File No: PLC/46

Date: November 1996

NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME

FULL PUBLIC REPORT

Polymer in EFKA-LP 4050

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Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT

Polymer in EFKA-LP 4050

1. APPLICANT

Multichem Pty Ltd of Suite 6, High Street KEW VIC 3101 has submitted a notification statement accompanying their application for assessment of a synthetic polymer of low concern, Polymer in EFKA-LP 4050.

2. IDENTITY OF THE CHEMICAL

Chemical Abstracts Service (CAS) Registry No.:	none assigned
Trade Name(s):	EFKA-LP 4050 (solution of notified polymer in n-butyl acetate (46%) and propylene glycol monomethyl ether acetate (PGMEA) (9%))
Number-Average Molecular Weight:	> 3 000
Weight-Average Molecular Weight:	> 6 000
Maximum Percentage of Low Molecular Weight Species (Polymers and Oligomers)	
(Molecular Weight < 1 000):	3.3%
(Molecular Weight < 500):	1.2%
Means of Identification (List of Spectral Data Available):	infrared spectroscopy

3. PHYSICAL AND CHEMICAL PROPERTIES

Appearance at 20°C and 101.3 kPa:	a solution of polymer in n-butyl acetate (46%) and PGMEA (9%) is a clear, yellowish liquid
Melting Point:	80°C
Density:	1 100 - 1 200 kg/m^3

Water Solubility:	claimed to be 0 mg/L (see comments below)
Hydrolysis as a Function of pH:	hydrolysis is not expected
Polymer Stability:	stable

Comments on Physico-Chemical Properties

A simple water solubility test was undertaken by the notifier as follows:

> 1 mg of the notified polymer was added to 1 L of water and stirred at 20°C for 1 hour. The water was decanted and the flask dried (at 120°C). The notifier recorded no difference in weight after and before the addition of water.

The notifier concluded that the water solubility was 0 mg/L. The EPA believes that the water solubility of the notified polymer will be very low under normal conditions based on its high number-average molecular weight (NAMW > 3 000) and composition.

Under normal conditions the polymer is not expected to undergo hydrolysis. The EPA notes that the polymer contains a number of ester and carbamate functionalities, but hydrolysis in the environmental pH range would be precluded by low solubility.

The data provided are acceptable for a polymer of low concern.

4. PURITY OF THE CHEMICAL

The combined level of residual monomers in the Polymer in EFKA-LP 4050 is less than 1%.

5. USE, VOLUME AND FORMULATION

The notified polymer will not be manufactured in Australia. It will be imported as a component of the product EFKA-LP 4050 in 20 L pails and 220 L drums. The polymer will be at a concentration of 44 - 46% in a solution of n-butyl acetate (46%) and PGMEA (9%).

EFKA-LP 4050 will be reformulated locally into a variety of solvent-based coatings, such as automotive topcoats (for use in both original equipment manufacture and refinish operations), coil coatings and two-pack polyurethane coating systems. The imported product will be used at a concentration of up to 10% in these coatings, giving a final concentration of up to 4.6% of the notified polymer.

The anticipated import volumes for each of the first five years are as follows:

Year	1	2	3	4	5
Import Volume (kg)	150	300	600	900	1 250

6. OCCUPATIONAL EXPOSURE

Drums and pails of EFKA-LP 4050 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-LP 4050, 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 solvent-based industrial coatings. EFKA-LP 4050 would typically be pumped into a closed mixing vessel, to which other paint components would be added. The smaller pails may, however, be manually poured into the mixing vessel, which would increase worker exposure, particularly to the solvent component of EFKA-LP 4050. The notifier estimates that workers would be exposed to the notified chemical for 15-30 minutes per batch when adding the product to the mixing vessel.

Following dispersion, the paint (containing the notified polymer at a final concentration of up to 4.6%) would be pumped to automated filling lines for packaging. The transfer and packaging processes are usually automated and enclosed and worker exposure to the notified polymer should be minimal. 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 the solvent components of EFKA-LP 4050 and other solvents which may be present in paints may occur. Eye exposure is expected to be limited to drips and splashes.

