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NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME (NICNAS)

FULL PUBLIC REPORT

Polymer in Solsperse 76500

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
NICNAS

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Polymer in Solsperse 76500

1. APPLICANT AND NOTIFICATION DETAILS

APPLICANT(S)
Orica Australia Pty Ltd (ABN: 99 004 117 828)
1 Nicholson Street, Melbourne VIC 3000

NOTIFICATION CATEGORY
Limited: Synthetic polymer with Mn ≥ 1000 Da.

EXEMPT INFORMATION (SECTION 75 OF THE ACT)
Data items and details claimed exempt from publication:
Chemical names, Other names, CAS Number, Molecular formula, Structural Formula, Molecular weight, Spectral data, Identity and concentration of impurities, Import volume, Concentration of the polymer in products

VARIATION OF DATA REQUIREMENTS (SECTION 24 OF THE ACT)
Variation to the schedule of data requirements is claimed as follows:
Density, Vapour pressure, Partition Coefficient, Adsorption/desorption, Dissociation Constant, Flammability Limit, Flashpoint, Autoignition Temperature, Explosive properties

PREVIOUS NOTIFICATION IN AUSTRALIA BY APPLICANT(S)
None

NOTIFICATION IN OTHER COUNTRIES
None

2. IDENTITY OF CHEMICAL

MARKETING NAME(S)
Solsperse 76500

ANALYTICAL DATA
Reference NMR, IR, HPLC, GC, GPC and MS spectra were provided to confirm the structure.

3. COMPOSITION

DEGREE OF PURITY > 95%

LOSS OF MONOMERS, OTHER REACTANTS, ADDITIVES, IMPURITIES
None under normal conditions of use. The notified polymer contains groups susceptible to hydrolysis.

Under extreme heat conditions, such as in a fire the notified polymer will burn emitting toxic fumes, gases or vapours including oxides of carbon and nitrogen.

DEGRADATION PRODUCTS
Stable under normal conditions of use and therefore the loss of any monomers, other reactants, additives and impurities is not expected.

4. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE AT 20°C AND 101.3 kPa: Soft yellowish solid

Property	Value	Data Source/Justification
Melting Point/Freezing Point	120°C	Measured (method not provided)
Density	1000 kg/m^3 at 20°C	Estimated
Vapour Pressure	< 10^{-8} kPa (temperature unspecified)	Estimated based on high molecular weight.
Water Solubility	> 1 g/L 20°C	Measured but value may not take dispersion or degradation of the notified polymer into account.
Hydrolysis as a Function of pH	Tested but not quantified.	The notified polymer contains potentially hydrolysable groups, which showed hydrolysis at all pH values measured between 1.2 and 9. The notified polymer was most stable to hydrolysis at pH 7.0 but showed very significant hydrolysis at all other pH values.
Partition Coefficient (n-octanol/water)	< 1	Estimated on the basis of water solubility (USEPA 2004; Connell 1989).
Adsorption/Desorption	> 1.5	Estimated on the basis of the water solubility (USEPA 2004). The notified polymer is expected to be mobile in soil and sediment. However, the cationic group and potentially cationic groups are expected to have affinity for negatively charged sites in soil and reduce the notified polymer's mobility.
Dissociation Constant	~10	pKa of potentially cationic groups is expected to show typical acidity.
Particle Size	Not determined	The notified polymer will imported as dispersion and throughout its entire lifecycle will not be isolated from dispersion.
Flash Point	Not determined	Imported as part of a flammable dispersion.
Autoignition Temperature	Not determined	Imported as part of a flammable dispersion.
Explosive Properties	Estimated	High molecular weight polymer without any chemical moieties that would contribute to the polymer being explosive.

DISCUSSION OF PROPERTIES

For full details of tests on physical and chemical properties, please refer to Appendix A.

Reactivity

Stable under normal conditions. Hydrolyses in aqueous solution.

5. INTRODUCTION AND USE INFORMATION

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

The notified polymer will not be manufactured in Australia. The notified polymer will be imported into Australia at 50% dispersion in solvent in sealed steel 20 kg or 180 kg drums.

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

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

PORT OF ENTRY
Melbourne

IDENTITY OF MANUFACTURER/RECIPIENTS
Orica Australia Pty Ltd
1 Nicholson St, Melbourne VIC 3000

TRANSPORTATION AND PACKAGING
The notified polymer will be stored and transported in 20 kg and 180 kg open head steel drums and will be transported by road and rail to reformulation sites. The reformulated paints containing the notified polymer will be stored and transported to end use sites in 1L, 4L, 10L and 20L steel cans and pails.

