

File No: NA/610

August 1998

**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION  
AND ASSESSMENT SCHEME**

**FULL PUBLIC REPORT**

**Polymer in Tersperse 4913**

This Assessment has been compiled in accordance with the provisions of the *Industrial Chemicals (Notification and Assessment) Act 1989* (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 National Occupational Health and Safety Commission which also conducts the occupational health & safety assessment. The assessment of environmental hazard is conducted by the Department of the Environment and the assessment of public health is conducted by the Department of Health and Family Services.

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*Telephone:* (61) (02) 9577 9514  
*Facsimile:* (61) (02) 9577 9465

Director  
Chemicals Notification and Assessment

**FULL PUBLIC REPORT****Polymer in Tersperse 4913****Secondary Notification of Polymer in Tersperse 4913**

This report represents the revised assessment of Polymer in Tersperse 4913 when manufactured in Australia and used in industrial coatings.

Assessment of Polymer in Tersperse 4913 was carried out under the *Industrial Chemicals (Notification and Assessment) Act 1989* and the Summary Report of that assessment was published in the Chemical Gazette No. C 6 dated 2 June 1998.

In the initial notification the polymer was imported as a 32% solution for use as an emulsifier/dispersant in insecticides and/or fungicides. Orica Australia Pty Ltd notified the Director that it intended to manufacture the polymer locally, to extend its use to surface coatings, and to import it as a component in industrial biocides for surface coatings and plasters.

As a result the Director published a notice in the Chemical Gazette No. C 6 dated 2 June 1998 requiring the secondary notification of Polymer in Tersperse 4913 by Orica Australia Pty Ltd. This notice stipulated that the following additional information, referring to the relevant sections of the Schedule to the Act, was required to complete the assessment:

**Part A** Summary of Notification**Part B** Identity, Properties and Uses

2. Composition
3. Use
4. Appearance
5. Manufacture/Import volume
6. Occupational Health and Safety
7. Environmental Impact
8. Public Health
11. Label
12. MSDS

**Part D** Polymer Information

## 1. APPLICANT

Orica Australia Pty Ltd of 1 Nicholson Street MELBOURNE VICTORIA 3000 has submitted a limited notification statement in support of their application for the secondary notification of Polymer in Tersperse 4913.

## 2. IDENTITY OF THE CHEMICAL

For the notified chemical, an application was made and accepted that the chemical name, CAS No., molecular and structural formulae, exact molecular weight and spectral data be exempt from publication in the Full Public and Summary Report.

<b>Trade Name:</b>	Tersperse 4913 (containing 32% notified polymer)
<b>Method of Detection and Determination:</b>	the following analytical spectra were provided: infrared spectroscopy (IR) used for identification; <sup>1</sup> H-NMR (nuclear magnetic resonance) and <sup>13</sup> C-NMR spectra were provided to determine structure; gel permeation chromatography (GPC) used to determine molecular weight and weight distribution

The notified polymer has a number-average molecular weight (NAMW) greater than 1 000.

## 3. PHYSICAL AND CHEMICAL PROPERTIES

<b>Specific Gravity:</b>	1.08 at 25°C (Tersperse 4913)
<b>Vapour Pressure:</b>	not determined for polymer but expected to be negligible due to the polymer's high molecular weight
<b>Water Solubility:</b>	not determined for polymer but Tersperse 4913 is very soluble as it has a similar Hydrophile Lipophile Balance (HLB) number to other highly water soluble surfactants and contains a high proportion of polyethylene glycol groups which would enhance water solubility
<b>Partition Co-efficient (n-octanol/water):</b>	K <sub>ow</sub> is expected to be low
<b>Hydrolysis as a Function of pH:</b>	not determined, the polymer contains hydrolysable ester groups but hydrolysis is not likely at the environmental range of pH 4-9

