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**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME
(NICNAS)**

FULL PUBLIC REPORT

Polymer in Disperbyk-185

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**Director
NICNAS**

TABLE OF CONTENTS

FULL PUBLIC REPORT	4
1. APPLICANT AND NOTIFICATION DETAILS	4
2. IDENTITY OF CHEMICAL	4
3. COMPOSITION.....	4
4. INTRODUCTION AND USE INFORMATION.....	5
5. PROCESS AND RELEASE INFORMATION.....	5
5.1. Distribution, Transport and Storage.....	5
5.2. Operation Description.....	5
5.3. Occupational exposure.....	5
5.4. Release.....	6
5.5. Disposal	7
5.6. Public exposure.....	7
6. PHYSICAL AND CHEMICAL PROPERTIES.....	7
7. TOXICOLOGICAL INVESTIGATIONS	9
7.1. Acute toxicity – oral	9
7.4. Irritation – skin	9
7.5. Irritation - eye	9
8. ENVIRONMENT.....	10
8.1. Environmental fate.....	10
8.2. Ecotoxicological investigations	10
9. RISK ASSESSMENT	10
9.1. Environment	10
9.1.1. Environment – exposure assessment.....	10
9.1.2. Environment – effects assessment	11
9.1.3. Environment – risk characterisation.....	11
9.2. Human health.....	11
9.2.1. Occupational health and safety – exposure assessment	11
9.2.2. Public health – exposure assessment.....	12
9.2.3. Human health - effects assessment	12
9.2.4. Occupational health and safety – risk characterisation	12
9.2.5. Public health – risk characterisation.....	12
10. CONCLUSIONS – ASSESSMENT LEVEL OF CONCERN FOR THE ENVIRONMENT AND HUMANS.....	12
10.1. Hazard classification.....	12
10.2. Environmental risk assessment	12
10.3. Human health risk assessment	12
10.3.1. Occupational health and safety.....	13
10.3.2. Public health.....	13
11. MATERIAL SAFETY DATA SHEET	13
11.1. Material Safety Data Sheet	13
11.2. Label	13
12. RECOMMENDATIONS.....	13
12.1. Secondary notification	13
13. BIBLIOGRAPHY	14

FULL PUBLIC REPORT**Disperbyk-185****1. APPLICANT AND NOTIFICATION DETAILS**

APPLICANT(S)

Nuplex Industries (Aust) Pty Ltd (ABN 25 000 045 572)
49-61 Stephen Road, Botany NSW 2019

SECOND APPLICANT(S)

Degussa Coatings and Colorants Pty Ltd (ABN 16 079 823 313)
30 Commercial Drive, DANDENONG SOUTH VIC 3175

Nuplex Industries (Aust) Pty Ltd have agreed to this extension.

NOTIFICATION CATEGORY

Limited: Polymer with NAMW ≥ 1000 (greater than 1 tonne per year).

EXEMPT INFORMATION (SECTION 75 OF THE ACT)

Data items and details claimed exempt from publication:

Chemical name

CAS No

Molecular weight

Molecular formula

Structural formula

Spectral data

Identity of hazardous/non hazardous impurities

Details of the polymer composition

Loss of monomers, other reactants, additives, impurities

VARIATION OF DATA REQUIREMENTS (SECTION 24 OF THE ACT)

No variation to the schedule of data requirements is claimed.

PREVIOUS NOTIFICATION IN AUSTRALIA BY APPLICANT(S)

None

NOTIFICATION IN OTHER COUNTRIES

Canada. NSN number 5914.

2. IDENTITY OF CHEMICAL

MARKETING NAME(S)

Disperbyk-185

METHODS OF DETECTION AND DETERMINATION

ANALYTICAL Infrared (IR) spectroscopy

METHOD

Remarks A reference spectrum was provided.

3. COMPOSITION

DEGREE OF PURITY

High

4. INTRODUCTION AND USE INFORMATION

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

The notified polymer will be imported from the Germany as a solution (at 52%) and reformulated to prepare industrial and architectural paints in Australia.

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

<i>Year</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>
<i>Tonnes</i>	20-25	20-25	20-25	20-25	20-25

USE

The notified polymer will be used as a wetting and dispersing additive for aqueous, solvent-based and solvent-free coatings and pigment concentrates, for industrial and architectural paints. The notified polymer will be used between 0.1% and 1.5% of total paint formulation.

