File No: PLC/117

October 1999

NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME

FULL PUBLIC REPORT

Polymer in EFKA-66

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

For the purposes of subsection 78(1) of the Act, copies of this full public report may be inspected by the public at the Library, National Occupational Health and Safety Commission, 92-94 Parramatta Road, Camperdown NSW 2050, between the following hours:

Monday – Wednesday	8.30 am - 5.00 pm
Thursday	8.30 am - 8.00 pm
Friday	8.30 am - 5.00 pm

Copies of the full public report may also be requested, free of charge, by contacting the Administration Coordinator.

Please direct enquiries or requests for full public reports to the Administration Coordinator at:

Street Address: 92 Parramatta Road, CAMPERDOWN NSW 2050, AUSTRALIA
Postal Address: GPO Box 58, SYDNEY NSW 2001, AUSTRALIA
Telephone: (61) (02) 9577 9514
Facsimile: (61) (02) 9577 9465

Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT

Polymer in EFKA-66

1. APPLICANT

Multichem Pty Ltd of Suite 6, 400 High Street, KEW VICTORIA 3101 has submitted a Polymer of Low Concern notification statement in support of their application for an assessment certificate for Polymer in EFKA-66.

2. IDENTITY OF THE CHEMICAL

The chemical name, CAS number, molecular and structural formulae, details of the polymer composition, methods of detection and determination and spectral data have been exempted from publication in the Full Public Report.

Marketing Name:	EFKA-66
Chemical Abstracts Service (CAS) Registry No.:	None allocated

Characterisation as a Synthetic Polymer of Low Concern

Number-Average Molecular Weight (NAMW):	> 1 000
Maximum Percentage of Low Molecular Weight Species	
Molecular Weight < 500:	< 2%
Molecular Weight < 1 000:	< 5%
Polymer Stability/Reactivity:	Expected to stable
Particle Size:	Polymer is in solution form
Charge Density:	No charged functional groups

Water Solubility:	Insoluble
Spectral Data:	Spectral data on the identity, NAMW and percentage of low molecular weight species was provided

The polymer meets the criteria for assessment as a synthetic polymer of low concern under Regulation 4A of the *Industrial Chemicals (Notification and Assessment) Act* (1989).

3. PHYSICAL AND CHEMICAL PROPERTIES

The polymer is never isolated as a defined entity and the limited physicochemical data provided below relates to EFKA-66, a 52% solution of the polymer in alkylbenzene and diisobutylketone.

Appearance at 20°C and 101.3 kPa:	Clear brownish liquid
Boiling Point:	>250°C; 167-168°C (in Material safety Data Sheet (MSDS))
Melting Point:	<20°C
Specific Gravity:	1.02
Vapour Pressure:	Not determined
Partition Co-efficient (n-octanol/water):	Not determined
Hydrolysis as a Function of pH:	Not determined
Adsorption/Desorption:	Not determined
Dissociation Constant:	Not determined
Flash Point:	40°C in MSDS
Flammability Limits:	Not determined
Autoignition Temperature:	Not determined

Explosive Properties: Lower = 1%;
Upper = 7.5%

Comments on Physico-Chemical Properties

The notifier estimates that the boiling and melting points of EFKA-66 are greater than 250°C and less than 20°C, respectively. The boiling point for EFKA-66 in the MSDS is given as 167-168°C.

The vapour pressure of the polymer was not determined but is expected to be very low. The vapour pressure of EFKA-66 would be expected to be that of the solvent mixture.

The water solubility (see Section 2) of EFKA-66 was determined by the notifier to be 0 mg/L by the water solubility ASTM Standard D 2030 Test. Under the conditions of the test the notifier found that EFKA-66 was completely immiscible with water. The notified polymer contains no polar functionality and with a very high molecular weight the water solubility would be expected to be low, that is ≤ 1mg/L.

Hydrolysis as a function of pH was not determined for the polymer. The polymer contains an anhydride functionality that could be expected to undergo hydrolysis under extreme pH conditions. However, due to the low water solubility, hydrolysis is unlikely in the environmental pH range of 4 to 9.