<b>Adsorption/Desorption:</b>	not determined for polymer but expected to be low due to high water solubility
<b>Dissociation Constant:</b>	not determined, however, the polymer is non-ionic and is not expected to dissociate in water
<b>Flash Point:</b>	76.5°C (Tersperse 4913)
<b>Flammability Limits:</b>	upper explosive limit = 12.6% lower explosive limit = 2.6% (propylene glycol, indicative for Tersperse 4913)
<b>Autoignition Temperature:</b>	420°C (propylene glycol, indicative for Tersperse 4913)
<b>Explosive Properties:</b>	the polymer is not expected to deteriorate as a result of exposure to heat, friction or shock
<b>Reactivity/Stability:</b>	the polymer and its solution are stable under conditions of use but should avoid contact with strong oxidising agents

#### **Comments on Physico-Chemical Properties**

The adsorption/desorption properties of the notified chemical have not been investigated. The polymer would not be expected to adsorb strongly to soils and sediments due to its high water solubility. However, this may be offset by its surface activity.

The dissociation constant of the notified polymer has not been determined. The notifier claims that “the polymer is non-ionic and will not dissociate in water”. However, the polymer contains a low percentage of free carboxylic acid groups that are expected to have typical acidity.

#### **4. PURITY OF THE CHEMICAL**

<b>Degree of Purity:</b>	high
<b>Hazardous Impurities:</b>	two hazardous residual monomers, one is corrosive and present at < 0.05%, the other is an irritant and skin sensitiser and present at < 0.005%; both monomers have exposure standards

**Non-Hazardous Impurities**

(&gt; 1% by weight): none

**Additives/Adjuvants:** none**5. USE, VOLUME AND FORMULATION**

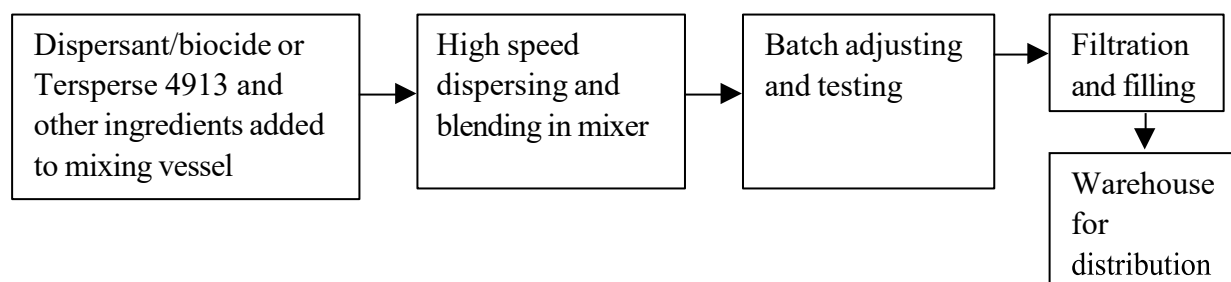
The notified polymer is to be used as a dispersant in aqueous coatings. Up to 10 tonnes of the notified polymer is to be imported in the first year. Subsequently the notified polymer will be manufactured at 10 to 100 tonnes per year in years 2 to 5. As the agricultural uses described in NA/431 (emulsifier/dispersant in the manufacture of insecticides and/or fungicides) will also be supplied from locally produced polymer, up to 150 tonnes per annum may be manufactured in years 2 to 5. This is set out in the following table:

	<i>Import (tonnes)</i>		<i>Manufacture (tonnes)</i>	
	Agricultural Use	Coating	Agricultural Use	Coating
<i>Year 1</i>	0.32 – 3.2	1 – 10	0	1 – 10
<i>Years 2 to 5</i>	0	1 – 10	3.2 - 32	10 –100

The notified polymer will be manufactured locally and formulated into coatings. The processes used are as follows:

*Polymer Manufacture*

<i>Stage 1</i>	<i>Stage 2</i>	<i>Stage 3</i>	<i>Stage 4</i>	<i>Stage 5</i>
initiator dissolved in methylethyl ketone (MEK); monomers blended; glycol solvent charged to reactor	initiator solution and monomer blend fed concurrently into reactor at 110 - 120°C; polymerisation occurs	MEK stripped from polymer product	solids content adjusted with water	polymer solution cooled, filtered and drummed for distribution

*Coatings Manufacture*

The manufactured coatings are applied by spraying or roller coating in enclosed ventilated booths in an industrial setting. Spraying onto fixed structures (eg. oil terminal) may also occur. Professional painters or home handypersons may apply architectural coatings by roller or spray.

