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September 1999

**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION
AND ASSESSMENT SCHEME**

FULL PUBLIC REPORT

Synthetic Lubricant 1383

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Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT**Synthetic Lubricant 1383****1. APPLICANT**

Quaker Chemical (Australasia) Pty Limited and APS Chemicals both of 8 Abbott Road SEVEN HILLS NSW 2147 have jointly submitted a Synthetic Polymer of Low Concern notification statement in support of their application for an assessment certificate for Synthetic Lubricant 1383.

2. IDENTITY OF THE CHEMICAL

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

Marketing Name: Synthetic Lubricant 1383

Characterisation as a Synthetic Polymer of Low Concern**Number-Average**

Molecular Weight (NAMW): > 1 000, NAMW is exempt information

**Maximum Percentage of Low
Molecular Weight Species**

Molecular Weight < 500: 4

Molecular Weight < 1 000: 32

Polydispersity (M_w/M_n): 1.93

Residual Monomers: Estimated to be less than 1%

Polymer Stability Stable under normal conditions; under extreme temperatures or pH may undergo hydrolysis or decomposition

Reactivity	No significant reactivity
Particle Size	Not applicable as polymer is a liquid
Charge Density	The notified polymer is a polyester and does not contain any anionic or cationic groups
Water Solubility	3 000 mg/L
Method of Detection and Determination:	Infra Red Spectroscopy

The polymer was accepted under the category of Synthetic Polymer of Low Concern (PLC), under the proposed revised criteria for PLC, on the basis that:

- the polymer is a polyester; and
- the monomers are either on the list of monomers which are accepted as constituents of PLCs or are similar enough to be considered to be on the list.

3. PHYSICAL AND CHEMICAL PROPERTIES

Appearance at 20°C and 101.3 kPa:	Clear amber liquid
Boiling Point:	276°C
Specific Gravity:	1.075 – 1.085 g/cm ³
Vapour Pressure:	Not determined; expected to be low
Water Solubility:	3 000 mg/L at 25°C
Partition Co-efficient (n-octanol/water):	Not determined (see comments below)
Hydrolysis as a Function of pH:	Not determined (see comments below)
Adsorption/Desorption:	Not determined (see comments below)
Dissociation Constant:	Not determined (see comments below)
Flash Point:	Not determined (see comments below)

Flammability Limits:	Non flammable; combustible liquid
Autoignition Temperature:	Not expected to autoignite
Explosive Properties:	Not expected to be explosive

Comments on Physico-Chemical Properties

The water solubility of the notified polymer was determined to be 3 000 mg/L which is consistent with the properties of the prepolymer on which the notified polymer is based.

The polymer contains ester linkages that could be expected to undergo hydrolysis in the environmental pH range of between 4 and 9 due to the high water solubility. However, the rate and extent of this is unclear.

Partition coefficient and adsorption/desorption were not determined. The notified polymer is soluble in water but is expected that it will still largely partition into *n*-octanol rather than water. Even though some mobility may occur because of the water solubility, the polymer is still expected to become associated with the organic component of soils and sediments.

No dissociation constant data was provided by the notifier. The submission claims that the notified polymer is primarily composed of polyester resins, which do not have dissociable groups, and is not likely to be either anionic or cationic within the environmental pH range.

It is noted that a small percentage of carboxylic acid functionality with typical acidity may be found as end groups.

4. PURITY OF THE CHEMICAL

Degree of Purity:	>99%
Hazardous Impurities:	none
Non-hazardous Impurities (> 1% by weight):	none
Additives/Adjuvants:	none

5. USE, VOLUME AND FORMULATION

Use

The notified polymer, Synthetic Lubricant 1383, will be used as an ingredient of two products used for medium duty machining and grinding operations of carbon steel, cast iron, aluminium and other non-ferrous alloys.

Manufacture Volume

Over the next five years between 12 to 20 tonnes per year are to be manufactured by APS Chemicals, for reformulation into Synthetic Lubricant 1383.

Manufacture and Formulation

Synthetic Lubricant 1383 is manufactured in a batch reactor, in a reaction process that takes place under vacuum at 240°C for 1 hour, followed by cooling to 60°C. The total reaction time is approximately 13 hours and produces a batch size of 2.5 tonnes. At completion of the reaction, Synthetic Lubricant 1383 is transferred to and stored in 200 L drums for subsequent blending into final products.

Synthetic Lubricant 1383 is pumped from the 200 L drums to a closed mixing vessel and blended with other chemicals to produce a final product containing Synthetic Lubricant 1383 at 5 to 15%. The blended final products are transferred by metering pumps to 200 L steel drums or 1 000 L bulk containers for transport to customers or export.