The partition coefficient and adsorption/desorption of the notified chemical was not determined. The notified polymer is expected to be insoluble in water and will largely partition into the *n*-octanol phase rather than to water. Due to its low water solubility, the polymer is expected to become associated with the organic component of soils and sediments.

The dissociation constant of the notified polymer was not determined. It is noted the polymer has no units likely to dissociate.

4. PURITY OF THE CHEMICAL

Degree of Purity: >99%

Hazardous Impurities: none

Non-hazardous Impurities (> 1% by weight): none

Maximum Content of Residual Monomers: All components, 0%

Additives/Adjuvants:

Chemical name:	Solvent naphtha (petroleum), light aromatic
CAS No.:	64742-95-6
Weight percentage:	43%
Regulatory Controls:	Hazard Classification (NOHSC, 1999a): R45(2) – May cause cancer: carcinogen category 2; R65 – Harmful: may cause lung damage if swallowed.

Chemical name:	Diisobutyl ketone
Synonyms:	2, 6-dimethylheptan-4-one
CAS No.:	108-83-8
Weight percentage:	5%
Regulatory Controls:	Hazard Classification (NOHSC, 1999a): R10 – Flammable; R37 – Irritating to respiratory system; National Exposure Standard (NOHSC, 1995): 25 ppm; 145 mg/m^3 TWA; Poisons Schedule Number (AHMAC, 1999): S5; Dangerous Goods Class (FORS, 1998): Class 3.2; Packing Group III.

5. USE, VOLUME AND FORMULATION

Use
Polymer in EFKA-66 will be used as a component of automotive coatings to prevent interfacial tension between hydrophilic pigments, extenders and the binder contained within the paint.

Import Volume
The polymer will be imported as a 52% solution, in a mixture of organic solvent containing alkylbenzene and diisobutylketone, in 25 kg steel drums. It will be stored in a hazardous goods warehouse before distribution *via* road to paint manufacturers. The estimated import volume for the notified polymer in the first year is 50 kg increasing to 250 kg in the fifth year.

Formulation
The notified polymer will be used in the dispersion stage of paint manufacture, where pigments are dispersed into a resin and solvent mixture. Paint batches will typically be in the range of 200 to 1 000 L and will contain 0.1 to 1.0% w/w of the notified polymer (2.5% product).

The paint containing the notified polymer will be packed in 4 and 20 L steel cans or 200 L drums. It will only be available for professional use by licensed spray painting contractors primarily for use on automobiles.

6. OCCUPATIONAL EXPOSURE

Transport and Storage
Polymer in EFKA-66 will be imported in 25 kg steel drums and delivered to a hazardous goods facility prior to dispatch to an estimated five customer sites. The notified polymer will remain in its original packaging until it reaches the customer site. Exposure of waterside, storage and transport workers is not expected except in the event of a spill.

Paint Manufacture
Polymer in EFKA 66 will be formulated into paints at the customer site. At each site a plant operator will weigh the product in volumes of 0.1 to 1.0% of polymer in the total batch weight. Bottles of 200 to 1 000 L are made. This procedure is estimated by the notifier to reach 5 to 10 minutes per batch of finished paint. The polymer is then added to other paint components. The notifier indicates weighing is done manually and skin exposure to drips and spills is possible. Exposure during subsequent stages of paint manufacture is expected to be negligible as the polymer will be incorporated into the paint matrix at a maximum of 1% and not separately available once the paint has dried.

The personal protective equipment recommended during use of EFKA-66 is geared towards prevention of exposure to the solvents in the product. The MSDS lists impervious gloves, namely Viton or PVA, chemical goggles and coveralls. Respiratory protection is also recommended where concentration of vapour may occur. The submission indicates that manufacturing plants have extraction systems in place to minimise inhalation exposure to volatiles and aerosols.

