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NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME

FULL PUBLIC REPORT

Polymer in Aero Oil 100 and Aero Oil 120

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Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT

Polymer in Aero Oil 100 and Aero Oil 120

1. APPLICANT

Rohm and Haas Australia Ltd of 969 Burke Road CAMBERWELL VIC 3124 and Mobil Oil Australia Ltd of 417 St Kilda Road MELBOURNE VIC 3004 have jointly submitted a limited notification statement in support of their application for an assessment certificate for Polymer in Aero Oil 100 and Aero Oil 120.

2. IDENTITY OF THE CHEMICAL

Polymer in Aero Oil 100 and Aero Oil 120 is considered not to be hazardous based on the nature of the chemical and the data provided. Therefore 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 and the Summary Report.

Trade Name:	Aero Oil 100 and Aero Oil 120 (products containing < 40 % of notified polymer)
Method of Detection and Determination:	Gel Permeation Chromotography (GPC) and infrared (IR) spectra were were provided by the notifier

3. PHYSICAL AND CHEMICAL PROPERTIES

Unless stated otherwise, the characteristics given below refer to the products, Aero Oil 100 and Aero Oil 120 containing the notified polymer.

Appearance at 20°C and 101.3 kPa:	brown viscous liquids with a mild odour
Melting Point:	> 316°C (mineral oil)
Specific Gravity:	0.89 (Aero Oil 100) and 0.95 (Aero Oil 120)
Vapour Pressure:	not determined (see comments below)

Water Solubility:	not determined (see comments below)
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:	> 243°C (closed cup)
Flammability Limits:	not determined (see comments below)
Autoignition Temperature:	not determined (see comments below)
Explosive Properties:	non-explosive
Reactivity/Stability:	notified polymer is considered to be stable, but contact with strong oxidants should be avoided

Comments on Physico-Chemical Properties

The boiling point and density reported are probably closer to those of the solvent (oil) rather than those of the polymer. The notified polymer itself would not have a measurable boiling point and its density would be high.

The company argues that the vapour pressure of such a high molecular weight compound (48900 $g.mol^{-1}$) is bound to be negligible. This is acceptable.

The presence of many long chain hydrophobic alkyl ester groups, the high molecular weight, and the very small amount (1%) of low molecular weight species would ensure the polymer is highly insoluble.

The polymer contains a large proportion of ester groups, but hydrolysis in the environmental pH range (4-9) is not expected due to the low water solubility.

Partition coefficient, adsorption/desorption and dissociation constant were not determined due to the low water solubility of the polymer. The partition coefficient is expected to be high and the polymer is expected to bind strongly to, or be associated with, the soil and sediment. The Material Safety Data Sheet (MSDS) for the chemical indicates the partition coefficient to be greater than 3.5. The polymer has no dissociable or reactive functionalities.

Flammability limits and an autoignition temperature were not provided but the notified polymer is unlikely to be flammable.

5. USE, VOLUME AND FORMULATION

The notified polymer is intended to be used as a viscosity index improver for aircraft engine oil. It will not be manufactured in Australia but will be imported in Aero Oil 100 and Aero Oil 120 at concentrations of less than 40%. Import volumes in the first 2 years will be between 5 and 10 tonnes, rising to 15 tonnes per annum for years 3 to 5 respectively. The oils containing the polymer are expected to be used by both commercial and private airlines.

6. OCCUPATIONAL EXPOSURE

The notified polymer will be imported in formulated products and transported from the docks by road to the notifier's warehouse where it will be stored for up to 3 months. The notified polymer will be contained in sealed 172 kg steel drums. During normal working conditions transport, storage and handling workers are unlikely to be exposed to the notified polymer.

During formulation of the end-use product, material handlers and applicators may be exposed to the notified polymer. Initially the steel drums containing the notified polymer will be connected to blending tanks by tubing and the material pumped into the tanks. Other components such as base oil are added and then mechanically mixed and heated. The blending tanks are open but fully guarded. Therefore there is the potential for workers to be exposed to the notified polymer during transfer of the notified polymer when fitting and disconnecting lines. If exposure ocurred it would most likely be via the dermal route.

Quality control workers will sample the blended end-use products and there is the potential to be exposed to the notified chemical during this process. Once again the dermal route is most likely.

Blended product is mechanically drummed off into 205 and 20 L steel drums before transport to customers. There is the potential for occupational exposure during the transfer process or when disconnecting lines.

Maintenance of pumps and tanks will be carried out for intermittent, short periods of time during which there is the potential for dermal exposure to the notified chemical.

At customer sites the reformulated product will most likely be handled by mechanics in designated servicing areas. As for other workers, exposure is likely to be minimal, but if it occurs is likely to be via the dermal route.