The second applicant will import the notified polymer for formulation into a colorant which will be solely used for tinting both aqueous emulsion paints (20% of use) and enamel alkyd and modified alkyd paints (20% of use). The final tinted paint would contain less than <1% notified polymer.

5. PROCESS AND RELEASE INFORMATION

5.1. Distribution, Transport and Storage

PORT OF ENTRY

Sydney and/or Melbourne.

IDENTITY OF MANUFACTURER/RECIPIENTS

Nuplex Industries (Aust) Pty Ltd is the recipient. However, a variety of other companies located throughout Australia may manufacture the paint.

TRANSPORTATION AND PACKAGING

The notified polymer will be stored and transported in steel drums of 60L or 200 L capacity. Paints are packaged in tin pails of varying sizes typically 1, 5, 10, and 20 L pails. The coatings will be stored and transported in 20 L steel pails or 200 L steel drums. Transport will be by road or rail.

5.2. Operation Description

Paint Manufacture:

A mixing vat is loaded with the notified polymer and other ingredients and the contents undergo high speed dispersing and blending. Once the batch has been adjusted and passed quality testing, it is filtered and filled into containers, which will be stored on-site in a warehouse until required by customers. The final paint contains up to 1.5% notified polymer.

Finished colorants may also be supplied to paint stores (~5%) who will carry out tinting before supplying paints to customers. Tinting include adding the required amount of colorant and paint base into a dispensing tube and mixing using a shaker machine.

Colorants formulated by customers of the second applicant will contain 8.58% of the notified polymer.

Paint Application:

Industrial paint application involves the use of spray, roller coatings or dipping equipment in an environment with a filtered exhaust system. Architectural coatings will be applied by professional painters and during periods of Do-It-Yourself (DIY), by brush, roller and occasionally spray.

5.3. Occupational exposure

Number and Category of Workers

<i>Category of Worker</i>	<i>Number</i>	<i>Exposure Duration</i>	<i>Exposure Frequency</i>
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Dock, transport and warehousing personnel	10	incidental	200 days/year
Paint manufacture	130	2-8 hrs/day	30 days/year
Paint application	60	2-8 hrs/day	200 days/year
Paint tinting	2000	0.5 hrs/day	200 days/year

Exposure Details

Dock, transport and warehousing personnel

These workers are not expected to be exposed to notified polymer, as they will only handle closed containers and would only be exposed to the notified polymer in the case of an accident. Workers involved in this process are expected to wear long sleeve clothing. In case of spillage, overalls, impervious gloves and goggles will be worn and if necessary an organic vapour respirator.

Paint (coating) manufacture:

The notifier has not provided an estimate of the number of reformulation sites at which paint will be manufactured.

Pigment dispersion stage: the 52% solution of the notified polymer is either metered directly to the mixer (with solvent, resin) under local exhaust ventilation, or is manually added from drums or pails. There is potential for dermal exposure to drips and spills of the polymer solution to occur during mixing/blending. Workers involved in this process are expected to wear overalls or PVC apron, impervious gloves and goggles.

Makeup (batch adjust) stage and QC testing stage: At this stage, the batch is adjusted for viscosity and quality control tests are also performed. All quality control testing of paint involving spray painting is performed in an approved booth subject to regular maintenance procedures. There is potential for dermal exposure to drips and spills of polymer solution to occur during this time. The workers use the same handling and control measures as described above. The paints will contain a maximum of 1.5% notified polymer.

Filling stage: filling of the finished paint (coatings) containing a maximum of 1.5% notified polymer into containers is carried out under local exhaust ventilation to capture any vapour generated at source and workers wear overalls, impervious gloves and goggles.

Retail Paint Tinting: colorants containing the notified polymer will be added in small quantities to base paints from a dispenser. Dermal exposure to the tinter containing a high proportion of notified polymer may occur particularly when adding the tinter from 1 L cans to the dispenser.

Paint (coating) application

Paint application (industrial) involves the use of spray, roller coating or dipping equipment in an environment with a filtered exhaust system. There is potential for worker exposure because of accidental spillage when stirring the finished paint and pumping it into trays. Spray applications are likely to occur in spray booths. Workers could also be exposed during cleaning of the equipment. Workers wear overalls, impervious gloves and goggles, and respirators are also used during spray application.