Paint Application – Spray Painting
Details of the spray paint procedure were not described in the submission. However, the process typically involves the professional spray painter preparing the paint immediately prior to use, by aliquoting a variety of components into an open container and pouring this mixture into a spray gun. Spray painting is conducted in a spray booth, which is designed to rapidly remove aerosol particles and solvent vapour from the atmosphere. Residual paint mixture is washed from the spray equipment manually, using recycled paint solvent, and the washings disposed of. Once the final paint mixture is dry, the

notified polymer is irreversibly bound within the cured matrix and not separately available for exposure.

During paint mixing, spraying and clean up, goggles or safety spectacles, gloves and overalls are worn. When in the spray booth, the painter wears a full face shield and respirator.

7. PUBLIC EXPOSURE

EFKA-66 will not be available to the public and is for use by professional spray painters only.

Public exposure will only occur in the event of an accidental spill. The MSDS give instructions to enable workers to deal with accidental spills. The procedure involves containment of the spillage, absorption onto inert material, for example, sand, earth or vermiculite, and collection into containers, which are then sealed and disposed of according to local regulations. Areas of major spills should be cleared of personnel and sources of ignition.

Once applied to the automobile body, the notified polymer is bound in an insoluble matrix and public exposure is expected to be negligible.

8. ENVIRONMENTAL EXPOSURE

Release

There is potential for release during paint formulation and paint application. The formulation processes will take place at five paint manufacturers and any spills that occur will be contained on site. The notifier estimates that the losses due to spills, washings and transfer during formulation would be no more than 5%. These residues would be retained in recycled paint solvent, normally used for cleaning and washing. Solids would be filtered from recycled solvent and disposed of to landfill. Importation of 250 kg in the fifth year approximately 12.5 kg of the notified polymer will be disposed of to landfill.

The paint is applied to motor vehicles with approximately 70% efficiency in a spray booth with control measures, such as a filtering system and masking materials. Waste generated during cleaning of the spray gun and mixing equipment will be collected and disposed of in the same manner as wastewater from the spray booth. It ies expected that by the fifth year approximately 75 kg of polymer waste will be produced during coating application.

Some residue (equal to 2% of the container contents) will also remain in the emptied containers. It is estimated that by the fifth year, approximately 5 kg annually, will remain as residue in the containers.

Fate

Once applied to the metal panels of vehicles the notified polymer will be incorporated in a hard, durable, inert film and would not present a significant hazard. Any fragments, chips and flakes of the paint lacquer will be of little concern as they are expected to be inert. The metal panels coated with the polymer are likely to be either recycled for steel reclamation or be placed into landfill at the end of their useful life. During steel reclamation, the polymer would be destroyed in the blast furnaces and converted to water vapour and oxides of carbon.

The solid waste generated in the formulation and application of the coating will be disposed of to landfill or by incineration. The polymer is unlikely to leach from landfill given the low solubility of the substance and would be expected to slowly degrade over time.

The polymer is not expected to cross biological membranes, due to the low solubility and high molecular weight, and as such should not bioaccumulate (Connell, 1989).

9. EVALUATION OF TOXICOLOGICAL DATA

No toxicology data were submitted.

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

No ecotoxicological data were submitted.

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

The polymer cross-links with other paint components to form a very high molecular weight and stable film that adheres firmly to the primer layer to which it is applied. The polymer is part of the surface coating and will share the fate of the vehicle panel. The paint will slowly deteriorate under the action of UV light, but this is negligible over the life of the motor vehicle. When the vehicle panel is recycled for steel reclamation, the polymer would be destroyed by incineration at high temperatures.

The majority of notified polymer associated with waste from overspray during the application of the coating to the automotive surface should not enter the environment until it is disposed of to landfill. Movement of the polymer by leaching from landfill sites is not expected because of the low water solubility, high binding affinity to soil or existence within a cross-linked cured coating.

In the event of accidental spillage of the polymer solution into waterways, the polymer is not

expected to disperse into the water, but settle out onto sediments. If the polymer is spilt on land, either during usage or transport, it is expected that the polymer would become immobilised in the soil layer. Contaminated soil can then be collected and disposed to landfill.