The notifier states that paints containing the notified polymer would usually be applied using spraying equipment, in an area containing an exhaust system suitable for handling solvents. The paints are likely to be applied during original equipment manufacture as well as during refinish operations. Given that the final concentration of the notified polymer in paints will be less than 4.6%, worker exposure is expected to be low, regardless of the method of application and level of engineering controls present.

The notifier states that spray application will be the usual method of application of paints containing the notified polymer. The greatest occupational exposure will occur when workers are using a non-automated spray system (such as during some refinish operations), where inhalational, dermal and ocular exposure may occur. Application of paints using a fully automated spray booth (which would probably be the case during original equipment manufacture) would result in minimal worker exposure. Should contact occur during application, the paint is likely to remain on the exposed surface for some time, hence prolonging exposure.

Workers may be exposed to the notified polymer in dried paint coatings, however the polymer will be encapsulated as part of the cured paint film and the concentration of the notified polymer in paints is relatively low.

7. PUBLIC EXPOSURE

There is little potential for public exposure to the notified polymer during import, storage, transport, formulation or use of EFKA-LP 4050. Minor public exposure to the uncured form of the notified polymer may result from accidental spillage. If spillage occurs, disposal is expected to be carried out in accordance with local regulations, which will minimise public exposure.

There is little potential for public exposure arising from the use of the professional paint product, as the notifier states that paint products containing the notified polymer will not be available for public use.

The chemical will finally be immobilised as part of an inert, fully cured, hardened paint film and there may be significant public contact with the notified chemical in this inert form.

8. ENVIRONMENTAL EXPOSURE

. Release

During transport, risk of environmental release is limited to spills and leaks caused by accidents. Spills of the polymer solution can be collected with absorbent materials, such as sand or vermiculite.

Formulation of paints will be undertaken at various paint manufacturers. Here the notified polymer will be poured manually into a mixing vessel. The notifier did not supply any estimates of losses, or indicate how wastes will be disposed of. However, other than the solvents present in the notified polymer mixture, losses through the simple mixing, blending and filling process should be minimal. Losses due to the cleaning of processing equipment will be minimised by recycling cleaning solvents into suitable 'dark coloured' coatings. The EPA expects that the wastes will be collected and sent to a waste disposal contractor for disposal. In some cases this may involve the solvents being reclaimed.

The notifier did not supply any estimates of losses through application. The notifier claims that the paints containing the polymer will normally be applied by spray systems usually dedicated to one type of paint system with 24 hour operation. With conventional spray equipment, up to 75% of the paint may end up as overspray (1,2). Electrostatic application results in somewhat lower overspray, and coil coating methods are described as very efficient (2). The notifier claims that waste due to cleaning application equipment is minimal due to the 24 hour application process, and that solvent recovery and recycling systems are commonplace at industrial paint application sites. Any disposal of wastes will be

conducted through appropriate waste disposal authorities.

The EPA expects that waste paints will be collected and processed. Some collected wastes may undergo a solvent recovery process.

The majority of notified polymer will be incorporated into paint products. The paint is expected to cure once it is applied. The notified polymer is incorporated into the dry paint matrix. The polymer is then effectively inert and disposed of with the article.

. Fate

The majority of polymer is not expected to be released to the environment until it has been cured into a solid paint matrix. The coating containing the polymer will share the fate of substrate to which it is applied. The resultant dry paint should limit hydrolysis or biodegradation of the polymer. Bioaccumulation of the polymer is not expected as biological membranes are not permeable to polymers of very large molecular size (3,4).

Excess paint, including residues from drums, will be disposed of to landfill. Here the polymer will be immobilised in the dry paint.

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

Any chips and flakes of the cured paint that occur (due to stone chips, accidents, wear and tear, etc) will be inert, and will diffuse and form part of the sediments.

9. ASSESSMENT OF ENVIRONMENTAL EFFECTS

No ecotoxicological data were provided which is acceptable for polymers of low concern with a NAMW greater than 1 000, according to the Act.

10. ASSESSMENT OF ENVIRONMENTAL HAZARD

The main environmental hazard would arise through spillage in transport accidents that may release quantities of the uncured polymer to drains and waterways. However, the polymer would quickly become immobile on association with soil/sediment. Adequate control procedures are outlined in the Material Safety Data Sheet (MSDS).