7. PUBLIC EXPOSURE

There is negligible potential for public exposure to the polymer arising from importation, transportation, storage, reformulation and use. The potential for

public exposure to the notified polymer after a spill is minor. Public exposure will be minimised by the recommended practices during storage, transportation and waste disposal.

Should contact occur, there is likley to be very low absorption of the notified polymer across biological membranes into tissues because of its high molecular weight.

8. ENVIRONMENTAL EXPOSURE

Release

Details of formulation and blending are provided in earlier sections.

The company estimates the residue left in the original imported drums to be less than 5%. These drums are collected by reconditioners who would dispose the residues either to landfill or by incineration. Residues in the blending tanks and transfer tubing are collected and either recycled or disposed as trade waste, again to landfill or by incineration. The company estimates the waste of the polymer through this source to be up to 5%. At airlines up to 3.6% of the polymer (10% of product) is expected to be wasted due to spillage etc during topping up and changing engine oil. This waste may either be reprocessed, disposed of to landfill or incinerated. The total waste polymer released to the environment through formulation and handling processes therefore is up to 14% of the import volume or a maximum of 2.1 tonnes per annum.

According to Qantas Airways, in commercial jet aircrafts, engine oil is only topped up, complete removal of oil being done only during engine rebuilding. In light piston aircrafts the engine oil may be changed more frequently. When the engine oil is changed the used oil is removed to drums and passed on to used oil collecting agents for disposal.

Fate

Waste polymer disposed of to landfill will remain bound to or associated with soil particles. Due to the low solubility and expected high partition coefficient the potential for aquatic contamination through leaching would be very low. In landfill sites the polymer will undergo slow biodegradation. Incineration will destroy the polymer converting it to oxides of carbon and nitrogen and water vapour.

Engine oil removed from aircraft engines is collected and disposed of by waste oil collection services. While some of the waste oil collected is recycled, most of it is sold as burner fuel in Australia to power stations, cement kilns, brick works, limeworks etc (1). The polymer in the oil will be destroyed during such burning.

9. EVALUATION OF TOXICOLOGICAL DATA

No toxicological data were provided, which is acceptable for polymers of NAMW greater than 1 000.

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

The polymer is unlikely to present a hazard to the environment when it is blended, packed and used as specified. Waste disposed of to landfill will not pose a hazard to aquatic organisms due to the low solubility and high molecular weight of the polymer.

The bulk of the polymer will remain with the used oil removed from aircraft engines which after collection will most likely be incinerated or used as fuel oil. This will destroy the polymer converting it to oxides of carbon and nitrogen and water vapour.
The US EPA for example considers polynonionic polymers with NAMW greater than 1 000 and low solubility to be of low concern (2).

The environmental hazard from the notified polymer can be rated as low.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

The notified polymer has a high molecular weight greater than 1 000 and will exist as a crosslinked network. Therefore, transmission across biological membranes is unlikely if exposure occurs. The polymer has a low percentage of low molecular weight species (MW < 1 000, < 1%; MW < 500, < 1.1%). Although some of the monomers may have the potential for sensitisation effects they are present at low concentrations and therefore the notified polymer is considered unlikely to be of significant toxicological concern.

Under normal working conditions transport, storage and handling workers are unlikely to be exposed to the notified chemical and the occupational risk for these workers is considered negligible.

During reformulation, quality control, drum filling and maintenance procedures, dermal exposure may occur. However, given the low hazards associated with the notified polymer and short processing periods for each category of worker the notified polymer is considered to be of low risk to workers performing these tasks.

For mechanics using the end-use product as an additive to engine oils, exposure to the notified chemical also presents low occupational risk.

It is unlikely that the notified polymer will pose a significant hazard to public health when used in the proposed manner.

13. RECOMMENDATIONS

To minimise occupational exposure to Polymer in Aero Oil 100 and Aero Oil 120 the following guidelines and precautions should be observed:

- Spillage of the notified chemical should be avoided, spillages should be cleaned up promptly with absorbents and 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 end-use products are likely to contain mineral oils for which an occupational exposure standard has been set (3). This should be adhered to if mist generation is likely to occur during blending. Refer to the product MSDS for further guidance.

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* (4).

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

1. Fortescue G. *Used Oil - Collection, Processing and Disposal*. in *Procedings of the Used Oil Management Conference*. 1997. Brisbane.

2. Nabholz, J.V., Miller, P. & Zeeman, M. 1993, 'Environmental Risk Assessment of New Substances under the Toxic Substances Control Act Section Five', in *Environmental Toxicology and Risk Assessment, American Society for Testing and Materials*, ASTM STP 1179, Philadelphia, pp. 40-55.

3. 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, Canberra.

4. 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.