Given the above, environmental exposure and the overall environmental hazard is expected to be low.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

No toxicological data is provided for polymer in EFKA-66. Therefore, no hazard assessment can be made against the NOHSC *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 1999b). The high molecular weight (greater than 1 000) indicates that polymer in EFKA-66 is unlikely to be bioavailable. It has a functional group (carboxylic acid) of low concern, low molecular weight fractions and no detectable residual monomers. Acute effects identified in the MSDS are due to naptha petroleum, light aromatic and diisobutylketone. EFKA-66 may cause nausea, pain and vomiting if swallowed. The vapour may cause eye irritation and the liquid will cause transient eye irritation and/or eye damage or ulceration. Inhalation of the vapour may cause irritation of the nose and throat; exposure to high concentrations of the solvent may cause respiratory irritation, headache and nausea, leading to narcosis, unconsciousness, coma and possible death. According to the notifier, no injuries related to occupational exposure to the notified polymer are known.

Under the NOHSC *List of Designated Hazardous Substances*, naptha petroleum, light aromatic, has risk phrases: R45(2) – May cause cancer: carcinogen category 2; R65 – Harmful: may cause lung damage if swallowed; and diisobutylketone, R10 – Flammable, R37 – Irritating to respiratory system, assigned (NOHSC, 1999b). The national exposure standard for diisobutylketone is 25 ppm (145 mg/m^3) Time-Weighted Average (TWA) (NOHSC, 1995). Diisobutylketone is also classified as dangerous good for transport, Flammable, Class 3.2 (FORS, 1998) and a Schedule 5 poison (AHMAC, 1999).

Occupational Health and Safety

Dermal exposure to the notified polymer is most likely to occur from drips and spills during manual weighing of aliquots of EFKA-66 for addition to the dispersion phase of paint manufacture. Exposure during subsequent paint manufacture stages and during spray painting may occur but would involve low concentrations of polymer. Once cured, the polymer is not separately available for exposure.

Workers involved in paint manufacture will wear impervious gloves, namely Viton or PVA, chemical goggles and coveralls. Exhaust ventilation will be positioned to capture aerosols and volatiles at point of source. During spray painting, personal protective

equipment will also include face shields and respirators. The spray booth ventilation system should rapidly remove aerosol particles and solvent vapour from the booth environment. The NOHSC *Draft National Reference Document for Spray Painting* (NOHSC, 1999) or guidelines published by state occupational health and safety authorities should be considered for identifying and managing health risks in spray painting.

The level of protection from exposure afforded by the standard protective measures in use for paint manufacture and spray painting will provide adequate protection from the notified polymer, which is likely to be less toxic than most of the solvents, pigments and other paint resins present. Therefore, exposure to the notified polymer poses no significant risk under the identified proposed uses.

Public Health
The notified polymer will only be supplied to industrial customers and will not be sold to the public. Minimal amounts of EFKA-66 may be present on finished articles. Public contact will only occur from touching automobile surfaces containing the notified polymer in a bound, insoluble matrix, or from accidental dermal, ocular, and inhalation exposure from a spill. Consequently, the potential for public exposure to the notified polymer during all phases of its life cycle is considered to be low. Based on the above information, it is considered that polymer in EFKA-66 will not pose a significant hazard to public health when used in the proposed manner.

13. RECOMMENDATIONS

To minimise occupational exposure to polymer in EFKA-66 the following guidelines and precautions should be observed:

- Safety goggles should be selected and fitted in accordance with Australian Standard (AS) 1336 (Standards Australia, 1994) to comply with Australian/New Zealand Standard (AS/NZS) 1337 (Standards Australia/Standards New Zealand, 1992); industrial clothing should conform to the specifications detailed in AS 2919 (Standards Australia, 1987) and AS 3765.2 (ref); impermeable gloves or mittens should conform to AS 2161 (Standards Australia, 1998); all occupational footwear should conform to AS/NZS 2210 (Standards Australia/Standards New Zealand, 1994c);

- Where concentration of vapour can occur an organic vapour (Type A) filter respirator should be used. Respiratory protection should conform to AS 1715 (Standards Australia/Standards New Zealand, 1994a), and AS 1716 (Standards Australia/Standards New Zealand, 1994b);

- EFKA 66 and paints containing the notified polymer are flammable and should be stored, handled and used in accordance with AS 1940 (Standards Australia, 1993);

- Spillage of EFKA-66 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; and

- A copy of the MSDS should be easily accessible to employees.

