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**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION  
AND ASSESSMENT SCHEME**

**FULL PUBLIC REPORT**

**Polymer in EFKA-772**

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 Worksafe Australia which also conducts the occupational health & safety assessment. The assessment of environmental hazard is conducted by the Department of the Environment, Sport, and Territories and the assessment of public health is conducted by the Department of Health and Family Services.

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Director  
Chemicals Notification and Assessment

**FULL PUBLIC REPORT****Polymer in EFKA-772****1. APPLICANT**

Multichem Pty Ltd of Suite 6, 400 High Street KEW VIC 3103 has submitted a notification statement accompanying their application for assessment of a synthetic polymer of low concern, EFKA-772.

**2. IDENTITY OF THE CHEMICAL**

Polymer in EFKA-772 meets the definition of a Polymer of Low Concern under the Act, and is not considered to be hazardous according to Worksafe Criteria (1,2), based on the nature of the polymer and the data provided. Therefore the chemical name, molecular formula, structural formula, molecular weight, spectral data, monomer identity and formulation details have been exempted from publication in the full public report.

**Chemical Abstracts Service  
(CAS) Registry No.:**

none allocated

**Trade Name(s):**

EFKA-772 ( &gt; 55% solution in sec-butanol)

**Number-Average Molecular  
Weight:**

&gt; 4 000

**Weight-Average Molecular  
Weight:**

&gt; 10 000

**Maximum Percentage of Low  
Molecular Weight Species  
(Polymers and Oligomers)****(Molecular Weight < 1 000):** 3.1%**(Molecular Weight < 500):** 0.6%**Means of Identification (List  
of Spectral Data Available):**

infrared spectroscopy

### 3. PHYSICAL AND CHEMICAL PROPERTIES

The following physical and chemical properties were provided for a 60% solution of the notified polymer in sec-butanol, unless otherwise indicated.

<b>Appearance at 20°C and 101.3 kPa:</b>	clear, colourless liquid
<b>Melting Point:</b>	not provided
<b>Specific Gravity:</b>	0.95
<b>Vapour Pressure:</b>	1.2 kPa at 20°C
<b>Water Solubility:</b>	0 g/L (figure provided for polymer - see comments below)
<b>Partition Co-efficient (n-octanol/water):</b>	not provided
<b>Flammability Limits:</b>	Lower Explosive Limit = 1.7% Upper Explosive Limit = 9.5%
<b>Autoignition Temperature:</b>	390°C
<b>Explosive Properties:</b>	not provided
<b>Particle Size Distribution:</b>	not applicable
<b>Reactivity/Stability:</b>	the polymer in EFKA-772 is expected to be stable

#### Comments on Physico-Chemical Properties

The reported water solubility of 0 mg/L is surprising. The water solubility experiment report provided by the notifier is inadequate, and followed no recognised guidelines. It is expected that the polymer would be water soluble to an extent that could be environmentally significant, and this is addressed in the Environmental Hazard section of this report.

Other information on the physico-chemical properties is acceptable for a polymer of low concern.

### 4. PURITY OF THE CHEMICAL

The notified polymer contains approximately 0.55% (w/w) residual acrylate monomers.

## 5. USE, VOLUME AND FORMULATION

The Polymer in EFKA-772 will not be manufactured in Australia. The notified polymer will be imported as a solution in sec-butanol, and will be reformulated locally into water-based air-drying and stoving enamels as well as industrial solvent based paints. The final concentration of the imported product (EFKA-772) in paints will be < 2.0%, giving a final concentration of < 1.5% of the notified polymer. The anticipated import volumes for the notified polymer over the next five years are shown below:

Year	1	2	3	4	5
Import volume (kg)	150	250	300	400	550

## 6. OCCUPATIONAL EXPOSURE

The notified polymer will be imported as a > 55% solution in sec-butanol, which will be packaged in 30 L pails and 220 L drums. These will be stored at a central warehouse prior to distribution to customers. Waterside, warehouse and transport workers will be handling unopened pails and drums of EFKA-772, and are only likely to be exposed in the event of an accident or leaking packaging.

Workers may be exposed to the notified polymer during reformulation of the substance into a variety of paint products. EFKA-772 would typically be pumped into a closed mixing vessel, to which other paint components would be added. The smaller pails of EFKA-772 may, however, be manually poured into the mixing vessel, which would increase worker exposure, particularly to the sec-butanol component of EFKA-772.

Following dispersion, the paint (containing the notified polymer at a final concentration of < 1.5%) would be pumped to automated filling lines for packaging. If the mixing, transfer and packaging processes are automated and enclosed, worker exposure to the notified polymer should be minimal. If dermal contact with the notified polymer does occur, absorption is expected to be low, due to the relatively high number-average molecular weight (NAMW) (> 4 000), which should minimise movement of the molecule across biological membranes. Inhalational exposure is also expected to be low, as the NAMW of the polymer would indicate a relatively low vapour pressure. However, inhalational exposure to sec-butanol or other solvent components in paints may occur. Eye exposure is expected to be limited to drips and splashes.