## **6. OCCUPATIONAL EXPOSURE**

Three main groups of workers potentially exposed to the notified polymer are those involved in polymer manufacture, coatings manufacture and coatings application.

### *Polymer Manufacture*

The number and category of workers and maximum duration of exposure are as follows:

- 10 production operators for 8 hrs/day, 50 days/yr
- 5 production support workers (supervision, maintenance) for 8 hrs/day, 5 days per yr
- 5 Q.C. testing workers for 8 hrs/day, 10 days per yr
- 50 storage and transport workers for 8 hrs per day, 15 days/yr

The main hazards involved in polymer manufacture are from exposure to constituent monomers. For this reason the reactor vessel is provided with local exhaust ventilation during charging and discharging of raw materials to capture emission of volatiles at their source. In addition, reactor vessels are sealed or vented into a scrubbing system to stop or capture volatile emissions during the manufacturing process. These precautions also serve to limit exposure to the notified polymer. Drumming off of the final product takes place in an automated enclosed system.

### **Coatings Manufacture**

The number and category of workers and maximum duration of exposure are as follows:

- 100 workers for 4 hrs/day, 30 days/yr in high speed dispersing
- 100 workers for 2 hrs/day, 30 days/yr in paint makeup
- 15 workers for 8 hrs/day, 30 days/yr in Q.C. testing
- 100 workers for 8 hrs/day, 30 days/yr in container filling

Coatings manufacture will involve either the locally manufactured polymer or use of imported industrial biocides containing approximately 1.5% polymer. The locally manufactured polymer formulation will be pumped from 200 L drums to a vessel for high speed mixing with other ingredients. The batch will be adjusted and tested followed by filtration and drum filling. Spillage is stated to be possible during these operations, consequently dermal

exposure may occur. Similar processes are used for blending the industrial biocides into coatings. The biocides will be imported in 25 L drums. Addition of the contents may be manual pouring or by tipping using a drum cradle. Some limited spillage and consequent exposure is possible.

## **Coatings Application**

The number and category of workers and maximum duration of exposure are as follows:

### *Industrial Paints*

Ten workers will potentially be exposed on 200 days/yr for 8 hrs/day thinning paint, adding it to a circulating system and spraying and for 1 hr/day cleaning equipment

### *Architectural Coatings*

A large number (possibly thousands) of professional painters may be exposed 8 hrs/day, 100 days/yr. Fewer home handypersons (employed by homeowners) would be expected to be exposed for 8 hrs/day, approximately 10 days/yr.

Industrial application of coatings containing the notified polymer may be accomplished by spraying or roller coating in enclosed ventilated booths. Some dermal exposure may occur during dilution and stirring, placing of the pump and application. Coatings containing the notified polymer also may be applied to structures (eg. oil terminal) by spraying, in which case there is also potential for exposure to aerosols.

Architectural coating application may be done by professional painters or home handypersons with brush or roller with potential for dermal exposure.

## **7. PUBLIC EXPOSURE**

No significant public exposure is expected during manufacture, transport or storage. Dermal contact with the notified polymer will occur mainly with home handypersons applying coatings containing it. However, exposure will be low because of the low concentration of the notified polymer used in coatings. Public contact will also occur with the notified polymer after the coatings have been applied to domestic interior surfaces by professional tradespersons or on goods such as cars or refrigerators. However, the notified polymer will be bound in a polymer film or matrix and hence exposure will be low.

## **8. ENVIRONMENTAL EXPOSURE**

### **Release**

#### ***Polymer Production***

The notifier estimates that up to 200 kg per annum of waste polymer may be generated from the washing of the production vessel and piping used for drumming. This will be released to the local sewerage according to the trade waste agreement at a rate of 0.54 kg per day at full production (200 tonnes per annum). Minor spillage during manufacture may result in up to 400 kg of the polymer being disposed of to landfill adsorbed to solid media.