USE
Polymeric dispersant at less than 5% in solvent based automotive and industrial paints.

OPERATION DESCRIPTION
Paints manufacture
It is estimated that the notified polymer will be used at 5-10 reformulation sites where up to 100 batches of paint will be manufactured annually. The notified polymer will be used at levels of less than 5% in the paints. There are a number of discrete steps involved in the manufacture process.

Pigment Dispersion Stage
The resin/solvent, notified polymer in dispersion and finally the pigment are weighed into the mixer and are subject to high speed sheer to produce a mill base. The ingredients are either metered directly into the mixer or manually added to from the drum.

Makeup Stage
The mill base is pumped into a large mixing vessel and the remaining resin and additive are added under constant stirring at low speed. Samples are removed at this stage for quality control testing in the laboratory, after which the batch is adjusted to meet specifications.

Filling Stage
The finished paint containing the notified polymer is fed by gravity from the bottom of the mixing vessel through a filter and filling lines into containers. The closed containers are usually manually placed on pallets and taken by forklift to a warehouse for storage and distribution.

Paint Application
At the end use sites the paints will be sprayed onto metal articles (e.g., post market cars, aircraft and other metal surfaces). The main use will be as automotive spray coating in repair bodyshops, where the 2-pack coatings will be diluted and applied by automatic processes. Other industrial coatings containing the notified polymer will be applied by spray both indoors and outdoors under less automated processes.

6. HUMAN HEALTH IMPLICATIONS

6.1 Exposure assessment

6.1.1 Occupational exposure

NUMBER AND CATEGORY OF WORKERS

Category of Worker per Site	*Number*	*Exposure Duration (hours/day)*	*Exposure Frequency (days/year)*
Transport workers	6-8	2-3 hours/day	10-15 days/year
Paint blending	4	8 hours/day	50 days/year
Paint laboratory workers	2	1 hour/day	50 days/year
Paint application	6-8	4 hours/day	260 day/year

EXPOSURE DETAILS

Transportation and storage

Workers involved in the transportation and storage of the notified polymer are not expected to be exposed to the notified polymer except in the unlikely event of accident which results in the rupture of the steel drums.

Paint Manufacture

At the paint manufacture sites the notified polymer will be manually weighed into a stainless steel blending tank and mixed with other components of the paint. Dermal exposure may occur as a result of drips and spills during the weighing and charging of the blending tanks. Once blended the paint will be piped to automated filling system and dispensed into containers. During the weighing and charging process, workers will wear protective clothing, gloves and safety eyewear. Extraction ventilation will also be used at the weighing and charging station.

Paint Application

In the main use for automotive refinishing, the application of the finished paint containing less than 5% notified polymer will use indoors automated spray processes. While dermal, respiratory and ocular exposure to the notified polymer may occur during the process, it is expected that automated processes, engineering controls (exhaust ventilation), and personal protective equipment (coveralls, gloves, boots, respiratory and eye protection) is used.

In other applications the paints containing less than 5% notified polymer will be applied via spray indoors or outdoors, and the routes of exposure to the notified polymer are likely to be similar to automotive coating. In such cases, worker exposure will be reduced by the use of full PPE, including respiratory protection.

After the paint is allowed to dry the paint containing the notified polymer is cured to form an inert matrix and the notified polymer is not bioavailable.

6.1.2. Public exposure

The notified polymer is intended for use in paints with industrial applications only, therefore it will not be available to the public. Members of the public may come into contact with the metal articles that have been coated with the paints. However, exposure will be negligible because the notified polymer will be bound to an inert paint matrix.

6.2. Human health effects assessment

No toxicity data were submitted.

General toxicity.

Systemic toxicity is unlikely as polymers with Mn > 1000 Da are poorly absorbed across biological membranes.

Irritation and Sensitisation.

The notified polymer is cationic, which is a structural alert for sensitisers (Barratt, 1994) and irritants (Hulzebos, 2005). Therefore the notified polymer may possess some sensitising and irritant properties.

Health hazard classification

The notified polymer may have slight eye and skin irritation and skin sensitisation properties. Based on the available data the notified chemical cannot be classified as hazardous under the *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 2004).

