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**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION  
AND ASSESSMENT SCHEME**

**FULL PUBLIC REPORT**

**Polymer in NeoRez R-9403**

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**FULL PUBLIC REPORT****Polymer in NeoRez R-9403****1. APPLICANT**

Orica Australia Pty Ltd of 1 Nicholson Street, Melbourne, VIC 3000 (ACN 004 117 828) has submitted a notification statement in support of their application for an assessment certificate for the synthetic polymer of low concern (PLC) Polymer in NeoRez R-9403.

**2. IDENTITY OF THE CHEMICAL**

The chemical name, CAS number, molecular and structural formulae, molecular weight, spectral data and details of the polymer composition have been exempted from publication in the Full Public Report.

**Method of Detection and Determination:** IR spectroscopy

The polymer meets the criteria for assessment as a synthetic polymer of low concern under Regulation 4A of the *Industrial Chemicals (Notification and Assessment) Act 1989*.

**3. PHYSICAL AND CHEMICAL PROPERTIES**

The notified polymer is produced as an aqueous dispersion and is never isolated. The following physico-chemical properties are for the aqueous dispersion unless otherwise indicated.

**Appearance at 20°C and 101.3 kPa:** pink semi-transparent liquid

**Boiling Point:** 100°C

**Specific Gravity:** 1.06 (dispersion)  
1.16 (notified polymer, calculated)

**Water Solubility:** dispersible in water

**Partition Co-efficient (n-octanol/water):** not determined

**Hydrolysis as a Function**

<b>of pH:</b>	not determined (see comments below)
<b>Dissociation Constant:</b>	not determined (see comments below)
<b>Flammability Limits:</b>	the notified polymer is only used in Australia as a dispersion in water and is not flammable
<b>Explosive Properties:</b>	not expected to be explosive
<b>Reactivity/Stability:</b>	stable under normal environmental conditions

### 3.1. Comments on Physico-Chemical Properties

A water solubility study was not submitted. The notifier claims that the notified polymer is not soluble but is dispersible in water. The amine is used to provide an anionic charge to the polymer surface and as water is added to the polymer salt it coils into a tight particle bearing the surface charge. This charge provides the dispersion stability. As the concentration of water increases, the amine partitions to the water and the polymer becomes more water insoluble.

The notified polymer is an amine salt of a carboxylic acid containing polymer; the carboxylic acid groups are expected to have typical acidity. The solution has a pH of 8, according to the Material Safety Data Sheet (MSDS).

The polymer contains linkages that could be expected to undergo hydrolysis under extreme pH conditions. However, due to the low water solubility, this is unlikely in the environmental pH range of between 4 and 9.

## 4. PURITY OF THE CHEMICAL

<b>Degree of Purity:</b>	> 98 %
<b>Hazardous Impurities:</b>	none present at above the relevant cutoff for classification of the notified polymer as a hazardous substance

### Additives/Adjuvants:

<i>Chemical name:</i>	water
<i>CAS No.:</i>	7732-18-5
<i>Weight percentage:</i>	57.3

<i>Chemical name:</i>	N-methyl pyrrolidone
<i>CAS No.:</i>	872-50-4

<i>Weight percentage:</i>	7.5
<i>Hazardous Properties:</i>	irritating to eyes and skin (NOHSC, 1999a)
<i>Regulatory Controls:</i>	no NOHSC exposure standard exists; the notifier has recommended a Maximum Allowable Concentration of 20 ppm
<i>Chemical name:</i>	dipropylene glycol monomethyl ether
<i>CAS No.:</i>	34590-94-8
<i>Weight percentage:</i>	1.3
<i>Hazardous Properties:</i>	on the NOHSC <i>List of Designated Hazardous Substances</i> (NOHSC, 1999a); skin and eye irritant; mild allergen (Lewis, 1996)
<i>Regulatory Controls:</i>	NOHSC exposure standard 100 ppm TWA, 150 ppm STEL; absorption through the skin may be a significant source of exposure (NOHSC, 1995)
<i>Chemical name:</i>	poly(oxy-1,2-ethandiyl), $\alpha$ -(nonylphenyl)- $\omega$ -hydroxy-
<i>Synonyms:</i>	nonylphenol ethoxylate nonylphenol polyethylene glycol ether
<i>CAS No.:</i>	9016-45-9
<i>Weight percentage:</i>	0.4
<i>Hazardous Properties:</i>	skin and severe eye irritant; moderately toxic by ingestion and skin contact (Lewis, 1996)

