File No: PLC/108

March 1999

NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME

FULL PUBLIC REPORT

I-82

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Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT

I-82

1. APPLICANT

Quaker Chemical (Australasia) Pty Limited and APS Chemicals Pty Ltd of 8 Abbott Road SEVEN HILLS NSW 2147 have submitted a notification statement in support of their application for an assessment certificate for I-82, as a synthetic polymer of low concern (PLC).

2. IDENTITY OF THE CHEMICAL

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

Trade Name: I-82

The notified polymer is a polymer produced from the reaction of 3 monomers. It is of variable composition, making it a UVCB substance.

3. PHYSICAL AND CHEMICAL PROPERTIES

Appearance at 20°C and 101.3 kPa:	clear brown, viscous liquid
Boiling Point:	313°C (for monomer)
Specific Gravity:	949 kg/m^3
Water Solubility:	insoluble - see notes below
Hydrolysis as a Function of pH:	see notes below
Dissociation Constant:	does not have any dissociable groups and is not likely to be anionic or cationic within the environmental pH range
Flash Point:	277°C
Flammability Limits:	not flammable

Autoignition Temperature: not expected to autoignite

Explosive Properties: not expected to be explosive

Reactivity/Stability: stable - see notes below

Comments on Physico-Chemical Properties

The notifier states that the water solubility is <1 mg/L, while no report was submitted. Since the polymer has a high hydrocarbon content and no highly polar groups, the water solubility will be low.

Although the ester groups within the polymer are potentially susceptible to hydrolysis, the predominantly hydrophobic nature of the molecules will prelude intimate contact between the susceptible bonds and the water molecules. Therefore, the polymer is expected to be stable under normal environmental conditions of use, but may undergo hydrolysis or decomposition under extreme temperature or pH conditions.

Data on partition coefficient and adsorption/desorption properties are not required under the Act for PLC. The polymer contains a high proportion of hydrocarbon and is expected to have very low water solubility. These characteristics indicate that it would have a high affinity for oil and the organic component of soils and sediments.

The new polymer also contains a significant number of unsaturated alkene bonds which are potentially reactive under certain conditions. However, reactions involving these bonds are likely to lead to crosslinking between polymer chains giving higher molecular weight species. Under the proposed PLC criteria, non-conjugated alkene groups are of low concern.

The notified polymer satisfies the proposed criteria for a PLC.

4. PURITY OF THE CHEMICAL

Degree of Purity: not specified

Additives/Adjuvants: not specified

5. USE, VOLUME AND FORMULATION

The notified polymer will be manufactured in Australia and used as an industrial lubricant and coolant.

The notified polymer is to be manufactured at one notifier's plant site. The polymer is prepared by mixing the reactants in a batch reactor and heating to approximately 120°C with nitrogen sparging. Once foaming has ceased, the nitrogen is turned off and vacuum applied. The mixture is heated to 190°C for the reaction to take place. After the reaction is complete the mixture is cooled to 60°C and then transferred to 200 L steel drums. The process takes 14-19 hours to complete.

The batch size is 2.5 tonnes and it is anticipated that 4-5 batches will be prepared each year. Approximately 5-10 tonnes will be produced annually in the first 5 years.

I-82 will be blended on-site to final products containing 15-30% of I-82; these will be transported to customer sites.

6. OCCUPATIONAL EXPOSURE

No vapour pressure data was provided. However, the vapour pressure for the notified polymer is expected to be low because of its high molecular weight and low content of low molecular weight species. As viscosity for a lubricant is expected to be high, the possibility to generate mists during handling is low. Therefore, dermal would be the main route for occupational exposure.

Transport and storage
Waterside, transport and warehouse workers will handle the notified polymer or the lubricant containing the notified polymer. There will be 2-4 waterside workers, 2-4 transport workers and 1-2 warehouse workers. They will handle the notified polymer or the product containing the notified polymer for 2-3 hours per day, 10-15 days per year. As the product may be transported in bulk containers, workers may be exposed to the notified polymer during transfer to storage tanks.