6.3. Human health risk characterisation

6.3.1. Occupational health and safety

The toxicological properties of the notified polymer have not been investigated. However, based on structural alerts, irritancy and sensitisation are possible.
Dermal and ocular exposure will be the main routes of worker exposure to the notified polymer (50%) expected to occur during manufacture, quality control, reformulation processes and preparation of the paints for end use. Inhalation exposure to the notified polymer may occur during end use spray operations (at concentrations of less than 5%), particularly when used outdoors. Exposure is expected to be reduced by various control measures, including engineering controls and PPE. Controls are also in place for other hazardous ingredients in the paint. Therefore, the occupational health and safety risk of the notified polymer is considered to be low.

6.3.2. Public health

As the public will not be exposed to the notified polymer except in a cured coating matrix where it will not be bioavailable, the risk to the public from exposure to the notified polymer is expected to be low.

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 but imported as a 50% polymeric dispersant. It will be reformulated into automotive and industrial paints at customers' sites.

During paint manufacture, an estimated 1% of the annual introduction volume (< 100 kg) of the notified polymer will be lost as result of spills. The spills will be collected and disposed of by licensed waste contractors. After recovery of any solvent it is expected the waste will be disposed of to landfill.

Up to 1% of the annual introduction volume (< 100 kg) of the notified polymer is anticipated to remain as residues in the import containers. It is expected that the drums will be recycled by licensed waste disposal contractors. The notified polymer is likely to be collected and disposed to landfill or possibly incinerated during the recovery of the drums.

Manufacturing equipment is likely to be rinsed with industrial solvent. Less than 1% (< 100 kg) of the annual introduction volume of the notified polymer is likely to be lost as a result of cleaning the manufacturing equipment. The solvent washings will be stored in holding tanks on site for collection and disposal by the licensed waste disposal contractors. It is likely that the wastes will undergo treatment after which time the polymer will be removed and disposed of to landfill.

RELEASE OF CHEMICAL FROM USE

The major loss during use will be from overspray. A maximum of 30% (< 3000 kg) of the paint product can be expected to be lost as overspray during the spraying process. However, this is likely to be considerably less (< 10%) as most of the application techniques are expected to be automated. Engineering controls for overspray will typically be spray booth filters and water scrubbers. Generally the spray booth filters are renewed every 2-4 months. The filters are disposed of to landfill. Waste from water scrubbers will be collected and sent to a waste contractor for flocculation, with the flocculant being sent to landfill. Assuming that a small amount (< 1%) of the notified chemical is not trapped by the water scrubbers and that in a worst case all spray booths use water scrubbers, then a maximum of 30 kg per annum (3000 kg × 1 ÷ 100) of the notified polymer will be released to sewer. This is regarded as a maximum value and the actual amount is expected to be much less than 30 kg per annum.

It is estimated that losses of up to 5% (< 500 kg notified polymer per annum) will occur during the cleaning of the application equipment. The equipment will be cleaned with solvents which will be collected and disposed of by licensed waste disposal contractors, where the notified polymer will be disposed to landfill as solid waste or possibly incinerated with recovery of calorific value.

The finished paint cans are likely to be disposed of to landfill. The residues in these cans are expected to be up to 2% of the import volume (< 200 kg per annum).

Any accidental spillages will be contained and soaked up with inert material for collection and disposal by licensed waste disposal contractor. It is expected that the notified polymer will be disposed of to landfill following treatment.

Minor use is also expected for industrial coatings other than automotive applications. For outdoor spray applications, any overspray droplets are likely to land on the immediate surrounding areas, which will be covered by a protective drop sheet. However, the droplets (<1%; < 100 kg per annum) may be carried by the wind and be dispersed throughout a wider area. As the coating droplets cure, the notified polymer is expected to react with the other components of the coating product. Any un-reacted polymer is expected to become immobilised.

RELEASE OF CHEMICAL FROM DISPOSAL

The notified polymer that is contained in wastes from spills, application, equipment cleaning, and drums will be collected by licensed waste disposal contractors, treated and disposed of to landfill or possibly by incineration.

The majority of the notified polymer will be applied to metal articles such as cars and aeroplanes by automated techniques. At the end of their use lives the articles will be disposed of to landfill or enter metal recycling.

7.1.2 Environmental fate

No environmental fate data were submitted. The notified polymer is expected to hydrolyse in water or under moist conditions and undergo eventual further degradation. It is expected to be moderately mobile in soil but as it will be usually bound in a paint matrix mobility and leaching is expected to be limited. During metal recycling the polymer is expected to be combusted and form oxides of carbon and nitrogen, chlorine compounds as well as water vapour.

7.1.3 Predicted Environmental Concentration (PEC)

Aquatic exposure is expected to be minimal (< 30 kg per annum) and it is therefore not necessary or meaningful to calculate a PEC when the notified polymer is used for its intended purpose in automotive and industrial paints.