#### ***Coatings Formulation***

It is estimated that up to 700 kg per annum of waste will be generated by cleaning up minor spills, cleaning out of manufacturing equipment and rinsing out polymer solution drums during paint manufacture. This aqueous waste will be disposed of through a licensed waste disposal contractor. Following treatment the solids from the polymer solution and paint will be buried in approved landfill.

#### ***Coatings Application***

##### ***Industrial Coatings***

The coatings will be applied in a ventilated spray booth and then heat cured. Aqueous waste containing the polymer will be generated in spray booths from overspray. The notifier estimates that up to 1 500 kg per annum will be generated in this manner. The waste will be collected from manufacturing plants by licensed waste disposal contractors for disposal to landfill after treatment.

##### ***Architectural Coatings***

The polymer is also released to the environment through washings of paint application equipment and disposal of empty cans. It is estimated that approximately 1 000 kg of polymer waste will be disposed of by tradespersons and domestically per annum. Polymer from washing brushes, rollers and spray equipment will be released directly to sewer but residues from empty cans will be contained in landfill.

### **Fate**

The company submitted a study on the biodegradability of Tersperse 4913 conducted according to a modified UK Department of the Environment method and OECD Test Guideline 301F. The biodegradability was determined to be 38% after 28 days at  $20 \pm 2^\circ\text{C}$  when expressed as a ratio of the biochemical oxygen demand (BOD) to the chemical oxygen demand (COD). On the basis of total organic carbon removal, Tersperse 4913 was 55% biodegraded after 28 days. No information was given on the biodegradation of the notified



polymer itself which makes up 32% of the product. It is probable that a large proportion of the biodegradation that occurred during the test was that of propylene glycol, a solvent making up 36% of the final product, and polyethylene glycol, which is an expected product in the first hydrolysis step of the polymer. Thus the actual amount of polymer degradation was between 6.4 and 51.4% after 28 days based on organic carbon analysis. Therefore, it is expected to be slowly but not readily biodegradable. Biodegradation rates of polyacrylates are inversely correlated with molecular weights (Cook et al., 1997).

No testing of the bioaccumulation potential was conducted. The low partition coefficient and high water solubility of the notified chemical would indicate it is not likely to bioaccumulate (Connell, 1989). Additionally, biological membranes are not permeable to polymers of very large molecular size and therefore bioaccumulation of the notified polymer is not expected (Gobas et al., 1986).

The fate of the majority of the notified chemical will share that of the industrial and architectural coatings into which it is formulated, which when cured will share the fate of the building materials to which they are applied. The final environmental fate being mostly landfill with some incineration. The probable degradation pathway of the notified polymer in soils provided by the notifier begins with the fission of the methoxypolyethyleneglycol chains from the polymethacrylic backbone by hydrolysis of the ester linkage. All surface activity is lost after this step. Next, methyl oxidation at either end of the polyethyleneglycol chain forms carboxyl functional groups which can then be beta oxidised ultimately to water and carbon dioxide. The polymethacrylic backbone is expected to precipitate as the Ca or Mg salt and then slowly biodegrade by end cleavage methyl and beta oxidation. Any incineration of the notified chemical is expected to produce water and oxides of carbon.

The small amount of polymer released sewer as a result of polymer manufacture will be diluted and treated at the Werribee treatment plant.

## 9. EVALUATION OF TOXICOLOGICAL DATA

The following studies on acute oral toxicity, eye irritation and skin sensitisation were provided for Tersperse 4913, a product that contains 32% the notified polymer.