The polymer is unlikely to present a hazard to the environment when it is incorporated into paint and applied to solid substrates. Such painted objects will be consigned to landfill or recycled at the end of their life.

The main environmental exposure arises from landfill disposal of recovered waste paint containing the polymer. The EPA estimates that up to 940 kg of the polymer may be consigned to landfill due to overspray (calculated using 75% overspray of maximum projected import volume). However, such material will be bound to soil and remain immobile in the environment. The environmental hazard due to this disposal is expected to be low.

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 n-butyl acetate and PGMEA, particularly if the EFKA-LP 4050 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, the low acute oral toxicity (LD_{50} > 2 066 mg/kg (rats) for the polymer in solvent solution) and the relatively high molecular weight, which 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 < 1 000, 3.3%; NAMW < 500, 1.2%) are not expected to cause adverse health effects. The level of residual monomers is less than 1.0%, and while 2-hydroxyethyl acrylate is considered hazardous according to Worksafe criteria (5,6), the residual levels are below threshold cutoffs (5). The notifier claims that the polymer has negligible water solubility and should not decompose under normal conditions of use.

Inhalational exposure to the solvent component of EFKA-LP 4050 may, however, be potentially harmful, and the exposure standard for n-butyl acetate (7) should be observed in areas where EFKA-LP 4050 is being handled. In addition, workers should be aware of the flammable nature of the solvent component.

Once the Polymer in EFKA-LP 4050 is incorporated into paints, the occupational health risk posed to workers who come into contact with these paints (either during reformulation, packaging, during application or in cure form) 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 potential for public exposure to the polymer arising from importation, storage, transportation and formulation into paint products. Similarly, the potential for public exposure to the chemical during transport and disposal of process waste and clean up water after a spill is very minor. This is further minimised by the recommended practices during storage, transportation and waste disposal. There is possible public exposure from the end use application of the chemical as a component of solvent based paints, but this exposure route is

minimised by the use of these products being expected to be restricted to professional premises with spray booth equipment. The chemical will finally be immobilised as part of an inert, hardened paint film and while there will be significant public contact with the notified chemical in this inert form, there seems no likely route of exposure and absorption.

12. RECOMMENDATIONS

To minimise occupational exposure to Polymer in EFKA-LP 4050, 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 (8) and occupational footwear which conforms to Australian and New Zealand Standard (AS/NZS) 2210 (9) 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 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* (7) should be used as a guide in the control of workplace exposure to n-butyl acetate in EFKA-LP 4050 and appropriate personal protective equipment should be worn where necessary to minimise exposure to this potentially harmful chemical. Workers using EFKA-LP 4050 should take appropriate precautions to minimise the risks associated with working with this potentially flammable product.

13. MATERIAL SAFETY DATA SHEET

The attached MSDS for EFKA-LP 4050 was provided in Worksafe Australia format (10).

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 EFKA-LP 4050 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. Randall PM, 1992, Pollution Prevention Methods in the Surface Coating Industry. *Journal of Hazardous Materials*, **29** p. 275-295.

2. Oil and Colour Chemists' Association, Australia, 1974, *Surface Coatings, Volume 2 - Paints and Their Applications,* TAFE Educational Books, Kensington, NSW.

3. Anliker R, Moser P & Poppinger D, 1988, Bioaccumulation of dyestuffs and organic pigments in fish. Relationships to hydrophobicity and steric factors, *Chemosphere*, **17(8)** p. 631-1644.

4. Gobas FAPC, Opperhuizen A & Hutzinger O, 1986, Bioconcentration of hydrophobic chemicals in fish: relationship with membrane permeation *Environmental Toxicology and Chemistry* **5** p. 637-646.

5. National Occupational Health and Safety Commission 1994, *List of Designated Hazardous Substances* [NOHSC:10005(1994)], Australian Government Publishing Service Publ., Canberra.

6. National Occupational Health and Safety Commission 1994, *Approved Criteria for Classifying Hazardous Substances* [NOHSC:1008(1994)], Australian Government Publishing Service, Canberra.

7. 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.

8. Standards Australia 1987, *Australian Standard 2919-1987, Industrial Clothing,* Standards Association of Australian Publ., Sydney.

9. 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.

10. 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.