7.2. Environmental effects assessment

No ecotoxicity data were submitted. The notified polymer contains a cationic group and potentially cationic functionalities which may exhibit toxicity to aquatic organisms.

7.2.1 Predicted No-Effect Concentration

A PNEC cannot be calculated as no aquatic toxicity data are available and a PEC cannot be accurately determined.

7.3. Environmental risk assessment

Although the notified polymer has potential to exhibit toxicity to aquatic organisms, it is not expected to enter the aquatic environment in significant quantities when it is used as intended for automotive and industrial paints. Therefore, the notified polymer is not considered to pose a risk to the environment.

8. CONCLUSIONS AND REGULATORY OBLIGATIONS

Hazard classification

Based on the available data the notified polymer cannot be classified as hazardous under the *Approved Criteria for Classifying Hazardous Substances* [NOHSC:1008(2004)].

As a comparison only, the classification of the notified polymer using the Globally Harmonised System for the Classification and Labelling of Chemicals (GHS) (United Nations 2003) is inapplicable as no toxicity data are available. The notified polymer has potential to be harmful to aquatic life, based on its structure.

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

Although the notified polymer has potential to exhibit toxicity to aquatic organisms, based on its reported use patterns it is not considered to pose a risk to the environment.

Recommendations

CONTROL MEASURES

Occupational Health and Safety

- Employers should implement the following engineering controls to minimise occupational exposure to the notified polymer during spray application:
  - Use of spray paints containing the notified polymer should be in accordance with the NOHSC National Guidance Material for Spray Painting (NOHSC, 1999).

- Employers should ensure that the following personal protective equipment is used by workers to minimise occupational exposure to the notified polymer as introduced and in the formulated products:
  - Coveralls
  - Gloves
  - Safety goggles
  - Air respirator where mists are likely to be generated

  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 chemical should be disposed of by licensed waste contractors or to landfill.

Emergency procedures

- Spills or accidental release of the notified polymer should be handled by containment and adsorption to inert material (soil, sand or other inert material). Remove sources of ignition and use non-sparking tools. Collect and place in properly labelled containers for 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 polymeric dispersant at less than 5% in solvent based automotive and industrial paints, or is likely to change significantly;
  - the amount of chemical being introduced has increased from 10 tonne per year, or is likely to increase, significantly;
  - the chemical has begun to be manufactured in Australia;
  - 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 products containing the notified chemical provided by the notifier was reviewed by NICNAS. The accuracy of the information on the MSDS remains the responsibility of the applicant.

APPENDIX A: PHYSICAL AND CHEMICAL PROPERTIES

Water Solubility > 1g/L at 20°C

Method	The sample was mixed with equal parts of the solvent of interest (water), and the number of phases observed after the mixture was left overnight was used to determine whether the sample is soluble in a given solvent.
Remarks	This method may be regarded only as semi-quantitative and is unlikely to take dispersions or hydrolysis of the polymer into account (see below).
Test Facility	Noveon (2006)

Hydrolysis as a Function of pH

Method OECD TG 111 Hydrolysis as a Function of pH.
EC Directive 92/69/EEC C.7 Degradation: Abiotic Degradation: Hydrolysis as a Function of pH.

pH	*T (°C)*	*t½ <hours or days>*
1.2	40	Not determined
4	40	Not determined
7	40	Not determined
9	40	Not determined

Remarks Test solutions of 1.6 g of notified polymer were prepared in 400 mL buffer solution at pH 1.2, 4.0, 7.0 and 9.0. These solutions were then shaken on an orbital shaker at 40°C at approximately 230 rpm for the duration of the exposure. After one hour a small aliquot of each buffer solution was removed, vacuum stripped at approximately 75°C and 22 mmHg pressure and analysed by GPC. The solution at pH 1.2 was then shaken at 40°C for 24 hours in total. The remaining solutions were shaken at 40°C for two weeks. At the end of each test period additional aliquots were removed, stripped and submitted to GPC. The concentration of the material in each aqueous sample was not determined.

The material was found to degrade to varying degrees dependent on the pH. The least amount of degradation of water soluble material was observed at pH 7.0. At pH 9.0 the polymer was almost completely degraded whilst at pH 1.2 and 4 the portion of higher molecular weight species had been reduced with a corresponding significant increase in low molecular weight species. Where solid material was recoverable, the material exhibited less degradation.

Test Facility Lubrizol (2007)

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