### 9.1 Acute Toxicity

#### Summary of the acute toxicity of Tersperse 4913

<i>Test</i>	<i>Species</i>	<i>Outcome</i>	<i>Reference</i>
acute oral toxicity	rat	LD <sub>50</sub> > 2 000 mg.kg <sup>-1</sup>	(Parr-Dobrzanski, 1995a)
eye irritation	rabbit	slight irritant	(Parr-Dobrzanski, 1995b)
skin sensitisation	guinea pig	non-sensitiser	(Bugg, 1995)

### 9.1.1 Oral Toxicity (Parr-Dobrzanski, 1995a)

<i>Species/strain:</i>	rat/Sprague Dawley
<i>Number/sex of animals:</i>	5/sex
<i>Observation period:</i>	14 days
<i>Method of administration:</i>	given orally by gavage
<i>Clinical observations:</i>	no abnormalities were observed
<i>Mortality:</i>	no deaths
<i>Morphological findings:</i>	no abnormalities were noted at necropsy
<i>Test method:</i>	based on OECD Guidelines for Testing of Chemicals (Organisation for Economic Co-operation and Development, 1995-1996)
<i>LD<sub>50</sub>:</i>	> 2 000 mg.kg <sup>-1</sup>
<i>Result:</i>	Tersperse 4913 was of low acute oral toxicity in rats

### 9.1.2 Eye Irritation (Parr-Dobrzanski, 1995b)

<i>Species/strain:</i>	rabbit/New Zealand White
<i>Number/sex of animals:</i>	3 males
<i>Observation period:</i>	three days at 24 hour intervals
<i>Method of administration:</i>	ocular administration
<i>Irrigated eyes:</i>	slight conjunctival redness and slight to moderate discharge one hour after dosing; no additional signs of irritation observed
<i>Test method:</i>	based on OECD Guidelines for Testing of Chemicals (Organisation for Economic Co-operation and Development, 1995-1996)
<i>Result:</i>	Tersperse 4913 was a slight irritant to the rabbit eye

### 9.1.3 Skin Sensitisation (Bugg, 1995)

<i>Species/strain:</i>	guinea pigs/Pirbright Albino (males)
<i>Number of animals:</i>	20 test; 10 control
<i>Induction procedure:</i>	topical induction using 100% Tersperse 4913
<i>Challenge procedure:</i>	a topical challenge was conducted using 30% (top left) and 100% (top right) Tersperse 4913

*Challenge outcome:*

<b>Challenge concentration</b>	<b>Test animals</b>		<b>Control animals</b>	
	<b>24 hrs*</b>	<b>48 hrs*</b>	<b>24 hrs</b>	<b>48 hrs</b>
30%	**0/20	0/20	0/10	0/10
100%	0/20	0/20	0/10	0/10

\* time after patch removal

\*\* number of animals exhibiting positive response

*Test method:* based on OECD Guidelines for Testing of Chemicals (Organisation for Economic Co-operation and Development, 1995-1996)

*Result:* Tersperse 4913 was not a skin sensitiser in guinea pigs

## 9.2 Overall Assessment of Toxicological Data

Based on studies done and information provided by the notifier, Tersperse 4913 containing 32% of the notified polymer may be of low acute oral toxicity in rats, a slight irritant to the eyes of rabbits and a non-sensitiser to guinea pig skin. Although no data were available, the Material Safety Data Sheet states that Tersperse 4913 may be a skin and respiratory irritant.

On the basis of submitted data, both the product and the notified polymer would not be classified as hazardous in accordance with the NOHSC *Approved Criteria for Classifying Hazardous Substances* (National Occupational Health and Safety Commission, 1994a) in relation to acute oral toxicity, eye irritation and skin sensitisation.

## 10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

For surfactants with MW greater than 1 000, toxicity is generally low when the hydrophobic component is small relative to the hydrophilic component (Nabholz et al., 1993). For the notified polymer, this is expected to be true given its high water solubility. Acute toxicity studies on three aquatic organisms submitted by the company confirmed this low toxicity.