## 5. USE, VOLUME AND FORMULATION

Polymer in Neorez R-9403 is used as a binder in surface coatings for use on wooden substrates such as floors and furniture and industrial metal coatings. It is used at approximately 30 % w/w in the coating. These coatings may be used by professional applicators or the general public.

The notifier estimates that 20 tonnes of notified polymer will be imported during the first year, increasing to 100 tonnes notified polymer per annum in years two to five.

The notified polymer will be imported as a 32 % solids solution in water, *N*-methyl pyrrolidone and dipropylene glycol monomethyl ether, and never isolated. The dispersion will be imported in 200 L polylined steel drums and 1000 L bulki boxes. It will be reformulated by addition of further ingredients at a number of sites in Australia to produce the industrial or architectural coatings, which will be packaged in 500 mL, 1 L, 4 L, 10 L and 20 L epoxy lined tinplate cans and pails for sale to industrial, professional and domestic users. Industrial spray application accounts for around 20% of the total polymer usage. The remaining 80% will be used by professional tradesmen and domestic users.

## 6. OCCUPATIONAL EXPOSURE

### *Transport and Storage*

The notified polymer will be imported as part of the product NeoRez R-9403 (32 % notified polymer). The product is liquid, and packed in 200 L plastic lined steel drums and 1000 L bulki boxes. Between 6 and 10 dock and transport workers will handle drums and bulki boxes of the notified polymer solution for 10 days per year, and from 26 to 38 storage workers will handle the drums and bulki boxes of solution for 50 days per year. No exposure is expected during transport and storage, except in the case of an accident involving damage to the packaging. Similarly, no exposure to the formulated paints (up to 30 % notified polymer) is expected during transport and storage.

### *Paint Manufacture*

The notifier indicates that the notified polymer is expected to be handled by 300 factory workers (in high speed dispersion, paint makeup and container filling) and 10 paint chemists. High speed dispersion will involve exposure to the 32 % solution of notified polymer, and will involve approximately 100 workers for 4 hours per day, 30 days per year. The other operations will generally involve exposure to formulated paints, containing up to 30 % notified polymer. The notifier estimates exposure times to be 2 hours per day, 30 days per year for paint makeup workers, and 8 hours per day, 30 days per year for quality control and filling personnel.

The products may be used at a large number of sites for reformulation into architectural and industrial paints. Reformulation will involve transfer of the solution, containing 32 % notified polymer, into mixing pots, where it will be blended with water, polymer emulsions and other additives to produce paints. Transfer may be by decanting or drum pumps. Samples will be taken for quality control testing. Dermal exposure to drips and spills of the product NeoRez R-9403 is possible during transfer.

The formulated product (up to 30 % notified polymer) is filled into 500 mL, 1 L, 4 L, 10 L or 20 L steel cans or pails. Dermal exposure to the up to 30 % solution of notified polymer is possible during filling.

Warehouse workers will handle the drums of polymer solution and also the filled cans of finished paint, but no exposure is expected unless the packaging is ruptured.

Paint chemists would be expected to sample the raw materials and paints for quality control purposes, and may be dermally exposed to the paint during sampling and testing. Quality control testing involving paint spraying will be carried out in an approved booth.

The notifier states that exhaust ventilation is fitted to the mixers and the filling system. Workers in the paint reformulation sites generally wear coveralls, safety goggles and impervious gloves.

### *Industrial Paint Application*

Industrial paints containing the notified polymer will be applied by spray painting or roller coating. Paint will be stirred, thinned and loaded into circulation tanks or spray guns. The notifier has estimated that 10 workers will be involved in addition to the circulation system, for 8 hours per day on a daily basis. During this procedure, dermal exposure to drips and spill

of the paint is possible. Coating by roller coating is likely to be an automated process, and exposure of workers will be limited to dermal contact during these operations. Spray painting involves a high level of potential exposure by the dermal, ocular and inhalation routes, and should be carried out in accordance with the NOHSC *National Guidance Material for Spray Painting* (NOHSC, 1999c).

