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

FULL PUBLIC REPORT

Polymer in EFKA-4580

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**Director
Chemicals Notification and Assessment**

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FULL PUBLIC REPORT

Polymer in EFKA-4580

1. APPLICANT AND NOTIFICATION DETAILS

APPLICANT(S)

Ciba Specialty Chemicals Pty Ltd (ABN 97 005 061 469)

235 Settlement Road

Thomastown VIC 3074

Multichem Pty Ltd (ABN 47 006 115 886)

Suite 6, 400 High St

Kew VIC 3101

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 identity

Import volume

Detailed Use

Product formulation details

Identity of customers.

VARIATION OF DATA REQUIREMENTS (SECTION 24 OF THE ACT)

Variation to the schedule of data requirements is claimed as follows:

Some physico-chemical properties.

PREVIOUS NOTIFICATION IN AUSTRALIA BY APPLICANT(S)

No

NOTIFICATION IN OTHER COUNTRIES

Canada (2004)

2. IDENTITY OF CHEMICAL

OTHER NAME(S)

Acrylic emulsion copolymer

MARKETING NAME(S)

EFKA-4580 (commercial product containing the notified polymer at 40% emulsion in water)

SPECTRAL DATA

ANALYTICAL Infrared Spectroscopy

METHOD

Remarks Spectra provided

METHODS OF DETECTION AND DETERMINATION

Remarks Not provided.

The notifier states that the levels of residual monomers and impurities have been analysed

by GC or HPLC (no spectra or details provided)

3. COMPOSITION

DEGREE OF PURITY
> 90%

HAZARDOUS IMPURITIES/RESIDUAL MONOMERS
All hazardous impurities and residual monomers are present at below the relevant cut offs for classification of the notified polymer as a hazardous substance

DEGRADATION PRODUCTS
No dangerous decomposition products known.

LOSS OF MONOMERS, OTHER REACTANTS, ADDITIVES, IMPURITIES
The residual monomers may be lost to the environment when the polymer or product containing it is in the liquid state. However, once the paint products are cured, the monomers will be trapped in the solid matrix.

4. INTRODUCTION AND USE INFORMATION

MODE OF INTRODUCTION OF NOTIFIED CHEMICAL (100%) OVER NEXT 5 YEARS
The notified polymer will not be manufactured in Australia. It will be imported as a component of EFKA 4580 as a 40% emulsion in water.

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>	1-3	1-3	1-3	3-10	3-10

USE
Additive in water-based automotive paints.

5. PROCESS AND RELEASE INFORMATION

5.1. Distribution, transport and storage

PORT OF ENTRY
Melbourne

TRANSPORTATION AND PACKAGING
EFKA 4580 containing the notified polymer at 40% will be imported and stored in 25 kg pails and 200 kg steel drums. It will be transported from dockside by road to a storage site and then supplied to paint manufacturers for formulation into a range of paints. The finished paints will be packed in 1 L, 4 L and 10 L steel paint cans and 200 L drums. The paints will be distributed to numerous automotive companies within Australia.

5.2. Operation description

Truck drivers will transport the sealed EFKA 4580 containers by road from wharf to the storage warehouse and then as needed to the customer warehouse.

The polymer solution will be formulated into paint products at paint manufacturing establishments. Formulation of the paint products will involve transfer of notified polymer by metered dosing to a mixing vessel and mixing the polymer solution and other ingredients in a sealed vessel fitted with a high speed mixer and local ventilation system. Each batch is to be quality checked and adjustments made as required. The resultant paint will be filtered prior to being dispensed into 1 L, 4 L and 10 L steel paint cans and 200 L drums using automated filling machine under exhaust ventilation. Paint products containing the notified polymer will be warehoused at the paint manufacturer's site prior to

distribution to customer sites.

At the end user's site the paint containing the notified polymer is used as a topcoat for original equipment manufacture (OEM) or refinishing in the automotive industry. At the customer sites the paint will be mixed, stirred and diluted then placed in a spray gun. The object to be primed with the paint will be sprayed then heat cured, resulting in the painted article.