5.4. Release

RELEASE OF CHEMICAL AT SITE

The notified polymer is an additive in solvent-free universal tinters, which are blended into aqueous, solvent-based and solvent-free architectural coatings. The percentage of notified polymer in the tinters varies from 3 - 80% depending on the pigment type. The percentage of notified polymer in the final architectural coatings will be between 0.1% and 1.5% of total paint formulation.

Manufacture

There is potential for release of the notified polymer through equipment cleaning and accidental spillage during the mixing/blending, batch adjustment, QC testing, and filling stages of coating formulation. The notifier has estimated that approximately 80 kg per year of the notified polymer will

be wasted due to the cleaning of process equipment, containers and spills. A licensed waste disposal contractor will collect this material and dispose of it in line with state requirements, generally this is likely to be to landfill but may include incineration.

RELEASE OF CHEMICAL FROM USE

The notifier estimates that approximately 95% of colorants containing the notified polymer will be used by paint companies for “in house” coloration of their paint bases, and the remaining 5% will be supplied by paint companies to retail outlets for “point of sale” tinting of paint bases. Paint could be applied in industrial applications or by professional painters and DIY users. No breakdown of industrial versus DIY applications was provided.

Paint (coating) application

Industrial paint will be applied by spray, roller coating or dipping equipment in an environment with a filtered exhaust system. Of these three proposed application methods, spray painting has the highest loss rate. The transfer efficiency for spraying is approximately 30%, with the remaining 70% captured as overspray in the spray booth filters. The other application methods will have a loss rate significantly less than this but all losses will be contained in the application booths.

The notifier estimates that up to 8 tonnes per annum of waste polymer could be generated during application (this volume of waste presumably would result if spray application is the dominant usage pattern). The wastes will be disposed of by licensed waste disposal contractors, generally to landfill. A small amount of the paint will remain in the empty containers (< 2%). These containers are collected by licensed drum recyclers who will clean them via incineration. It is estimated that approximately 50 kg of the notified polymer will be lost in this way.

Retail outlets

The notifier estimates that 2.5% (equating to about 25 kg per year, assuming 5% is sold in retail outlets) of the notified chemical in the colorant sold in retail outlets could be lost due to periodic cleaning of paint carousel dispenser tubes and residues in empty colorant cans. These wastes are likely to be disposed of in Municipal landfill.

DIY paint application

Professional painters and DIY users are expected to apply the paint predominantly by brush or roller. The notifier estimates that 150 kg of notified polymer could end up in the sewer each year when paint equipment is cleaned by DIY users. A further 225 kg of notified chemical is expected to be disposed of with empty containers most likely in Municipal landfill.

5.5. Disposal

Most of the waste paint is likely to be disposed of in landfill, with a small proportion going to the sewer or incinerated.

5.6. Public exposure

The notifier has stated that public will come into contact with the polymer after it has been applied to and becomes an integral part of a hard durable coating on articles such as motor vehicles and packaging materials. The potential public exposure would arise from a spill during the transport of the polymer solution or coating containing it.

The public will also be exposed to the notified polymer during household painting, as a small proportion of the paint containing the notified polymer may also be used Australia wide in general architectural coatings. The notifier has estimated that approximately 5% of the notified polymer will be used in retail paints.

6. PHYSICAL AND CHEMICAL PROPERTIES

Appearance at 20°C and 101.3 kPa

Light yellow liquid with a mild odour.

Boiling Point	> 200°C
Density	1130 kg/m ³ at 20°C.
Method	DIN 53217, OECD 109
Remarks	For the polymer solution.
Vapour Pressure	< 0.1 kPa at 20°C
Water Solubility	Not determined
Remarks	There is no water solubility data for the polymer. However, based on a similar product, Disperbyk 184, the water solubility is expected to be in the order of 0.9 g/L.
Hydrolysis as a Function of pH	Not determined
Remarks	The polymer contains linkages which may hydrolyse, however, this is unlikely under normal environmental conditions.
Partition Coefficient (n-octanol/water)	Not determined
Remarks	The partition coefficient was determined for a structurally similar polymer, Disperbyk 184, to be -1.52 ($K_{ow} < 0.03$) indicating a poor affinity to lipids.
Adsorption/Desorption	Not determined
Remarks	No test was performed. As the carrier solvent evaporates the polymer solution will become more viscous and sticky, thus binding to soil and sediments, which will be helped by any cationic functionalities formed.
Dissociation Constant	Not determined
Remarks	No test was performed. Since the polymer contains a tertiary nitrogen functionality, it is expected to have typical basicity.
Particle Size	Not determined
Remarks	The notified polymer is only used in Australia in solution form.
Flash Point	> 93°C.
Remarks	For the polymer solution.
Flammability Limits	Not determined
Remarks	The notified polymer does not form flammable vapours and thus this property was not been tested.
Autoignition Temperature	Not applicable for the polymer solution.
Explosive Properties	Not determined
Remarks	No explosive properties are predicted based on the structure.
Reactivity	Not determined

Remarks The notified polymer is expected to be stable under normal environmental conditions.