Organism	Test Type	Time	Parameter and Result (mg a.i./L)	Formulation (% a.i.)
Crimson spotted rainbow fish ( <i>Melanotaenia fluviatilis</i> )	Static renewal	96 h	$512 \leq LC_{50} \leq 896$	Tersperse 4913 (32%)
Water flea ( <i>Daphnia magna</i> )	Static	48 h	$EC_{50} = 120$ (98, 146)	Tersperse 4913 (32%)
Alga ( <i>Selenastrum capricornutum</i> )	shaken twice	72 h	$IC_{50} = 752$ (656, 866)	Tersperse 4913 (32%)

The study of Windeatt and Banner on *Daphnia magna* (Windeatt & Banner, 1995) was said to follow OECD and EEC guidelines. However, the calculation of the  $EC_{50}$  was based on a method not considered valid and was recalculated using probit analysis to yield 373 (306, 457) mg Tersperse 4913/L. As the notified polymer makes up only 32% of Tersperse 4913, the 48-h  $EC_{50}$  of the polymer is approximately 120 (98, 146) mg a.i./L based on nominal concentrations and assuming there were no confounding effects from other components of the formulation. This classifies the polymer as practically nontoxic to daphnids.

An endemic Australian species, the Crimson spotted rainbow fish (*Melanotaenia fluviatilis*, mean length  $5.1 \pm 0.6$  cm, mean weight  $1.5 \pm 0.5$  g), was exposed to five concentrations of Tersperse 4913 up to 5 000  $mg \cdot L^{-1}$  for 96 hours (O'Brien & Davies, 1997). Treatment solutions of soft water (hardness  $< 30$   $mg CaCO_3 \cdot L^{-1}$ ) were maintained at 17.0-19.2°C, pH 5.9-6.7 and renewed daily. After accounting for the 32% content of notified polymer, the 96-hour  $LC_{50}$  lies between the concentrations of 512 and 896  $mg a.i. \cdot L^{-1}$  which caused 0 and 100% mortality, respectively. This would classify the polymer as practically nontoxic to this species.

The toxicity of Tersperse 4913 to *Selenastrum capricornutum* was examined according to OECD protocols (Stauber, 1997). Flasks containing treatment solutions were incubated at  $24 \pm 2^\circ C$ , pH 7.0-8.9, continuous light and shaken twice daily by hand. After 72 hours, the  $IC_{50}$  was reported as 2 380 (2 125, 2 666) mg/L using nominal concentrations but no calculations were shown. The 72-hour  $IC_{50}$  was calculated to be 752 (656, 866) mg a.i./L after correcting for the 32% content of the notified polymer in Tersperse 4913. This is classified as practically nontoxic.

No other aquatic ecotoxicology studies have been provided which is normally acceptable for polymers with a NAMW greater than 1 000 according to the Act. However, summary data on two expected degradation products, polyethylene glycol and polyacrylic acid, were submitted. Polyethylene glycol had a 24-hour  $LC_{50}$  to goldfish of greater than 5 000 mg a.i./L and a 15-min  $EC_{50}$  to *Photobacterium phosphoreum* of greater than 100 mg a.i./L. Polyacrylic acid was practically nontoxic to zebra fish ( $LC_{50} > 200$  mg a.i./L), bluegill sunfish ( $LC_{50}$

greater than 1 000 mg a.i./L), *D. magna* (LC<sub>50</sub> greater than 200 mg a.i./L) and the alga *Scenedesmus subspicatus* (EC<sub>10</sub> greater than 180 mg a.i./L) in 48 and 96-hour experiments (ECETOC, 1993). In 21-day daphnid reproduction tests, however, divergent results were obtained with NOEC values of 12 and 450 mg a.i.·L<sup>-1</sup> in different experiments. It also had a low toxicity to earthworms (LC<sub>50</sub> > 1 000 mg a.i.·kg soil<sup>-1</sup>) and did not inhibit the growth of corn, soybean, wheat and grass seeds at up to 225 mg a.i.·kg soil<sup>-1</sup>. Nabholz et al. (1993) report that polyacrylic acid is moderately toxic to green algae.

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

The fate of the majority of the notified chemical will share that of the industrial and architectural coatings into which it is formulated, which when cured will share the fate of the building materials to which they are applied. The final environmental fate will be mostly landfill with some incineration. In landfill the polymer is expected to remain trapped within the coatings matrix. Any incineration of the notified chemical is expected to produce water and oxides of carbon.