Manufacturing plant operators
The notifier stated that there will be 5-10 workers at the notifier's plant involved in the manufacturing and formulating processes. The plant operators will handle the notified polymer for 8 hours per day and 30-40 days per year.

The manufacturing operators will transfer the monomers into the reactor vessel. The reactor vessel is a closed tank equipped with mechanical stirring and local exhaust ventilation. After manufacturing, the notified polymer will be packed into 200 L steel drums. The manufacturing operators may be exposed to the notified polymer during the connecting and disconnecting of the pumps, and collecting the QC samples for testing. The manufacturing operators will wear impermeable vinyl or rubber gloves, overalls and safety glasses.

The formulators will transfer the notified polymer and other ingredients into a mixing vessel. The mixing vessel is also a closed system with mechanical stirring and local exhaust ventilation. The final products will contain 15-30% of the notified polymer and be packed via a micromotion meter into 218 kg plastic-lined steel drums or 10 kL or 20 kL bulk tankers for transportation to customers. The formulators could be exposed to the notified polymer or the lubricant products containing the notified polymer through dermal contamination during the connecting and disconnecting of the pumps. The formulators will wear impermeable vinyl or rubber gloves, overalls and safety glasses.

End use
The notifier estimated that there would be 10-20 application plant operators handling the 15-30% product for 2 hours per day and 60 days per year.

The end users will transfer the products to an on-site storage tank. The products will be added by automatic dosing to the industrial cooling/lubrication system. The entire process is fully automatic, enclosed, continuous and recycling. Local exhaust ventilation will extract vapours from the process, which is kept at approximately 900°C. The products containing the notified polymer will be consumed during the industrial process. Dermal contamination in end users is possible during addition to the storage tank or directly to the dosing system. The end users will wear overalls, gloves, chemical goggles and safety boots.

7. PUBLIC EXPOSURE

The notified polymer will not be sold to the general public and will only be used in industrial applications. According to the notifier, the notified polymer will be totally consumed in the application process, and no residues will be present in the finished products. Consequently, public exposure to the notified polymer during manufacture, transport, storage, and use will be negligible.

8. ENVIRONMENTAL EXPOSURE

Release

The submission states that only 1% (at maximum 100 kg/year) of the freshly manufactured polymer will be lost during manufacture and transfer to 200 L drums. Most of the lost polymer will be collected and treated in an on-site dissolved air flotation (DAF) treatment plant, and the resultant sludge will be transferred to an aqueous waste treatment plant. A small amount may be released into the sewer as a consequence of incomplete recovery into the sludge.

The blended formulations containing the new polymer are used as cooling lubricants applied at temperatures of approximately 900°C. Vapours and decomposition products from the resultant reactions will be removed by local exhaust ventilation. No release of the polymer except for accidental spills and leaks is expected during use.

Fate

Most of the compound will be destroyed during use due to the very high temperatures employed. The decomposition products (primarily oxides of carbon and water vapour) are removed through vacuum extraction. However, the small amounts lost during manufacture from leaks or accidents are expected to become incorporated into sludge and placed into land fill. Here the polymer can be expected to be slowly decomposed to water and oxides of carbon through biological and abiotic processes which operate in land fills.

9. EVALUATION OF TOXICOLOGICAL DATA

No toxicological data were provided which is acceptable for a PLC.

The notifier provided a published toxicity review of a structural analogue glyceryl ricinoleate (CIR Expert Panel, 1988). The review assessed toxicity data generated for glyceryl

ricinoleate to assess its hazard as a cosmetic ingredient. Ricinoleic acid comprises 87% of the fatty acid composition of castor oil and is the main component of castor oil fatty acids. Commercial manufacture of glyceryl ricinoleate involves catalysed glycerolysis of castor oil.

Glyceryl ricinoleate showed an acute oral LD_{50} in mice of >25 mL/kg and 15 g/kg of a 33.3% product was non-lethal to rats. It is a moderate irritant to abraded rabbit skin, a slight irritant to unabraded rabbit skin, and a moderate irritant (and remains unabsorbed) following i.m. injections into the pectoral muscles of chickens. In human single-insult occlusive patch tests, no indication of skin irritation occurred for 2 products containing 5.6% glyceryl ricinoleate. The structural analogue was non-irritant in washed and unwashed rabbit eyes and non-carcinogenic in BALB/c female mice following 100, twice weekly, intravaginal applications of 2% ricinoleic acid. Castor oil was not mutagenic in the Ames test.