7. TOXICOLOGICAL INVESTIGATIONS

<i>Endpoint and Result</i>	<i>Assessment Conclusion</i>
Rat, acute oral LD50 >6000 mg/kg bw	low toxicity
Rabbit, skin irritation	non-irritating
Rabbit, eye irritation	slightly irritating

7.1. Acute toxicity – oral

TEST SUBSTANCE BYK-LP-N-6006.

METHOD OECD TG 401 Acute Oral Toxicity – Limit Test.

Species/Strain Rat/Wistar

Vehicle 30% suspension in Tylose with some drops of Tween 60.

Remarks - Method Dose volume is 1 ml/100 g bw (group I) and 2 ml/100 g bw (group II).

RESULTS

<i>Group</i>	<i>Number and Sex of Animals</i>	<i>Dose mg/kg bw</i>	<i>Mortality</i>
I	5/sex	3000	None
II	5/sex	6000	None

LD50 > 6000 mg/kg bw

Signs of Toxicity None

Effects in Organs The only change was a slight hyperaemia in small intestines.

Remarks - Results The animals showed normal weight gain.

CONCLUSION The notified chemical is of low toxicity via the oral route.

TEST FACILITY Pharmatox (1989a)

7.4. Irritation – skin

TEST SUBSTANCE BYK-LP-N-6006

METHOD Not stated

Species/Strain Rabbit/New Zealand White

Number of Animals Five

Vehicle 30% suspension in Tylose with some drops of Tween 60.

Observation Period 72 hours

Type of Dressing Occlusive

Remarks - Method The notified polymer was applied to both intact and abraded skin.

RESULTS

Remarks - Results Draize scores for erythema and oedema were zero for all animals at both intact and abraded sites.

CONCLUSION The notified chemical is non-irritating to skin.

TEST FACILITY Pharmatox (1989b)

7.5. Irritation - eye

TEST SUBSTANCE BYK-LP-N-6006

METHOD OECD TG 405 Acute Eye Irritation/Corrosion.

Species/Strain	Rabbit/New Zealand White
Number of Animals	Six
Observation Period	7 days
Remarks - Method	0.1 ml of the notified polymer was instilled as a 30% suspension into the conjunctival pouch of the left eye. The right eye stayed untreated and served as control.
Remarks - Results	All Draize scores for conjunctival, corneal and iris irritation were zero at 24, 48 and 72 hrs after instillation. Draize scores of 1 were recorded for conjunctival redness, chemosis and discharge at 1 hr for all animals.
CONCLUSION	The notified chemical is slightly irritating to the eye.
TEST FACILITY	Pharmatox (1989c)

8. ENVIRONMENT

8.1. Environmental fate

No environmental fate data were submitted.

8.2. Ecotoxicological investigations

No ecotoxicity data were submitted.

9. RISK ASSESSMENT

9.1. Environment

9.1.1. Environment – exposure assessment

The notified polymer is an additive in aqueous, solvent-based and solvent-free architectural coatings. As such, most of the polymer will be incorporated into the paint matrix on the surfaces of buildings and will not be available for release. Some release of the notified polymer into the environment may occur during manufacture and during application of the paint.

The notifier estimates approximately 80 kg per year of the notified polymer will be wasted during manufacture. A further 8 tonnes of waste polymer may be collected on filters each year from overspray, and 300 kg of waste may be generated from roller and brush applications and container residues. The paint wastes are most likely to be disposed of in landfill in a diffuse manner owing to the expected nationwide use of the products. Waste polymer will have reacted with the other components to form an inert matrix before reaching landfill, rendering the notified polymer immobile.

No biodegradation data are available for the notified polymer; however, an inherent biodegradability test performed for a structurally similar polymer, Disperbyk 184 resulted in a mean biodegradation rate over the 28-day study period of 72%, classifying the polymer as ultimately biodegradable. Thus, the polymer is expected to slowly degrade through biotic processes in landfill.