As a result of polymer manufacturing at the Melbourne plant, up to 200 kg per annum will be released to the western Melbourne sewerage system. In the sewer, this quantity will be diluted by the average daily inflow to the Werribee treatment plant of 500 ML, giving a maximum concentration in sewage effluent of 1 ppb. This PEC value is well below the levels at which the polymer exhibits toxicity to aquatic organisms. Additionally, during treatment it is anticipated that some of the polymer will be degraded and some will be removed by partitioning to sediment (sludge) or soils of Werribee Farm, with the remainder discharged to the receiving waters of Port Philip Bay. Thus, the concentration of the notified chemical in receiving waters from Werribee farm is expected to be significantly lower than the PEC of 1 ppb.

Washing of application equipment for architectural coatings containing the notified polymer will result in a maximum PEC of 1 ppb in Australian sewage wasters (assuming all 1 000 kg of the waste discharged to the sewer, with an average per capita water consumption of 150 L per day for a population of 18 million people).

Hence the overall environmental hazard posed by the manufacture of the polymer at the proposed level or its use architectural and industrial coatings is expected to be low.

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

No data on effects in humans were available for assessment. However, based on results of animal studies using Tersperse 4913 (containing 32% of the notified polymer), the notified polymer is likely to exhibit low acute oral toxicity and slight eye irritation, and is unlikely to present a risk of skin sensitisation to workers. The MSDS for Tersperse 4913 suggests it may be a skin and respiratory irritant. However, none of the experimental data provided for

assessment support this. Systemic effects from dermal exposure are unlikely as dermal absorption will be limited because of the high NAMW of the notified polymer. The levels of residual monomers and low molecular weight species in the notified polymer are unlikely to present a health hazard. There are no hazardous impurities present in sufficient concentrations to render the polymer hazardous.

### *Polymer Manufacture*

During manufacture of the polymer, potential for exposure is limited because engineering controls are used to control exposure to constituent monomers. Two of the constituent monomers have exposure standards (100 ppm and 20 ppm) and are corrosive and skin sensitisers. Local exhaust ventilation is used during blending and to capture volatiles emanating from the reactor. These precautions also serve to control exposure to the polymer. There may be some risk of slight eye irritation resulting from exposure to Tersperse 4913 as a result of spillage and according to the MSDS, skin and respiratory irritation, however, the risk of adverse systemic health effects is low.

### *Coatings Manufacture*

Manufacture of coatings involves pumping the polymer solution into a mixing vessel. Contamination via spills may occur during addition and blending, sampling for testing, and drumming off. Manufacture of coatings using imported biocides may also result in exposure, but this is expected to be low given that the polymer concentration is approximately 4.5%. In either case the risk of adverse health effects from exposure the notified polymer is negligible. However, there is a risk of slight eye irritation, and skin and respiratory irritation as noted above, due to exposure to Tersperse 4913.

The MSDS for the imported biocide suggests that there is risk of eye and skin irritation, skin sensitisation, irritation of mucous membranes and the respiratory tract and liver and blood disorders from repeated or prolonged exposure. These effects are not due to the notified chemical but to the active constituent in the biocide formulation.

### *End-use*

During application of coatings by spraying in spray booths, exposure to spray is likely to be minimal, although some dermal exposure is possible during mixing and cleaning equipment. Where spraying is conducted outdoors some exposure to overspray is possible and a mask should be worn if the coating is classified as hazardous according to the NOHSC *Approved Criteria for Classifying Hazardous Substances* (National Occupational Health and Safety Commission, 1994a). Where application of architectural coatings is carried out by tradespersons or home handypersons, dermal exposure is likely and may be prolonged. However, the risk of adverse health effects caused by the notified polymer is expected to be negligible.

The risk of adverse health effects to workers or the general public arising from transport,

storage, use or disposal of the notified polymer is expected to be minimal due to the likely low hazard and limited exposure.