Employers are responsible for ensuring that NOHSC exposure standards (NOHSC, 1995) for any of the compounds in the final coating product are not exceeded in the workplace.

Spray painting establishments are encouraged to consult guidance documents for identifying and managing health risks in spray painting available from the National Occupational Health and Safety Commission or some state occupational health and safety authorities.

If the conditions of use are varied, then greater exposure of the public may occur. In such circumstances, further information may be required to assess the hazards to public health.

14. MATERIAL SAFETY DATA SHEET

The MSDS for EFKA-66 containing the notified polymer was provided in accordance with the *National Code of Practice for the Preparation of Material Safety Data Sheets* (NOHSC, 1994).

This MSDS was provided by the applicant 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 applicant.

15. REQUIREMENTS FOR SECONDARY NOTIFICATION

Under subsection 64(1) of the Act, secondary notification will be required if the polymer characteristics cease to satisfy the criteria under which it has been accepted as a Synthetic Polymer of Low Concern. Secondary notification of the notified polymer shall be required if any of the circumstances stipulated under subsection 64(2) of the Act arise. No other specific conditions are prescribed.

16. REFERENCES

AHMAC. (1999). *Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP)*. Vol. 13. Australian Government Publishing Service: Canberra.

Connell. (1989). General characteristics of organic compounds which exhibit bioaccumulation. In *Bioaccumulation of Xenobiotic Compounds*, DW, C. (ed). CRC Press: Boca Raton.

FORS. (1998). *Australian Code for the Transport of Dangerous Goods by Road and Rail (ADG Code)*.

NOHSC. (1994). *National Code of Practice for the Preparation of Material Safety Data Sheets [NOHSC:2011(1994)]*. Australian Government Publishing Service: Canberra.

NOHSC. (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: Canberra.

NOHSC. (1999a). *List of Designated Hazardous Substances [NOHSC:10005(1999)]*. Australian Government Publishing Service: Canberra.

NOHSC. (1999b). *Approved Criteria for Classifying Hazardous Substances [NOHSC:1008(1999)]*. Australian Government Publishing Service: Canberra.

SCAA. (1993). Vegetable Oils and Oleoresinous Media. In *Raw Materials and Their Usage*, (SCAA), S.C.A.o.A. (ed) pp. 49-52. New South Wales University Press,.

Standards Australia. (1987). *AS 2919-1987, Australian Standard Industrial Clothing*. Standards Australia: Sydney.

Standards Australia. (1993). *AS 1940 The Storage and Handling of Flammable and Combustible Liquids*. Standards Australia: Sydney.

Standards Australia. (1994). *AS 1336-1994, Australian Standard Eye protection in the Industrial Environment*. Standards Australia: Sydney.

Standards Australia. (1998). *AS/NZS 2161.2:1998, Australian/New Zealand Standard Occupational Protective Gloves Part 2: General Requirements*. Standards Australia and Standards New Zealand: Sydney/Wellington.

Standards Australia/Standards New Zealand. (1992). *AS/NZS 1337-1992, Australian/New Zealand Standard Eye Protectors for Industrial Applications*. Standards Australia and Standards New Zealand: Sydney/Wellington.

Standards Australia/Standards New Zealand. (1994a). *AS/NZS 1715-1994, Australian/New Zealand Standard Selection, Use and Maintenance of Respiratory Protective Devices*. Standards Australia and Standards New Zealand: Sydney/Wellington.

Standards Australia/Standards New Zealand. (1994b). *AS/NZS 1716-1994, Australian/New Zealand Standard Respiratory Protective Devices*. Standards Australia and Standards New Zealand: Sydney/Wellington.

Standards Australia/Standards New Zealand. (1994c). *AS/NZS 2210-1994, Australian/New Zealand Standard Occupational Protective Footwear*. Standards Australia and Standards New Zealand: Sydney/Wellington.