by the applicant as part of the notification statement. It is reproduced here as a matter of public record. The accuracy of this information remains the responsibility of the applicant.

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