There is potential for some of the notified polymer to be released into the sewer during DIY applications. The notifier estimates up to 150 kg per annum of notified polymer could end up in the sewer when paint equipment is cleaned. From these estimates, a daily PEC being discharged to sewer each year of 1.05×10^{-4} mg/L is expected. This value assumes diffuse release with no attenuation within the sewage systems, and a population of 19.5 million people using 200 L water/person/day (3900 ML/day for total population).

Based on dilution factors of 1 and 10 for inland and ocean discharges of STP-treated effluents,

respectively, the predicted daily PEC of the notified chemical in fresh water is approximately 1.05×10^{-4} mg/L and in marine surface waters, approximately 1.05×10^{-5} mg/L.

9.1.2. Environment – effects assessment

No data were provided for the notified polymer. However, ecotoxicity data are available for a structurally similar polymer, Disperbyk 184, which is expected to have comparable toxicity. Test results for Disperbyk 184 showed a 96 h LC₅₀ for Fathead Minnow of 4.6 mg/L, a 48 h LC₅₀ for *Daphnia magna* of > 1000 mg/L, and a 96 h EC₅₀ for green algae of 1.3 mg/L, indicating Disperbyk 184 is moderately toxic to fish and algae, while being practically non-toxic to daphnids.

A further test was performed with Disperbyk 184 on Fathead Minnow in test water with dissolved organics. The results showed a 96 h LC₅₀ of 82 mg/L in the presence of 10 mg/L humic acid, and a 96 h LC₅₀ of 350 mg/L in the presence of 20 mg/L humic acid.

Using the lowest EC₅₀ for green algae exposed to Disperbyk 184, and assuming a safety factor of 100 the predicted no effect concentration (PNEC) is 0.013 mg/L.

9.1.3. Environment – risk characterisation

The notified polymer is an additive in architectural coatings, and as such, most of the polymer will be incorporated into the inert paint matrix, posing little risk to the environment.

Most wastes generated during paint application and in container residues are typically allowed to harden, where the polymer is bound within the paint matrix in an inert manner, hence environmental risks are low, particularly in landfills with leachate collection and treatment plants.

With potential for aquatic release during DIY applications, the predicted daily PEC of the notified chemical in fresh water assuming release of 150 kg/annum of the notified polymer by DIY painters is approximately 1.05×10^{-4} mg/L and in marine surface waters, approximately 1.05×10^{-5} mg/L. The PEC/PNEC ratios, based on surrogate data, are 8.1×10^{-3} and 8.1×10^{-4} respectively, indicating a low hazard to aquatic organisms.

9.2. Human health

9.2.1. Occupational health and safety – exposure assessment

Workers involved in transport, warehousing, paint manufacture, and application are likely to be exposed to the notified polymer. The most likely routes of exposure are dermal and inhalation (during spray applications), however ocular exposure may occur as a result of splashing following accidental spillage. The following activities were identified as potential exposure scenarios:

- weighing and mixing the notified polymer with other ingredients
- batch adjustment and QC testing
- filling paint containers
- tinting base paints in retail stores
- transferring the paint (coatings) from one container to another
- pumping the finished paint containing up to 1.5% notified polymer into trays
- applying the finished paint in industrial situation

The highest occupational exposure is expected to be for workers involved in manufacturing of the coating, and for paint shop workers involved in tinting base paints, as these workers will handle concentrated amounts of notified polymer. All other workers are expected to handle the notified chemical only in sealed containers containing up to 1.5% of notified polymer, or handle only the finished products containing up to 1.5% of notified polymer.

Skin contamination, and limited ocular exposure can occur when tinting base paints prior to application. Paint shop workers will have the highest exposure to the colorants, as PPE is often limited to overalls or equivalent clothing.

Workers in the manufacturing plant are expected to use local exhaust ventilation and personal

protective equipment. During application, in industrial situations, the main use is by spraying and it is likely that workers will use spray booths fitted with exhaust ventilation. During spraying, workers may wear a respirator.

Exposure during transport and warehousing is only likely in the case of accidental spills.

9.2.2. Public health – exposure assessment

Public exposure to surface coatings containing the notified polymer is expected to be low as the concentration of the notified polymer in the coating is a maximum of 1.5%. Public exposure 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. Inhalation exposure may occur if the paint is applied by spray. 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 also likely.

