File No: PLC/136

January 2000

NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME

FULL PUBLIC REPORT

Kerocom ES 3489

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

Kerocom ES 3489

1. APPLICANT

BASF Australia Ltd of 500 Princes Highway NOBLE PARK VIC 3174 has submitted a Polymer of Low Concern notification statement in support of their application for an assessment certificate for Kerocom ES 3489.

2. IDENTITY OF THE CHEMICAL

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

Marketing Name:	Kerocom ES 3489
Other Names:	Polymer in Keropur AP 96

Characterisation as a Synthetic Polymer of Low Concern

Number-Average Molecular Weight (NAMW):	1400
Weight-Average Molecular Weight:	1600
Polydispersity:	1.14
Maximum Percentage of Low Molecular Weight Species	
Molecular Weight < 500:	2 %
Molecular Weight < 1 000:	10 %
Polymer Stability	expected to be stable under normal environmental conditions
Reactivity	no reactive functional groups are present; the polymer contains low concern terminal aliphatic hydroxyl groups

Charge Density	no charged functional groups or functional groups which would be expected to become charged under normal environmental conditions are present
Method of Detection and Determination:	infrared spectroscopy

A GPC (Gel Permeation Chromatography) trace and printout was supplied to determine the NAMW and percentage of low molecular species. The GPC trace showed a very narrow peak, which could be consistent with a very narrow range of molecular weight species being present. However, the method of manufacture, which inevitably leads to the distribution of homologues, the slice printout range of 60 % between 1200 and 1900 and an Electrospray-Ionisation-Mass-Spectrometry spectrum supplied by the notifier provide evidence as to the distribution of molecular weights and therefore the polymeric nature of the substance.

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 water solubility of the notified polymer has been determined; the other physical and chemical properties given below are for the product containing the notified polymer, Keropur AP 96.

Appearance at 20°C and 101.3 kPa:	colourless liquid (notified polymer); yellowish liquid (Keropur AP96)
Melting Point:	< -27°C
Specific Gravity:	0.841 at 20°C
Vapour Pressure:	the notified polymer is not expected to be volatile
Water Solubility:	< 1 mg/L at 25°C
Particle Size:	not applicable as the notified polymer is a liquid
Partition Co-efficient (n-octanol/water):	not determined (see comments below)
Dissociation Constant:	no acidic or basic functional groups are present
Flash Point:	68°C
Flammability Limits:	Upper Explosive Limit = 4.7 % Lower Explosive Limit = 0.6 %
Autoignition Temperature:	> 200°C

Explosive Properties:	not expected to be explosive
Reactivity/Stability:	expected to be stable under normal environmental conditions

Comments on Physico-Chemical Properties

The water solubility of the notified polymer was determined using OECD TG 105, column elution method. The notified polymer was dissolved in dichloromethane mixed with silica. After evaporation of the solvent some of the silica was loaded into a column and eluted with water. The amount of the test substance in the water was determined by Total Organic Carbon (TOC) analysis and found to be < 1 mg/L.

Due to the low water solubility of the notified polymer hydrolysis is unlikely in the environmental pH range of between 4 and 9. The notified polymer contains no functional groups that are likely to hydrolyse.

The notified polymer is insoluble in water and is expected to largely partition into n-octanol rather than water. Due to its low water solubility and its high surface activity the polymer is expected to become associated with the organic component of soils and sediments.

4. PURITY OF THE CHEMICAL

Degree of Purity:	not stated; notified polymer comprises 10 – 30 % of the imported product, Keropur AP 96
Hazardous Impurities:	none
Non-hazardous Impurities (> 1% by weight):	none
Maximum Content of Residual Monomers:	residual monomer identities and concentrations have been exempted from publication; concentrations of residual monomers are all below the relevant cutoffs for the notified polymer to be classified as hazardous

Additives/Adjuvants:

Chemical name:	polymeric amine
CAS No.:	not stated
Weight percentage:	up to 70 %
Hazardous Properties:	expected to be irritating to skin and eyes
Chemical name:	petroleum distillate
CAS No.:	64742-81-0

Weight percentage: 15 - 20 %

Hazardous Properties: R65 “Harmful: may cause lung damage if swallowed”

5. USE, VOLUME AND FORMULATION

The notified polymer will be used as a component of a fuel additive for cleaning and keeping clean the inlet systems of spark ignition engines. It will be imported as a component of the fuel additive package, Keropur AP96, at 10 – 30 % (w/w). It will be imported in 205 L containers and in bulk containers, with one delivery per month expected.