The notifier states that paints containing the notified polymer may be applied using spraying equipment, rollers and brushes. No further information was provided by the notifier on potential end uses of the notified polymer. Given that the final concentration of the notified polymer in paints will be less than 1.5%, worker exposure is expected to be low, regardless of the method of application.

Occupational exposure to the notified polymer would be greatest during spray application of paints, using a non-automated spray system. In this situation inhalational, dermal and ocular exposure may occur. Application of paints using a fully automated spray booth would result in minimal worker exposure. Dermal

exposure to the notified polymer may occur during application of paints using a roller or brush. Inhalational exposure is not expected to occur during application with a roller or brush, although drips and splashes into the eyes may occur during painting. Should contact occur during application, the paint is likely to remain on the exposed surface for some time, hence prolonging 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.

## **7. PUBLIC EXPOSURE**

The public will not normally be exposed to the notified polymer during its importation and mixing. Given the type of paints in which it is used, it appears that the public may come into contact frequently with cured paints containing the notified polymer, however exposure to the notified polymer is likely to be minimal, as its concentration in the paint is low. Public exposure to the notified polymer during accidents in storage and transport is likely to be limited in extent because of the small quantity of material involved.

## **8. ENVIRONMENTAL EXPOSURE**

### **. Release**

Release will occur during reformulation and end use operations. Reformulation will be carried out at various paint company locations. In the absence of adequate information from the notifier, as a worst-case situation, it will be assumed that all reformulation is conducted on one site only, so all release is from one point.

The notified polymer can be used in waterborne air-drying and stoving enamels, as well as industrial solvent-based paints. This indicates a variety of reformulation techniques.

Release could be expected to occur through filling, sampling and cleaning procedures. The notifier has indicated that the notified polymer may be added to the reaction kettle by manual pouring, which increases the risk of accidental spillage. The maximum residue left in drums is given as 0.1%. Empty drums will either be sent to a drum recycler or landfilled.

Total release through the operations mentioned will be unlikely to exceed 5% of the import volume of the notified polymer, equating to 27.5 kg of waste through reformulation based on the import volume expected in year 5. Assuming 300 days per year of reformulation, this equates to around 92 g per day of operation.

The major release could be expected through end use application. The end uses of the notified polymer are varied and the notifier has stated that all kinds of application (spray, roller etc) will be used. Depending on the type of method employed, experience indicates that transfer efficiencies can range from 35% for some spray painting methods to over 90% for more efficient methods. In the absence of

adequate information, a worst case will be assumed, where products containing the notified polymer are all applied through spray painting, with a transfer efficiency of 35%. Therefore, with the import volume anticipated in the fifth year of 550 kg, losses to the environment through end use application will be around 340 kg (after release due to reformulation). Again, assuming use on 300 days of the year, this equates to a daily release of 1.13 kg.

Generally, overspray is collected in scrubber and filter systems and disposed of to landfill.

#### **. Fate**

The low water solubility of the notified polymer indicates leaching from landfill sites is not expected. Any incineration of the notified polymer is expected to produce water and oxides of carbon.

After application, the notified polymer is not expected to be released to the environment until it has been cured into a solid polymer matrix. The resultant matrix structure should limit the hydrolysis or biodegradation of the polymer.

Bioaccumulation of the polymer is unlikely due to the high molecular weight of the polymer even before curing.

### **9. ASSESSMENT OF ENVIRONMENTAL EFFECTS**

No ecotoxicological data were provided, which is acceptable for polymers of low concern according to the Act.

### **10. ASSESSMENT OF ENVIRONMENTAL HAZARD**

Disposal of the notified polymer to landfill is unlikely to present a hazard to the environment. Any disposal of material collected in filter and scrubber systems, and any surface on which the notified polymer has cured will be in a solid matrix and is not expected to biodegrade or leach.

With the exception of accidental spillage, losses to the aquatic system are expected to be minimal. In the event of release to sewer, the polymer is likely to become immobile through association with sludge in the sewage treatment plants.

Considering that the polymer may be more soluble than reported by the notifier, a worst case scenario for release is that the entire expected release of around 1.2 kg per day based on the maximum import volume, is released to a city sewer (250 ML). The concentration prior to release to receiving waters would be 4.9 ppb.

The low environmental exposure of the polymer as a result of the proposed use, together with its expected low environmental toxicity, indicates that the overall environmental hazard should be negligible.

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

There is a negligible occupational health risk posed to waterside, warehouse and transport workers, due to the expected low toxicity of the notified polymer and because exposure will only occur in the event of an accident or leaking packaging.