The notifier has estimated that 10 workers will be involved in spray painting, for 8 hours per day on a daily basis. An additional 10 workers may be exposed to paints containing the notified polymer during equipment cleaning, for 1 hour per day on a daily basis. The notifier states that industrial paint use will occur in an environment with an effective filtered exhaust system. Coveralls, safety goggles and impervious gloves will be worn by industrial paint users, and cartridge type respirators may be used during spray application of the paints.

#### *Architectural Paint Sales and Application*

Architectural paints containing the notified polymer will be available to both professional painting contractors and do-it-yourself home painters. Paint application will generally be done by brush or roller, although spray painting may also occur. Occupational contact with the notified polymer can occur during the tinting of paints at point of sale by the store staff, and during the application of the paints by professional painting contractors. The exposure for these workers will be to the finished paint containing up to 30 % notified polymer, and would normally be dermal. The notifier estimates that the number of professional painters and home users will both be in the thousands, with professional painters being exposed for up to 8 hours per day, 100 days per year. The notifier indicated that coveralls, impervious gloves and safety glasses are recommended to the end users, but that the use of protective equipment is difficult for the paint manufacturer to control.

After application of the paint, it will cure and crosslink, encapsulating the notified polymer, which will no longer be separately available for exposure.

Material Safety Data Sheets (MSDS) will be available to customers using the architectural paints.

## **7. PUBLIC EXPOSURE**

It is expected that during transport, storage, paint/lacquer manufacture, and most industrial use, exposure of the general public to the notified polymer will be minimal, except in the event of an accidental spill.

Public exposure to surface coatings containing the notified polymer is expected to be widespread but intermittent i.e. limited to periods of home decoration. The likely route of exposure would be dermal, with the possibility of accidental oral and ocular exposure. Due to the wide range of applications in the domestic and industrial environment, public exposure via dermal contact with dried surface coating films containing the notified polymer is expected to be high.

## **8. ENVIRONMENTAL EXPOSURE**

## **8.1. Release**

There is potential for release of the notified polymer to the environment during the coating reformulation and application. The reformulation process will take place at the customer sites around Australia. Any spills will be contained by the plant bunding and collected for disposal to landfill along with the aqueous waste from equipment cleaning and rinsing the import drums. The notifier estimates that < 1 % (up to 1000 kg/annum) of the polymer may be lost during the reformulation processes.

Approximately 20 % of the paint containing the notified polymer will be applied by spray as an industrial metal coating with a loss from overspray of about 70 % (< 14 tonnes per annum) which will be collected from the manufacturing plants by licensed contractors and disposed to landfill after treatment.

The other 80 % of the polymer will be used by professional applicators and home handymen as an architectural coating. The notifier estimates that approximately 2 % (up to 1600 kg per annum of the notified polymer) of the floor and furniture coating product will be lost due to cleaning of the application equipment (brushes, rollers and sponges) and will be disposed of to the sewer.

The notifier also estimates that 0.5 % (up to 500 kg per annum) of the coating would remain as residue in the paint tins after emptying. This will be disposed of to landfill along with the containers.

## **8.2. Fate**

The waste generated in the reformulation process (1 % or up to 1000 kg per annum), remaining in the paint tins (0.5 % or up to 500 kg per annum) and from spray application as industrial coatings (up to 14 tonnes per annum) will be disposed of to landfill or by incineration. Leaching of the polymer from landfill is unlikely, given the low solubility of the substance.

The waste from the floor finish and coating applications will be approximately 1.6 % of the import volume of the notified polymer or up to 1600 kg per annum. All the waste polymer will be washed down the drain with water and end up in the sewer. It would be expected to remain suspended or dispersed in the water fraction until such time as the amine partitions to the water and the polymer gradually becomes insoluble and drops out of solution due to its high molecular weight. It will eventually become associated with the sediments in the rivers and creek beds or ocean floor and possibly some will be removed during the sewage treatment process, although this is hard to predict due to the lack of information or data regarding the conditions and time involved in the settling process.