According to the notifier, no injuries related to occupational exposure to the notified polymer are known, and it is not known whether it will exacerbate any existing medical conditions.

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

No ecotoxicological data were provided which is acceptable for polymers of low concern.

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

The new polymer does not present a hazard to the environment when manufactured as described and used in the indicated manner. The great majority of the polymer will be destroyed during its use as a coolant/lubricant at temperatures of approximately 900°C. The decomposition products (primarily, water vapour and carbon oxides) will be released into the atmosphere.

A very small amount of polymer may be released to the sewerage system as the result of incomplete recovery during clean up of spills. However, the hydrophobic nature of the polymer indicates that this would largely become associated with the organic component of soils and sediments.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

The notified polymer is not expected to cause systemic health effects because it is of high molecular weight, so unlikely to traverse biological membranes, and has a low content of residual monomers. Health hazard information on the material safety data sheet (MSDS) supplied by the notifier, states that I-82, containing >60% of the lubricant may cause diarrhoea if swallowed, may cause dermatitis from defatting the skin on prolonged contact, and may cause irritation to the nose and throat from irritation of mist. The available toxicity data is very limited, however, it is unlikely that the notified polymer will be a hazardous substance according to the NOHSC *Approved Criteria for Classifying Hazardous Substances* (National Occupational Health and Safety Commission, 1994a).

Occupational Health and Safety
Waterside and warehouse workers are expected to have negligible health risk during storage unless the drums are broken in an accident. Transport workers may be exposed during the transfer of notified polymer from bulk containers, however, as the polymer is not hazardous the risk of adverse health effects is low. Gloves should be worn.

The manufacturing operators and formulators could be exposed to the notified polymer when connecting and disconnecting of the pumps during transfer to reactors and mixing tanks, filling of containers, and when collecting the QC samples for testing. Dermal contamination will be the main route of occupational exposure. The manufacturing and formulation processes are enclosed, with local exhaust ventilation provided as a standard industrial control measure. To minimise any possible risk of contamination from spills and leaks, the operators should wear gloves, overalls and safety glasses to prevent irritation.

The entire end use process is fully automatic, enclosed, continuous and recycling. Local exhaust ventilation will extract vapours from the process. However, as dermal contamination may occur during transfer of the polymer and other (undescribed) constituents in the blend, end users should wear overalls, gloves chemical goggles and safety boots.

Overall, due to low toxicity of the polymer and the expected low frequency of exposure, the risk of adverse health effects arising from contact with the notified polymer is low.

Public Health
Based on the use pattern of the notified polymer, it is unlikely to pose a significant hazard to public health.

13. RECOMMENDATIONS

To minimise occupational exposure to I-82 the following guidelines and precautions should be observed:

- Ensure that local exhaust ventilation is in place during manufacture and formulation;
- 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 3765.1 (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, 1994);
- 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 notified chemical was provided in accordance with the *National Code of Practice for the Preparation of Material Safety Data Sheets* (National Occupational Health and Safety Commission, 1994c).

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 the Act, secondary notification of the notified chemical 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

CIR Expert Panel (1988) Final report on the safety assessment of glyceryl ricinoleate. Journal of the American College of Toxicology, **7**(6): 721-739.

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

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

National Occupational Health and Safety Commission (1994c) National Code of Practice for the Preparation of Material Safety Data Sheets [NOHSC:2011(1994)]. Canberra, Australian Government Publishing Service.

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

Standards Australia (1990) Australian Standard 3765.1-1990, Clothing for Protection against Hazardous Chemicals Part 1 Protection against General or Specific Chemicals. Sydney, Standards Association of Australia.

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

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

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

Standards Australia/Standards New Zealand (1998) AS/NZS 2161.2:1998 Occupational protective gloves, Part 2: General requirements, Standards Australia/Standards New Zealand.