The additive package will be reformulated by blending with petrol and other additives, in batches of 10000 to 100000 L. Reformulation will occur only at refineries or bulk fuel storage facilities. The finished fuel will contain up to 0.05 % (w/w) notified polymer. The finished product will be transferred by road tanker to retail outlets.

The notifier estimates that up to 100 tonnes of the new product, containing up to 30 tonnes notified polymer, will be imported per annum in the first five years of importation.

6. OCCUPATIONAL EXPOSURE

Transport and Storage

Transport and storage workers are not expected to be exposed to the additive packages containing the notified polymer during shipment in drums except in the case of an accident involving spillage. The additive package will also be imported in bulk containers, and transferred to road tankers for distribution. Dermal exposure of the waterfront and transport workers to drips and spills of the additive package containing the notified polymer (at up to 30 %) is possible during the connection and disconnection of the transfer hoses during these procedures. Additive packages delivered to the customer site in bulk tankers may be transferred to holding tanks.

The notifier estimates that 2 workers will be involved in receiving and unloading the imported product at the docks, and a further 1 – 2 workers will be involved in road transport. There are likely to be 12 deliveries of the additive package per year. No details of the exposure control measures or personal protective equipment to be employed during these operations was provided by the notifier.

Reformulation

The additive package containing the notified polymer will be reformulated by blending with gasoline and other additives, to produce the finished fuel product. The blending will be mostly an automated enclosed process. The additive package container will be connected to the blending system by flexible transfer hose, and the contents pumped into the blending vessel. Upon completion of the transfer, the container, transfer hose and pump are cleaned by flushing with gasoline before the transfer hose is disconnected. Dermal contact with the notified polymer in the additive package (up to 30 % notified polymer) is possible during the transfer operation. However, little loss of additive package is expected upon connection and disconnection of the transfer hose due to the flushing process.

The finished fuel will be transferred to road tankers for bulk delivery to customers. Dermal exposure to drips and spills of the fuel (typically 0.05 % notified polymer) is possible during the connection and disconnection of transfer hoses during the filling of bulk tankers.

Maintenance workers handling the equipment used for blending and filling may also come into dermal contact with residues containing the notified polymer, should maintenance be required prior to flushing the equipment.

The notifier estimates that between 1 and 4 operators will be involved in the blending process at each customer site. Including maintenance workers, it is likely that less than 10 workers will be exposed to the notified chemical at each site for each delivery. The notifier indicates that the operators will wear industrial clothing and footwear, and that safety glasses, goggles and face shields and protective gloves will be made available.

Distribution and End Use
The finished fuels will be widely distributed to distributors, retail outlets and industrial users. The transport, storage and retail sale of the fuel will involve a large number of workers, but should involve little risk of exposure to the notified polymer due to the low concentration of notified polymer in the fuel and the precautions normally taken to prevent contact with petrol.

7. PUBLIC EXPOSURE

During transport, storage and reformulation, public exposure to the notified polymer is expected to be low. There is likely to be widespread public exposure to the notified polymer as a component of petrol, but there is generally little contact with petrol during transfer from storage tanks to automobile fuel tanks, and the concentration of notified polymer in the petrol is typically 0.05 %.

8. ENVIRONMENTAL EXPOSURE

Release

The preparation of the final petrol product containing the notified polymer will occur at the customer refinery/storage facility at approximately 6 sites around Australia. The company estimates that approximately 1 % of the additive will remain in the 'empty' import drums as residue. This means that up to 0.3 tonnes/year of the polymer may be left as drum residues to be disposed of by licensed drum recyclers by incineration or disposal to landfill.