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>
<i>Transportation and Storage</i>			
Transporting from dock to Notifier's site for warehousing (loading/unloading trucks)	3	2-3 hours/day	10-15 days/year
<i>Paint manufacture</i>			
Workers involved in weighing, mixing and bead milling operations.	6	30 min to 6 hrs/day	4 days/week 4 weeks/year
Workers involved in filling cans of coating	4	3 hrs/day	4 days/week for 4 week working period
Quality control/chemists and technical service	4-8	1 hr/day	4 days/week for 4 week working period
Cleaning operations	2	30 min/day	4-days/week for 4 week working period
<i>Paint application</i>			
Automotive industry	> 1000	8 hrs/day	5 days/week

Exposure Details

Transport and Storage:

Waterfront, transport and warehouse workers are not expected to be exposed to the notified polymer except in the case of an accident involving spillage of the EFKA-4580 containing the notified polymer at 40% as emulsion in water. Spills are cleaned up by absorbing with liquid-binding material (sand, diatomite, acid binders, universal binders or sawdust) and recovered into containers for disposal in accordance with local government regulations. No controls are required. Gloves, coveralls and goggles are available if required.

Paint formulation:

Paint mixing – Workers may be exposed to polymer via dermal and ocular exposure due to drips, spills and splashes during charging of mixer and blending. Workers will wear coveralls, goggles and impervious gloves. Aerosols may be released during blending, but inhalation exposure is expected to be because of use of enclosed mixing and exhaust ventilation system.

QC testing: Dermal and ocular exposure is possible from drips, spills and splashes during batch adjustment and when taking and testing samples. Workers wear coveralls, goggles and impervious gloves to minimise exposure.

Filling into drums: Dermal exposure may be possible due to drips and spills when connecting filling lines. The paint is filled into drums under local exhaust ventilation and workers are expected to wear overalls, goggles and impervious gloves. Therefore only incidental exposure is expected.

Maintenance workers: There is possible of skin contact during equipment maintenance. Workers wear coveralls, goggles and gloves.

End use:

Workers exposed during end-use of the formulated paints will mostly consist of spray painters preparing and applying the formulated paint coatings to surfaces (e.g. automotive parts), and cleaning

equipment after use. As the paints are to be used in both OEM and refinish operations, there could be variations in the scale and sophistication of the spray painting operations, and the controls in place that would affect exposure.

The final concentration of the notified polymer in paints will be < 10%, reducing the potential for worker exposure. Dermal exposure is possible during preparation of paint, which involves stirring, transfer and dilution steps. Aerosols may be formed during spray application and therefore inhalation exposure may be possible. To minimise exposure during end use, the paint is diluted and applied in a well ventilated, down draft spray booth with an effective fume extraction system. Workers also wear anti-static footwear and flame retardant overalls, impervious gloves, eye protection and an air fed breathing mask or respirator if local exhaust ventilation is inadequate.

Spray painting may be carried out without the full range of controls mentioned above, increasing exposure.

Worker exposure to the notified polymer in dried paints is likely to be minimal, as the polymer will be encapsulated as part of the cured paint film.

5.4. Release

RELEASE OF CHEMICAL AT SITE

Local operations will include transport and storage, formulation, filling and packaging and application by end-users using spray gun.

During storage and paint manufacture the notified polymer will be released in the following ways:

- Spills - up to 1%, up to 100 kg annually to landfill
- Import container residue - up to 1%, up to 100 kg annually to waste contractor
- During paint formulation - up to 1%, up to 100 kg annually to waste contractor

During paint formulation, it is anticipated that there will be minimal release of the notified polymer during manual transfer from the storage containers to the mixers and during filling of paint into containers or during blending since it is undertaken in enclosed systems under exhaust ventilation and in a bunded area. Spills will be contained by the bunding, collected with inert absorbent material (eg sand) and placed in a sealable container ready for disposal. The process equipment, blending tanks and mixers will be cleaned with suitable solvent which is collected, reused, if possible, otherwise it will be disposed off-site.

Import containers will be rinsed with the rinsate being used in the paint formulation and the rinsed containers will be disposed of off-site.

RELEASE OF CHEMICAL FROM USE

Release of the notified polymer to the environment as a result of its use in the automotive industry is expected to be minimal, unless an accidental spillage occurs, and include:

- Spills - up to 1%, up to 100 kg annually to landfill
- Container residue - up to 2.5 %, up to 250 kg annually to waste contractor
- Overspray - up to 30%, up to 3000 kg annually to landfill
- Equipment cleaning - up to 5%, up to 500 kg annually to waste contractor

All spills will be contained, collected with inert absorbent material (eg sand) and placed in a sealable container ready for disposal. Since the modern high volume low pressure HVLP spray guns have a 70% spray efficiency while the older high pressure guns have an efficiency of only 30%, the former are used more frequently and have been used in the above overspray release estimation. As the paint will be applied within a specialised spray booth, all overspray will be contained and collected for disposal. Since the paint is water based, equipment will generally be cleaned with water, however, solvent may be used. This effluent will be collected and reused if possible otherwise it will be disposed of.