6. OCCUPATIONAL EXPOSURE

Manufacture of Polymer (13 hours/day, 5 to 10 days/year)

Plant operators (5 to 10 workers) are potentially exposed to hot Synthetic Lubricant 1383, via fumes and drips and spills, during sampling of the reactor contents every 10 minutes while at 240°C, and once again at 60°C. Opportunity for dermal exposure also exists when transferring Synthetic Lubricant 1383 from the reactor to storage drums. The means of addition of monomers to the reactor were not identified in the submission.

Formulation of Final Products (13 hours/day, 5 to 10 days/year)

Other plant operators at the manufacturing site are potentially exposed to the notified chemical during the formulation of the final products. The notifier has indicated that the mixing vessel is closed, however, skin contamination may occur during the transfer of notified chemical from 200L drums (by pump). The mixer is equipped with local exhaust ventilation to capture any fugitive vapours during the blending process. The product is filled into 200L drums or 1 000 L bulk containers, and skin contact may ensue if spillage occurs during this operation. The plant operators are also potentially exposed to the notified chemical when sampling the blended product for quality control testing. The notifier has indicated that plant operators wear overalls, rubber gloves and safety glasses. Laboratory workers would be expected to wear laboratory coat and safety glasses for protection.

Application (2 hours/day, 60 days/year)

At the customer site, the final products will be drawn automatically from the drum/container directly into the lubrication system of machining equipment where it is applied directly to the workpiece. For grinding operations, the synthetic lubricant is used at 1:20 to 1:50 (0.75 to 0.3% notified polymer) and for machining applications, at 1:10 to 1:30 (1.5 to 0.5% notified polymer). The notifier expects that minimal amounts of finished product and notified polymer will remain on the workpiece following machining. The system is described as continuous and fully automated, with the lubricant collected and recycled. Plant operators (50 to 60 workers) are required to monitor the machining and grinding processes.

Plant operators may have potential for exposure to the final products while connecting/disconnecting pump lines to and from the drums/containers and machining equipment, handling and positioning of the workpiece and during clean up and maintenance of the equipment.

Workers will be required to wear personal protective equipment, including coveralls, impervious rubber gloves and safety glasses or chemical goggles.

Transport, Storage and Waterside (2 to 3 hours/day, 10 to 15 days/year)

The final products will be transported in 200 L drums or 1 000 L containers to customer sites and if an export market is realised, to dockside areas. Exposure to drivers, warehouse workers (3 to 6 workers) or waterside workers (2 to 4 workers) may occur in the event of a spill.

Education and Training

The notifier advises that only chemical trained operators will handle the notified polymer. Material Safety Data Sheet (MSDS) are available to all workers.

7. PUBLIC EXPOSURE

Manufacture of the notified polymer and blending into synthetic lubricant products, will occur at a single site in closed reaction and mixing vessels. Losses due to spills, leaks and clean up will combine with other wastes for treatment in the on-site waste treatment plant. Most of the notified polymer will be coagulated and disposed of with sludge waste and the remainder will be discharged into the sewer.

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.

The synthetic lubricant products that contain the notified polymer are for industrial use and will not be sold to the public. Minimal amounts of Synthetic Lubricant 1383 may be present on finished articles. Public contact will only occur from touching finished articles containing residual notified polymer.

8. ENVIRONMENTAL EXPOSURE

Release

Manufacture of the notified polymer and subsequent formulation into synthetic lubricants will take place at the APS Chemicals plant. There is potential for release of the notified polymer during these processes. The notifier estimates around 5% of manufacture (around 1 000 kg per annum) of the notified polymer and 1% of final products (around 1 500 kg) will be lost due to spills, leaks and cleaning of equipment. All effluent will be treated at an on-site treatment plant.

Final products, containing the notified polymer, will be used in grinding and machining processes at industrial sites. During these processes, the machining fluid containing the notified polymer is collected and recycled via collection tanks and trays surrounding the equipment. Splashes are unlikely to occur as most machining equipment have safety shields around the lubricated moving pieces. Splash-down is directed to the collection trays and tank.

Fate

At the manufacturing site, the waste treatment plant consists of two dissolved air flotation tanks in series, and numerous wastewater and sludge tanks which contain chemicals are added, including alum, caustic and acid, to coagulate the waste and adjust pH. Most of Synthetic Lubricant 1383 (95% or 1 090 kg per annum) will be coagulated and disposed of with sludge waste to one localised waste treatment plant, then landfill and approximately 60 kg will be discharged into the sewer.

The average daily water plant discharge to sewer is 300 000 L. Assuming 10 days per annum of production and discharge to sewer, the worst case concentration of notified polymer released to sewer at the site will be approximately 20 mg/L. Taking into account the dilution ratio in the metropolitan sewer and in receiving waters of approximately 1:10 each, the predicted environmental concentration PEC will be 0.2 mg/L.