Reformulators may be exposed to the notified polymer as a solution in sec-butanol, particularly if the EFKA-772 is manually poured into mixing vessels. The occupational health risk posed by the notified polymer is low, however, due to the expected short exposure periods and the low acute toxicity (oral LD<sub>50</sub> > 2 090 mg/kg for the solution in sec-butanol). In addition, the relatively high molecular weight indicates that the polymer should not move across biological membranes and should have a relatively low vapour pressure. The levels of low molecular weight species (NAMW < 1000, 3.1%; NAMW < 500, 0.6%) are not expected to cause adverse health effects. The level of residual acrylate monomers is approximately 0.55%, and while each monomer is considered hazardous according to Worksafe criteria (1,2), the residual levels are below threshold cutoffs (2), even when potential cumulative effects are taken into account. The notifier claims that the polymer has negligible water solubility and it should not decompose under normal conditions of use.

Inhalational exposure to the solvent component of EFKA-772 may, however, be potentially harmful, and the exposure standard for sec-butanol (100 ppm (303 mg/m<sup>3</sup>) Time Weighted Average) (3) should be observed in areas where EFKA-772 is being handled. In addition, workers should be aware of the flammable nature of the solvent component.

Once the Polymer in EFKA-772 is incorporated into paints, the occupational health risk posed to workers who handle these paints (either during reformulation/ packaging or during end use) is low, due the expected low toxicity (discussed above) and the low levels of the notified polymer in paint products. Worker exposure to paints containing the notified polymer may, however, be frequent and prolonged.

There is negligible occupational health risk posed to workers or the general public who may come into contact with the notified polymer as a component of cured paints, due to the expected negligible exposure potential and the low concentration of the polymer in paint products.

Based on the use pattern and physico-chemical characteristics of the notified polymer, it is considered that the polymer in EFKA-772 will not pose a significant hazard to public health.

## 12. RECOMMENDATIONS

To minimise occupational exposure to the Polymer in EFKA-772 the following guidelines and precautions should be observed:

- It is good work practice to wear industrial clothing which conforms to the specifications detailed in Australian Standard (AS) 2919 (4) and occupational footwear which conforms to Australian and New Zealand Standard (AS/NZS) 2210 (5) to minimise exposure when handling any industrial chemical;
- Spillage of the notified polymer should be avoided, spillages should be cleaned up promptly with absorbents which should then be put into containers for disposal;
- Good personal hygiene should be practised to minimise the potential for ingestion;
- A copy of the Material Safety Data Sheet (MSDS) should be easily accessible to employees.

In addition, the Worksafe Australia document *Exposure Standards for Atmospheric Contaminants in the Occupational Environment: Guidance Note and National Exposure Standards* (3) should be used as a guide in the control of workplace exposure to sec-butanol in EFKA-772 and appropriate personal protective equipment should be worn where necessary to minimise exposure to this potentially harmful chemical. Appropriate precautions should also be taken to minimise the risks associated with working with this potentially flammable solvent.

## 13. MATERIAL SAFETY DATA SHEET

The MSDS for the notified polymer was provided in accordance with the *National Code of Practice for the Preparation of Material Safety Data Sheets* (6).

This MSDS was provided by the notifier as part of the notification statement. It is reproduced here as a matter of public record. The accuracy of this information remains the responsibility of the notifier.

## 14. REQUIREMENTS FOR SECONDARY NOTIFICATION

Under the Act secondary notification of the Polymer in EFKA-772 shall be required if any of the circumstances stipulated under subsection 64(2) of the Act arise. No other specific conditions are prescribed.



## 15. REFERENCES

1. National Occupational Health and Safety Commission 1994, *Approved Criteria for Classifying Hazardous Substances* [NOHSC:1008(1994)], Australian Government Publishing Service, Canberra.
2. National Occupational Health and Safety Commission 1994, *List of Designated Hazardous Substances* [NOHSC:10005(1994)], Australian Government Publishing Service Publ., Canberra.
3. National Occupational Health and Safety Commission 1995, 'Adopted National Exposure Standards for Atmospheric Contaminants in the Occupational Environment', [NOHSC:1003(1995)], in *Exposure Standards for Atmospheric Contaminants in the Occupational Environment: Guidance Note and National Exposure Standards*, Australian Government Publishing Service Publ., Canberra.
4. Standards Australia 1987, *Australian Standard 2919-1987, Industrial Clothing*, Standards Association of Australia Publ., Sydney.
5. Standards Australia/Standards New Zealand 1994, *Australian/New Zealand Standard 2210-1994, Occupational Protective Footwear*, Standards Association of Australia Publ., Sydney, Standards Association of New Zealand Publ, Wellington.
6. National Occupational Health and Safety Commission 1994, *National Code of Practice for the Preparation of Material Safety Data Sheets* [NOHSC:2011(1994)], Australian Government Publishing Service, Canberra.