The additive package will be pumped from the import containers into the blend tank and added to the petrol, typically in batches of 10 000 to 100 000 L. After the blending process is completed the hoses and pumps are cleaned by flushing with petrol which is added to the batch. The small leaks that may occur during this reformulation process will be collected and recycled or disposed of in accordance with State and Territory EPA regulations, most likely to landfill. The notifier indicates that < 0.5 % of the polymer could be lost per year by spills during reformulation (up to 0.15 tonnes/year).

For purposes of assessment, it is estimated that approximately 1 L loss due to spills and leaks is possible when transport tankers are filled with the final blended fuel product. This loss

would also occur at petrol service stations when fuel is transferred from tankers into storage tanks. In both these cases, given its low percentage in fuel, the loss of notified polymer in these spills would be expected to be low.

There are no data available that takes into account the frequent minor spills (< 1 L) that would occur at petrol bowsers as customers fill their vehicles with fuel. However, given its low percentage in fuel (0.05 %), the loss of notified polymer in these spills would be expected to be low. The notifier also indicates that the petrol when spilled will evaporate which would leave the fuel additive containing the notified chemical behind. The notified polymer will then bind strongly to the soil, concrete and asphalt and, as the notified polymer has low water solubility, aquatic pollution should not be significant.

The intended use pattern of the notified polymer in the fuel additive is not expected to result in a significant release to the environment as it is claimed by the notifier to be destroyed by combustion within the petrol engine. The polymer is made up of hydrocarbon and oxygen, the constituents of the petrol. The notified polymer will be a minute part of fuel and should be destroyed at the temperatures at which the fuel is exploded within the internal combustion engine.

Fate

If the polymer is released to soil in either a spill or leak from a storage tank, it is expected to bind strongly to soil due to its low water solubility and its anticipated high partition coefficient. If released to an aquatic environment, the polymer would tend to partition out of water and into sediment. Once adsorbed to soil/sediment, the fate of the polymer is unknown. 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, 1990).

The notification provides no data concerning the effect of the notified substance on tail pipe emissions. The notifier supplied a publicity release on the benefits of deposit control additives like the notified polymer in controlling tail pipe emissions and improving fuel economy. Discussion of test results provided show a positive statistical difference in hydrocarbon, carbon monoxide and NO_x emissions upon use of the additive in test fuel (Nierhauve, 1994). The long term result of detergent fuel additives is to reduce the formation of engine deposits, and to remove existing engine deposits leading to reduced levels of tail pipe emissions.

The notified polymer will need to be tested to ensure that it will meet the upcoming criteria in the Australian Standard, Evaluation of Devices and Additives which Claim to Improve Vehicle Performance, to be AS 4430.2.

9. EVALUATION OF TOXICOLOGICAL DATA

No toxicology data were submitted.

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

No ecotoxicological data were submitted. However, the Material Safety Data Sheet (MSDS) provides ecotoxicity data from a toxicity test on the fish *Leuciscus idus* that indicates that the product containing the notified polymer is slightly toxic to fish [LC_{50} (96 h) = 1-10 mg/L]. The high molecular weight of the substance suggests that it will not cross biological membranes, and will therefore not bioaccumulate.

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

The intended use pattern of the polymer in the fuel additive is not expected to result in a significant release to the environment as it is claimed to be completely destroyed by combustion within the petrol engine, resulting in oxides of carbon and hydrogen. In the event of spills and minor releases during transfer operations, the MSDS of the additive package containing the polymer contains information on procedures to reduce release to the environment. All of the notified polymer that is disposed of to landfill, either from drum residues or spill clean-ups, will be expected to be strongly bound to the soils and sediments and be unlikely to enter the water compartment due to its low solubility and anticipated high partition coefficient.

There is no direct data to support the claim of complete combustion of the polymer to oxides of carbon and hydrogen when the fuel is burnt within the combustion chamber of petrol engines. However, it is evident that the polymer which is made up of hydrocarbon and oxygen, is similar to the petrol of which it will be a minute part and is expected to be destroyed at the temperatures at which the fuel is exploded within the internal combustion engine.

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 information has been provided for the notified polymer. Therefore, the substance cannot be assessed against the NOHSC *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 1999). The additive package Keropur AP 96 is a hazardous substance according to the MSDS.