At the application site, spills of the machining fluid would be handled according to the instructions in the MSDS using absorbent material and washing down of the area. After a certain period of use the machining fluid becomes unsuitable and needs to be collected into drums for disposal. Disposal of the used machining fluid would be through a licensed waste contractor. The notifier claims that the waste facility is likely to treat this material in the same way as hydrocarbon/oil wastes. The most likely fate would be use as a fuel source for industrial furnaces. Combustion of the notified polymer will produce oxides of carbon and hydrogen.

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

9. EVALUATION OF TOXICOLOGICAL DATA

No toxicological data were submitted.

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

No ecotoxicological data were submitted.

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

The majority of notified polymer associated with waste from the application of the machining fluid should not enter the environment until it is disposed to either landfill or incineration. Movement of the polymer by leaching from landfill sites, even though water soluble, is not expected because of its expected binding affinity to soil. If the polymer is incinerated when used as an industrial fuel source as suggested by the notifier then the polymer will be reduced to oxides of carbon and hydrogen.

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 Synthetic Lubricant 1383. Therefore, no hazard assessment can be made against the NOHSC *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 1999). The high molecular weight (>1 000) indicates that Synthetic Lubricant 1383 is unlikely to be bioavailable. Synthetic Lubricant 1383 does not contain any reactive functional groups considered to cause adverse health effects. On the available data, the constituent and residual monomers would not be not considered hazardous against the NOHSC *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 1999). Acute effects identified in the MSDS indicate Synthetic Lubricant 1383 may cause slight discomfort to the gastrointestinal tract if swallowed, and may cause transient eye irritation. Inhalation of high concentration of mist may cause irritation of the nose and throat. No adverse effects are

expected through skin contact. According to the notifier, no injuries related to occupational exposure to the notified polymer are known.

The final products containing Synthetic Lubricant 1383 also contain 10 to 30% diethanolamine and are classified as hazardous, R36/R38 – Irritating to Eyes and Skin. The NOHSC exposure standard for diethanolamine is 3 ppm (13 mg/m³) Time-Weighted Average (TWA) (NOHSC, 1995).

Occupational Health and Safety

During transport and export of the synthetic lubricants containing the notified polymer, there is unlikely to be any worker exposure, except in the event of a spill. Exposure after a spill would be controlled by use of the recommended practices for spillage clean up given in the MSDS.

During manufacture of Synthetic Lubricant 1383, exposure to fumes, drips and spills is possible during quality control sampling of reactor contents and drum filling. During formulation activities, exposure to drips and spills is also possible during transfer of Synthetic Lubricant 1383 or final synthetic lubricant products (5 to 15% notified polymer) to and from storage containers. The use of enclosed systems and local exhaust ventilation is needed to control worker exposure during these operations. Dermal exposure may also occur during the sampling and testing of the product, however, the quantities handled will be small.

At industrial sites where the synthetic lubricants are used for machining and grinding of workpieces, exposure is via drips and spills during pump line connection/disconnection, when handling lubricated workpieces and during clean up and equipment maintenance. Exposure is expected to be minimal, as the concentration of the notified polymer in the end use synthetic lubricant is low. The system should be fully automated with *in situ* engineering controls.

In both manufacture and end use, workers will be required to wear personal protective equipment namely, coveralls, impervious rubber gloves and chemical goggles. These control measures are needed to minimise inhalation exposure and the risk of eye and skin irritation from diethanolamine, present at 10 to 30% in the synthetic lubricants. No significant health risk is foreseen for workers exposed to the notified polymer in manufacture, formulation or end use.

Public Health

The synthetic lubricant products that contain the notified polymer are for industrial use and will not be sold to the public. Minimal amounts of Synthetic Lubricant 1383 may be present on finished articles. Public contact will only occur from touching finished articles containing residual notified polymer 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 this information, it is considered, Synthetic Lubricant 1383 will not pose a significant hazard to public health when used in the proposed manner.

13. RECOMMENDATIONS

To minimise occupational exposure to Synthetic Lubricant 1383 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, 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.

The final products contain diethanolamine. Workers should be advised of the potential for occupational dermatoses following repeated skin exposure and to report any skin changes to the occupational health and safety officer at the workplace. When an occupational skin disease occurs, work practices and opportunities for contact with the substance should be reviewed and preventive measures instigated to ensure other workers do not develop the same condition. Further guidance on preventing the occurrence of occupational skin diseases can be found in the NOHSC guide *Occupational Diseases of the Skin* (NOHSC, 1990). The employer is responsible for maintaining exposure to diethanolamine below the NOHSC exposure standard of 3 ppm (13 mg/m³) TWA. (NOHSC, 1995)

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 Synthetic Lubricant 1383 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

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