The polymer floor finish will dry to form an inert coating on the surface of the floors. It will remain on the floors until it is gradually worn down by human traffic, being slowly dispersed on shoes etc. At the end of its useful life it is likely to be removed and replaced by another coat of a similar product. The coating containing the notified polymer will be broken up into solid particulate matter in the removal process and most likely disposed of to landfill. The fate the polymer applied to the industrial metals will be tied to the fate of this metal. At the end of its useful life most used metal will be disposed of to landfill with the polymer coating



sharing this fate. However, some metal could be recycled by smelting in furnaces. At high smelting temperatures the polymer will be destroyed by conversion to oxides of carbon and nitrogen and water vapour.

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

## **9. EVALUATION OF TOXICOLOGICAL DATA**

No toxicological data were submitted.

## **10. ASSESSMENT OF ENVIRONMENTAL EFFECTS**

No ecotoxicological data were submitted.

## **11. ASSESSMENT OF ENVIRONMENTAL HAZARD**

The environmental hazard presented by the importation and use of the polymer is expected to be low.

The products containing the notified polymer are likely to be used throughout Australia. The major environmental exposure to the substance will come from disposal of the waste polymer from the reformulation process, empty containers and application overspray to landfill but this should be of low hazard to the environment as the polymer will remain bound within the soils and sediments of the landfill and slowly degraded by abiotic processes.

The waste polymer produced during the architectural application process is likely to be discharged in domestic wash waters to waste water treatment systems through washing of paint equipment. If it presumed as a worst case scenario that there is no removal of the polymer in the sewage treatment plant, the resultant Predicted Environmental Concentration (PEC) in receiving waters would be:

Amount released to sewer (annually):	1600 kg
Population of Australia:	18 million
Volume of water/person (daily):	150 L
Dilution factor in receiving water:	1:10
PEC in receiving water:	0.1 µg/L

Adsorption to sludge, soil and sediment as well as dilution in receiving waters should reduce environmental concentrations to negligible levels. The polymer is not expected to persist in the aquatic environment, being removed through a combination of sorption to particulates and eventual chemical degradation.

Polymer spilt on land either during usage or transport is expected to become immobilised in the soil layer. Contaminated soil can then be collected and disposed to landfill. Polymer disposed to landfill either from spills, the reformulation process or as drum residues will similarly remain bound in the soil and sediments.

Given the above, environmental exposure and the overall environmental hazard is expected to be low.

## **12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS**

No toxicological information has been provided for the notified polymer and therefore the substance cannot be assessed against the NOHSC *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 1999b). Due to the high molecular weight and low reactivity of the polymer, the toxicological hazard of the notified polymer is expected to be low. The polymer is not expected to be hazardous by dermal exposure as the high molecular weight will preclude absorption through the skin. The residual monomer concentrations in the finished polymer are below the cutoff levels for classification as a hazardous substance.

The MSDS indicates that the product NeoRez R-9403 has potential health effects including eye, skin mucous membrane and respiratory irritation. These effects are expected to be due to the co-solvents, *N*-methyl pyrrolidone and dipropylene glycol monomethyl ether, rather than the notified polymer itself. There is a NOHSC exposure standards for dipropylene glycol monomethyl ether.

### *Occupational Health and Safety (OHS)*

There is little potential for significant occupational exposure to the notified polymer in the transport and storage of the polymer solution or the paint component containing this polymer. There will be exposure during production of paints, and in the use and disposal of the paints.

During the paint manufacture processes, the main exposure route for the notified polymer will be dermal. The paints will be viscous, and ready formation of aerosols is not expected. The polymer is not expected to be hazardous by dermal exposure as the high molecular weight will preclude absorption through the skin, however irritation may occur on dermal exposure to the product NeoRez R-9403 due to the solvents present. The engineering controls and personal protective equipment specified in the notification (impervious gloves, safety goggles and coveralls) will provide a high level of protection against the notified polymer. No significant OHS risks are expected when control and protective measures are implemented.