It is expected that during transport, storage, manufacture, industrial and professional use, exposure of the general public will be low, except in the event of an accidental spill

9.2.3. Human health - effects assessment

The notified polymer was of low acute oral toxicity in rats ($LD_{50} > 6000$ mg/kg bw), was not a skin irritant in rabbits and was a slight eye irritant in rabbits. The polymer has a NAMW > 1000 , low levels of low molecular weight species and would not be classified as a hazardous substance on the basis of residual monomer content. In addition adverse health effects from reactive functional groups can be predicted to be unlikely, as these will be involved in bonding to pigment and not available for exposure.

9.2.4. Occupational health and safety – risk characterisation

The notified polymer is unlikely to be a hazardous substance on the basis of the toxicological data submitted and structural and functional characteristics. Worker exposure to the notified polymer is likely to be low at all stages of the paint production process and exposure to high levels should only be possible in the event of spillage during weighing the imported polymer solution and its addition to the mixing vessel.

9.2.5. Public health – risk characterisation

The notified polymer is of high molecular weight and is unlikely to penetrate biological membranes. As public exposure will be limited to periods of home decoration with surface coatings containing up to 1.5% of the notified polymer, the health risk to members of the public resulting from exposure to the notified polymer is low.

The notified polymer in dried surface coating films will be encapsulated within an inert, very high molecular weight film matrix. This will render the notified polymer biologically unavailable, consequently the health risk arising from exposure to the notified polymer from dried surface coating films is considered to be negligible.

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

10.1. Hazard classification

Based on the available data, the notified polymer is not classified as hazardous under the NOHSC *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 1999a).

10.2. Environmental risk assessment

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

10.3. Human health risk assessment

10.3.1. Occupational health and safety

There is Low Concern to occupational health and safety under the conditions of the occupational settings described (engineering controls and personal protective equipment).

10.3.2. Public health

There is Negligible Concern to public health when used as specified in the notification statement.

11. MATERIAL SAFETY DATA SHEET**11.1. Material Safety Data Sheet**

The MSDS of Disperbyk-185 and a colorant containing the notified polymer provided by the applicant were in accordance with the NOHSC *National Code of Practice for the Preparation of Material Safety Data Sheets* (NOHSC, 1994a). They are published here as a matter of public record. The accuracy of the information on the MSDS remains the responsibility of the applicants.

11.2. Label

The label of a product containing the notified polymer provided by the notifier was in accordance with the NOHSC *National Code of Practice for the Labelling of Workplace Substances* (NOHSC, 1994b). The accuracy of the information on the label remains the responsibility of the applicant.

12. RECOMMENDATIONS**CONTROL MEASURES****Occupational Health and Safety**

- A copy of the MSDS should be easily accessible to employees.
- If products and mixtures containing the notified polymer are classified as hazardous to health in accordance with the NOHSC *Approved Criteria for Classifying Hazardous Substances*, workplace practices and control procedures consistent with provisions of State and Territory hazardous substances legislation must be in operation.

Environment**Disposal**

- Wastes generated during industrial application should be disposed of through a licensed waste contractor. Wastes generated during domestic use should be disposed of according to the following instructions: "Do not pour unwanted paint down the drain. Keep unwanted paint in sealed containers for disposal via special chemical waste collections. Empty paint containers should be left open in a well-ventilated area to dry out. When dry, recycle steel containers via steel can recycling programs. Disposal of empty paint containers via domestic recycling programs may differ between local authorities. Check with your local council first."

Emergency procedures

- Spills/release of the notified chemical should be soaked up with inert absorbent material and disposed of in accordance with State regulations. Do not allow spills to enter drains.

12.1. Secondary notification

The Director of Chemicals Notification and Assessment must be notified in writing within 28 days by the notifier, other importer or manufacturer:

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.

13. BIBLIOGRAPHY

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Pharmatox (1989b) Irritant Effects of BYK-LP-N-6006 on Rabbit Skin. Study No. 1-4-64-89. Pharmatox GmbH, Hannover, Germany (unpublished report submitted by notifier).

Pharmatox (1989c) Irritant Effects of Compound BYK-LP-N-6006 on Rabbit Eye. Study No. 1-4-65-89. Pharmatox GmbH, Hannover, Germany (unpublished report submitted by notifier).