Any paint residue in empty paint containers will be allowed to dry and then disposed of with the container.

5.5. Disposal

The rinsed import containers, 25 kg pails and 200 kg steel drums, and steel end-user paint cans, containing any residual notified polymer (up to 250 kg annually) will be disposed to landfill as industrial waste. All effluent, rinsate and equipment cleaning effluent (accounting for up to 700 kg of waste notified polymer annually), will be collected and reused where possible. Otherwise, it will be disposed of to a liquid waste facility by a licensed contractor (eg for solvent recovery). There will be no release to sewer.

Any spilt material (containing up to 200 kg annually of the notified polymer) will be disposed of to landfill. The spray booth filters are replaced every 2 to 4 months and the used filters, containing up to 3000 kg of notified polymer annually) will be disposed of to landfill. Any effluent from wet scrubbers will go to licensed liquid water facilities.

5.6. Public exposure

The general public is not expected to come into contact with EFKA-4580 or products containing it, except in the case of transport accidents where the packaging was breached.

Once the paint containing the notified polymer is applied to the substrate in the automotive industry, the notified polymer is bound in an insoluble polymeric matrix and is not bioavailable.

6. PHYSICAL AND CHEMICAL PROPERTIES

Unless otherwise stated, physico-chemical properties refer to EFKA-4580 rather than the notified polymer.

Appearance at 20°C and 101.3 kPa	White milky liquid
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Boiling Point	100°C at 101.3 kPa (water)
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Density	1050 kg/m ³ at 20°C
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Remarks	Method not specified.
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Vapour Pressure	2.4 kPa at 20°C (water)
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Water Solubility	Very water soluble
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Based on its structure it is expected that the notified polymer will be very water soluble. The notified polymer is imported as a 40% aqueous solution.

Hydrolysis as a Function of pH	Not determined.
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The notified polymer is very water soluble and has a number of functional groups that are potentially susceptible to hydrolysis. However, the notifier states they are subject to steric hindrance and so under normal environmental conditions, pH range 4 to 9, this hydrolysis could be expected to be slow.

Partition Coefficient (n-octanol/water)	Not determined.
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The notifier claims that the notified polymer will be surface active as a consequence of pendant groups and thus these measurements are difficult.

Adsorption/Desorption	Not determined
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Remarks	Despite the high water solubility, the notified polymer is likely to adsorb to organic matter due to its cationic form.
Dissociation Constant	Not determined.
Remarks	One of the functional groups is strongly basic (Acheson, 1962) and therefore will remain dissociated in the environmental range 4 to 9. Another functional group present has a pK _a range from 9.0 – 11.0.
Particle Size	Not applicable as imported in solution.
Flash Point	>100°C
Flammability Limits	Not expected to be flammable
Remarks	Statement by notifier
Autoignition Temperature	Product is not self-igniting
Remarks	Statement by notifier
Explosive Properties	Does not present an explosion hazard
Remarks	Statement by notifier
Reactivity	Under normal conditions the polymer will not degrade or depolymerise.
Remarks	Statement by notifier.

7. TOXICOLOGICAL INVESTIGATIONS

No toxicological data were submitted.

8. ENVIRONMENT

8.1. Environmental fate

No environmental fate data were submitted.

8.2. Ecotoxicological investigations

No ecotoxicological data were submitted.

9. RISK ASSESSMENT

9.1. Environment

9.1.1. Environment – exposure assessment

Exposure will only occur due to use of the notified polymer as it will not be manufactured in Australia. It will be reformulated into paints that will be used across Australia by professional trades people in the automotive industries, ie will not be available for general consumer use. The proposed use pattern and waste management indicate a low potential for environmental release of the notified polymer. Solid wastes (containing up to 3450 kg of notified polymer annually) resulting from the paint manufacture and paint use will be collected and sent to landfill or incineration.