### **13. RECOMMENDATIONS**

To minimise occupational exposure to the notified polymer the following guidelines and precautions should be observed:

- Spillage of the notified chemical should be avoided. Spillage should be cleaned up promptly with absorbents which should be put into containers for disposal;
- Good personal hygiene should be practised to minimise the potential for secondary ingestion;
- A copy of the relevant Material Safety Data Sheet should be easily accessible to employees.

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

The MSDS for Tersperse 4913 and for an industrial biocide containing the notified polymer were provided. Both are in a format consistent with the NOHSC *National Code of Practice for the Preparation of Material Safety Data Sheets* (National Occupational Health and Safety Commission, 1994b).

These MSDS were provided by the applicant as part of the notification statement. They are 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 the Act, secondary notification of the notified chemical 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

- Bugg L (1995) Skin Sensitisation Study of Polymer in Hypermer CG6 in Albino Guinea Pigs, Project No. GG6517, Zeneca Central Toxicology Laboratory, Devon, U.K.
- Connell DW (1989) General characteristics of organic compounds which exhibit bioaccumulation. In: D. W. Connell ed. *Bioaccumulation of Xenobiotic Compounds*. CRC Press, Boca Raton.
- Cook BD, Bloom PR & Halbach TR (1997) Biodegradation and bioremediation: fate of a polyacrylate polymer during composting of simulated municipal solid waste. *Journal of Environmental Quality*, 26: 618-625.
- ECETOC (1993) Joint assessment of commodity chemicals No. 23: *Polycarboxylate polymers as used in detergents*, Project No. European Centre for Ecotoxicology and Toxicology of Chemicals, Brussels, Belgium.
- Gobas FAPC, Opperhuizen A & Hutzinger O (1986) Bioconcentration of hydrophobic chemicals in fish: relationship with membrane permeation, *Environmental Toxicology and Chemistry* 5:637-646.
- Nabholz JV, Miller P & Zeeman M (1993) Environmental Risk Assessment of New Substances under the Toxic Substances Control Act Section Five. In: W. G. Landis, J. S. Hughes and M. A. Lewis ed. *Environmental Toxicology and Risk Assessment*, American Society for Testing and Materials. ASTM STP 1179, Philadelphia p. 40-55.
- National Occupational Health and Safety Commission (1994a) Approved Criteria for Classifying Hazardous Substances [NOHSC:1008(1994)], Australian Government Publishing Service, Canberra.
- National Occupational Health and Safety Commission (1994b) National Code of Practice for the Preparation of Material Safety Data Sheets [NOHSC:2011(1994)] , Australian Government Publishing Service, Canberra.
- O'Brien T & Davies W (1997) Toxicity of an experimental surfactant to the Crimson Spotted Rainbowfish *Melanotaenia fluviatilis*, Freshwater Ecology Division, Marine & Freshwater Resources Institute, Queenscliff, Victoria.
- Organisation for Economic Co-operation and Development (1995-1996) OECD Guidelines for the Testing of Chemicals on CD-Rom. Paris, OECD.
- Parr-Dobrzanski RJ (1995a) Acute Oral Toxicity Study in Sprague Dawley rats with Polymer in Hypermer CG6, Project No. AR6038, Zeneca Central Toxicology Laboratory, Devon, U.K.



Parr-Dobrzanski RJ (1995b) Primary Eye Irritation Study in Albino Rabbits with Polymer in Hypermer CG6, Project No. FB5199, Zeneca Central Toxicology Laboratory, Devon, U.K.

Stauber J (1997) Toxicity of a polymeric dispersant to the freshwater green alga *Selenastrum capricornutum*, CSIRO Investigation Report CET/IR10, Centre for Advanced Analytical Chemistry, Commonwealth Scientific and Industrial Research Organisation, Menai, NSW.

Windeatt AJ & Banner AJ (1995) Hypermer CG-6: determination of acute toxicity to *Daphnia magna*, Project No. AB0532/A, Brixham Environmental laboratory, ZENECA Limited, Devon, U.K.