Industrial application of paint by roller coating may lead to dermal exposure to an up to 30 % solution of the notified polymer. The use of the specified personal protective equipment will provide a high level of protection against the notified polymer.

The paint containing the notified polymer will also be applied by spraying. The spraying procedure produces a dense aerosol of paint particles which would potentially lead to a high level of exposure to the notified polymer by the dermal, ocular and inhalation routes. The industrial paint may also contain a wide variety of additional ingredients once fully mixed.

For these reasons, the notified polymer must be assessed for the contribution it makes to the hazards associated with use of the spray paints. The presence of many potential and actual hazardous substances in the formulations requires the use of stringent engineering controls, such as a correctly constructed and maintained spray booth, and of a high level of personal

protective equipment, such as impermeable overalls and gloves and a full face shield and respirator. The use of the paint containing the notified polymer should be in accordance with the NOHSC *National Guidance Material for Spray Painting* (NOHSC, 1999c). The level of protection from exposure afforded by the standard protective measures will provide adequate protection from the notified polymer, which is likely to be less intrinsically toxic than many of the components of the paints.

Occupational exposure during the sale and professional use of architectural paints, containing up to 30 % notified polymer, is likely to be widespread and often under poorly controlled conditions. Dermal contact during handling and application of the paints is likely. The occupational health and safety risk associated with dermal contact with the notified polymer in the form of uncured paints will be low, due to the low toxicological hazard of the polymer.

#### *Public Health*

While dermal and possibly eye contact with the notified polymer may occur during application of the paints containing the polymer by the general public, based on its expected low toxicity, the notified polymer is not expected to pose a significant hazard to public health when used in the proposed manner.

In dried paint films, the notified polymer will be encapsulated in an inert, very high molecular weight matrix, which will render it biologically unavailable, and consequently public exposure to the notified polymer from dried paint films is considered to be low.

### **13. RECOMMENDATIONS**

To minimise occupational exposure to Polymer in NeoRez R-9403 the following guidelines and precautions should be observed:

- Employers should ensure that NOHSC exposure standards for all of the components of the polymer solution are not exceeded in the workplace;
- Protective eyewear, chemical resistant industrial clothing and footwear and impermeable gloves should be used during occupational use of the products containing the notified polymer; where engineering controls and work practices do not reduce vapour and particulate exposure to safe levels, an air fed respirator should also be used;
- Spillage of the notified chemical should be avoided. Spillages should be cleaned up promptly with absorbents which should then be put into containers for disposal;
- A copy of the MSDS should be easily accessible to employees.

If products containing the notified chemical are hazardous to health in accordance with the NOHSC *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 1999b), workplace practices and control procedures consistent with State and territory hazardous substances regulations must be in operation.

Guidance in selection of protective eyewear may be obtained from Australian Standard (AS) 1336 (Standards Australia, 1994) and Australian/New Zealand Standard (AS/NZS) 1337

(Standards Australia/Standards New Zealand, 1992); for industrial clothing, guidance may be found in AS 3765.2 (Standards Australia, 1990); for impermeable gloves or mittens, in AS 2161.2 (Standards Australia/ Standards New Zealand, 1998); for occupational footwear, in AS/NZS 2210 (Standards Australia/ Standards New Zealand, 1994a); for respirators, in AS/NZS 1715 (Standards Australia/ Standards New Zealand, 1994b) and AS/NZS 1716 (Standards Australia/ Standards New Zealand, 1994c).

#### **14. MATERIAL SAFETY DATA SHEET**

The MSDS for the notified chemical was provided in accordance 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.

#### **15. REQUIREMENTS FOR SECONDARY NOTIFICATION**

Under subsection 64(1) of the Act, secondary notification will be required if the polymer characteristics cease to satisfy the criteria under which it has been accepted as a Synthetic Polymer of Low Concern. Secondary notification of the notified polymer shall be required if any of the circumstances stipulated under subsection 64(2) of the Act arise. No other specific conditions are prescribed.

#### **16. REFERENCES**

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