Liquid effluents (containing up to 700 kg of notified polymer) produced from paint formulation and use will be sent to liquid waste plants, including solvent recovery, where the notified polymer will end up in any resultant sludge which will be disposed of to landfill. A small amount of the notified polymer may be present in effluent discharged to sewer, which is expected to undergo further treatment prior to eventual discharge to the aquatic environment. Cationic polymers with a number average molecular weight greater than 1,000 are assumed to partition mainly to the solids phase and to be 90% removed relative to the total influent concentration. The remaining 10% is assumed to be discharged to receiving waters although much of this material is likely to be in the form of polymer sorbed to suspended solids (Boethling and Nabholz 1997).

Following application and curing, the notified polymer is likely to be tightly cross-linked within an inert matrix. Due to its high molecular weight, the potential for bioaccumulation is very low.

9.1.2. Environment – effects assessment

No ecotoxicological data were provided for the notified polymer, thus a PNEC cannot be estimated. Following application and curing, the notified polymer will be within an inert matrix and be unavailable to organisms. However, being cationic, any unbound polymer is likely to exhibit significant toxicity to aquatic organisms, particularly algae (Boethling and Nabholz 1997).

9.1.3. Environment – risk characterisation

The notified polymer will interact with other components to form a stable chemical matrix and, once dry, is expected to be immobile and pose little risk to the environment. After the useful life of painted article, the notified polymer suffer the same fate as the article. If the article is recycled then the notified polymer will be destroyed to release water vapour, oxides of carbon, nitrogen and sulphur and chloride salts.

Within a landfill environment, the notified polymer (up to 3450 kg) contained in waste from paint manufacture and paint application, including cured paint, will be immobile and is expected to breakdown at a very slow rate.

The notified polymer is not likely to present a hazard to the environment when it is stored, transported, used, recycled and disposed of in the proposed manner.

9.2. Human health

9.2.1. Occupational health and safety – exposure assessment

During transport and storage, worker exposure to EFKA-4580 containing the notified polymer or to products containing it, is expected to be very low, and would only occur if accidental spillage of the materials occurred.

During processing of EFKA-4580 into paint formulations there is potential for dermal/ocular exposure of workers. However standard engineering controls for formulation, eg enclosure and local exhaust ventilation, would limit this to incidental exposure. Exposure at this stage could occur to EFKA-4580 containing 40% of the notified polymer, or to paint formulations containing < 10% of the notified polymer.

Potential for exposure occurs at the end-use stage, when paint formulations containing < 10% of the notified polymer are prepared for application and sprayed onto automotive components. Dermal/ocular exposure is likely during cleaning of the equipment and during the small-scale preparation for spraying, which may involve stirring the paint, diluting with solvent, and transfer to the spray gun. During the spraying process itself, inhalation and possibly ingestion exposure is possible, because aerosols containing the notified polymer would be formed during atomisation of the paint. The extent of dermal/ocular and inhalation exposure will depend on the controls in place, including isolation and engineering measures. It is estimated that > 1000 workers will carry out spray painting using formulations containing the notified polymer. Some of this will occur at large facilities manufacturing new automotive components. Some will occur as refinishing at crash repair shops which may vary in the type and effectiveness of spray booths

or other equipment. While much of the spray painting may be carried out with a high level of controls, the possibility of less effective control measures and therefore higher worker exposure cannot be ruled out.

It should be noted that worker exposure to the notified polymer in paint would leave obvious staining, and would therefore be avoided by workers wherever possible.

Worker exposure to the notified polymer in dried paints is likely to be minimal, as the polymer will be encapsulated as part of the cured paint film.

9.2.2. Public health – exposure assessment

Once the paint containing the notified polymer is applied to the substrate in the automotive industry, the notified polymer is bound in an insoluble polymeric matrix and is not bioavailable. Therefore no significant dermal or inhalation exposure to the public is expected.

9.2.3. Human health - effects assessment

The high molecular weight of the notified polymer should limit absorption across biological membranes. However systemic toxicity cannot be ruled out because 9% of low molecular weight species < 1000 is present. The polymer contains a reactive group and there is also a potential for local effects. Hazardous monomers are present only at low levels, well below the cut-off concentration for classification as a hazardous substance under the NOHSC . *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 2002).

As no toxicological data have been submitted the notified polymer cannot be classified under the NOHSC *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 2002).