The MSDS for the additive package Keropur AP 96 indicates that it is a skin irritant. Symptoms including headache, dizziness, or possible nausea may be seen. It is also an aspiration hazard. The symptoms relate mainly to the solvent, petroleum distillate, and possibly the polymeric amine, rather than the notified polymer.

The polymer itself is not reactive and non-volatile, and because of the high molecular weight is not expected to cross biological membranes. The notifier states that there have been no reported incidences of adverse effects on the occupational health of workers using similar polymers in Australia and overseas.

Occupational Health and Safety
The notified polymer will be imported in drums or in bulk as a component (10 – 30 % w/w)

of a gasoline additive package. The additive package will be reformulated in Australia, by blending with gasoline and other additives. The final product is then transferred to road tankers for bulk delivery to customers.

Dermal exposure would be the predominant route of occupational exposure to the notified polymer. Due to the low concentration of notified polymer in finished fuels, little exposure is expected except during handling of the additive package. Precautions including the wearing of impervious gloves are recommended to avoid exposure to the irritant components of the additive package. Inhalation exposure is expected to be minimal because the notified polymer has a very low vapour pressure, so vapour accumulation in the workplace air is not likely.

The system for reformulating the additive package to produce finished fuels is generally enclosed and automated and the possibility of exposure is therefore limited and will typically be of short duration. Workers involved in transferring the imported oil additive containing the notified polymer, including bulk fuel terminal workers and transport workers, and workers involved in blending the additive into fuels may be exposed to drips and spills of the additive package, containing 10 – 30 % notified polymer. Dermal exposure should be controlled by the use of oil impervious clothing and gloves to minimise the risk of skin irritation.

Occupational exposure to the products containing the notified polymer will occur for a large number of customers including fleet operators and petrol retailers. Dermal and ocular exposure to the notified polymer at a concentration of 0.05 % is possible. Exposure will be of short duration and intermittent, and the notified polymer is not expected to pose a significant hazard to these workers.

Public Health
There is likely to be widespread public exposure to the notified polymer as a component of petrol, but the quantities involved will be small, and the concentration of notified polymer in the petrol is low (typically 0.05 %).

The notified polymer is not expected to pose a significant hazard to public health when used in the proposed manner.

13. RECOMMENDATIONS

To minimise occupational exposure to Kerocom ES 3489 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 (Standards Australia, 1990); impermeable gloves or mittens should conform to AS 2161 (Standards Australia/ Standards New Zealand, 1998); all occupational footwear should conform to AS/NZS 2210 (Standards Australia/ Standards New Zealand, 1994b);

- Spillage of the notified chemical 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.

14. MATERIAL SAFETY DATA SHEET

The MSDS for the additive package 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 may 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 may be required if any of the circumstances stipulated under subsection 64(2) of the Act arise. No other specific conditions are prescribed.

16. REFERENCES

Connell DW (1990) General Characteristics of Organic Compounds Which Exhibit Bioaccumulation. In: D. W. Connell ed. Bioaccumulation of Xenobiotic Compounds. CRC Press, Boca Raton.

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.

National Occupational Health and Safety Commission (1999) Approved Criteria for Classifying Hazardous Substances [NOHSC:1008(1999)]. Australian Government Publishing Service, Canberra.

Nierhauve B (1994) Mineralöltechnik 13.

Standards Australia (1987) Australian Standard 2919-1987, Industrial Clothing. Standards Association of Australia, Sydney.

Standards Australia (1990) Australian Standard 3765.2-1990, Clothing for Protection against Hazardous Chemicals Part 2 Limited protection against specific chemicals. Standards Association of Australia.

Standards Australia (1994) Australian Standard 1336-1994, Eye protection in the Industrial Environment. Standards Association of Australia.

Standards Australia/Standards New Zealand (1992) Australian/New Zealand Standard 1337-1992, Eye Protectors for Industrial Applications. Standards Association of Australia/ Standards Association of New Zealand.

Standards Australia/Standards New Zealand (1994b) Australian/New Zealand Standard 2210-1994, Occupational Protective Footwear. Standards Association of Australia/Standards Association of New Zealand.

Standards Australia/Standards New Zealand (1998) Australian/New Zealand Standard 2161.2-1998, Occupational protective gloves, Part 2: General requirements. Standards Association of Australia/Standards Association of New Zealand.