9.2.4. Occupational health and safety – risk characterisation

The health effects of the notified polymer have not been characterised. Its absorption into the body is expected to be limited by its high molecular weight. However some low molecular weight species < 1000 are present. As the polymer contains a reactive group, local effects are also possible.

The notified polymer will be imported in 25 kg pails and 200 L drums as a 40% solution in solvents as EFKA-4580. It will be used as an additive in industrial automotive paints for spray application, in both original equipment manufacture (OEM) and refinishing applications.

Dermal/ocular exposure to the notified polymer may occur during paint manufacture and paint application by spray painting. In addition inhalation and possibly ingestion exposure may also occur during spray painting.

During formulation, exposure and the consequent risk of health effects would be reduced by engineering controls such as enclosed tanks. This risk would be further reduced by use of protective clothing including gloves.

In spray painting both engineering controls such as spray booths and full personal protective equipment are needed to reduce the exposure to a low level. The risk of possible systemic effects resulting from exposure would be further reduced by spray painting being carried out according to the NOHSC *National Guidance Material for Spray Painting* (NOHSC, 1999b).

Once the final paint mix has hardened, the notified polymer is bound within the matrix and unavailable for exposure. Therefore, should exposure occur, the risk of health effects from the polymer is low.

Overall the health risk to workers is considered low, if appropriate engineering controls are in place to prevent exposure.

9.2.5. Public health – risk characterisation

Once the paint containing the notified polymer is applied to the substrate in the automotive industry, the notified polymer is bound in an insoluble polymeric matrix and is not bioavailable. Therefore no significant exposure to the public is expected.

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 a hazardous substance under the NOHSC *Approved Criteria for Classifying Hazardous Substances*.

and

As a comparison only, the classification of notified polymer using the Globally Harmonised System for the Classification and Labelling of Chemicals (GHS) (United Nations, 2003) is presented below. This system is not mandated in Australia and carries no legal status but is presented for information purposes.

Based on available data the notified polymer is not classified for health effects under the GHS. For the environment it is not possible to categorise the notified polymer according to the GHS.

10.2. Environmental risk assessment

The notified polymer 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.

10.3.2. Public health

There is Negligible Concern to public health when used as a paint additive.

11. MATERIAL SAFETY DATA SHEET

11.1. Material Safety Data Sheet

The MSDS of the product containing the notified polymer provided by the notifier was in accordance with the NOHSC *National Code of Practice for the Preparation of Material Safety Data Sheets* (NOHSC, 2003). It is published here as a matter of public record. The accuracy of the information on the MSDS remains the responsibility of the applicant.

11.2. Label

The label for the 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

- Employers should implement the following isolation and engineering controls to

minimise occupational exposure to the notified polymer:

- Closed tanks and lines for formulation and filling of paint containing the notified polymer;
 - Use of engineering controls in spray painting to minimise exposure of workers.
- Employers should implement the following safe work practices to minimise occupational exposure during handling of the notified polymer;
 - Avoid splashing, spills and generation of aerosols during formulation and filling processes;
 - Spray application of paint containing the notified polymer should be in accordance with the NOHSC *National Guidance Material for Spray Painting* (NOHSC, 1999b)
 - Workers using spray products containing the notified polymer should be instructed in their proper handling and use, including information about the additional risks posed by spray application.
 - Employers should ensure that the following personal protective equipment is used by workers to minimise occupational exposure to the notified polymer:
 - Protective gloves
 - Safety glasses or goggles
 - Industrial clothing
 - Respiratory protection during spray painting, or if aerosols are formed
 - Full body protection during spray painting

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 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

- The following control measures should be implemented by paint manufacturers and warehouse sites to minimise environmental exposure during paint formulation and storage of the notified polymer:
 - All process equipment and storage areas should be bunded.

Disposal

- The notified polymer should be disposed of to landfill for solids and to licensed waste contractors for liquids.

Emergency procedures

- Spills/release of the notified polymer should be contained by soaking up with inert absorbent material and dispose of as special waste in compliance with local and State regulations as recommended in the MSDS.
- Use detergent in cleaning up.
- Prevent product from entering 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:

- (1) Under Subsection 64(1) of the Act; if
 - Due to the potential cationic nature of the notified polymer, there are any changes to the use pattern which significantly increases the potential for aquatic exposure, whereby full ecotoxicity studies for fish, daphnia and algae would need to be submitted for assessment.

or

- (2) 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.

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