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NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME

FULL PUBLIC REPORT

Polymer in VISCOPLEX 5367

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Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT

Polymer in VISCOPLEX 5367

1. APPLICANT

Plastral Fidene of 11B Lachlan Street, Waterloo NSW 2017 has submitted a Synthetic Polymer of Low Concern notification statement in support of their application for an assessment certificate for Polymer in VISCOPLEX 5367.

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.

Characterisation as a Synthetic Polymer of Low Concern

Number-Average Molecular Weight (NAMW):	< 10 000
Polymer Stability:	Considered stable unless heated above 250^{o}C
Reactive Functional Groups:	None present
Charge Density:	Polymer has no charged groups (see comments below)
Method of Detection and Determination:	IR, GPC

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*.

Comments on Chemical Identity
Infrared (IR) spectrometric data were submitted for the identification of the notified substance. Gel Permeation Chromatography data were supplied to determine the NAMW and percentage of low molecular species of the notified polymer.

3. PHYSICAL AND CHEMICAL PROPERTIES

The notified polymer will be imported into Australia by the notifier as a dilution of VISCOPLEX 5367. It constitutes 50% per weight of VISCOPLEX 5367 in Hexanedioic acid, bis (2-ethylhexyl) ester.

Appearance at 20°C and 101.3 kPa:	light yellow viscous, rubber-like liquid
Specific Gravity:	0.98 gm/cm^3 at 20^{o}C (for VISCOPLEX 5367)
Boiling Point:	Not determined for the polymer; > 200^{o}C at 100 kPa for VISCOPLEX 5367
Vapour Pressure:	Not determined for the polymer; < 0.1 hPa at 20^{o}C for VISCOPLEX 5367
Water Solubility:	<<0.2 ppm (detection limit)
Flash Point:	Not determined for the polymer; 136^{o}C for VISCOPLEX 5367
Flammability Limits:	Not flammable
Autoignition Temperature:	Not determined
Explosive Properties:	Not determined
Reactivity/Stability:	No hazardous reactions known; Polymer is Stable unless heated to temperatures >300^{o}C; VISCOPLEX 5367 is Stable unless heated to temperatures >250^{o}C(see comments below)

Comments on Physico-Chemical Properties

The polymer is never isolated as a defined entity and the data provided was for VISCOPLEX 5367, as a 50% solution of the polymer in a carrier fluid, diethylhexyl adipate. The notifier determined the boiling point of the notified polymer to be > 200ºC. The notifier did not determine the vapour pressure of the notified polymer. It is noted that the vapour pressure of the polymer would be expected to be very low. However, the vapour pressure of the polymer solution would be expected to be that of the solvent mixture.

The notifier determined the water solubility of the notified polymer to be < 0.02% by weight according to an in-house procedure claimed to be analogous to the flask shaking method OECD TG 105. Approximately 46% the notified polymer is made up of a monomer containing poly ethylene glycol which may lend some water solubility to the chemical. However, in light of the high molecular

weight and lack of other polar functionality in the notified chemical, the water solubility is expected to be < 1 mg/L.

The polymer contains ester groups that could be expected to undergo hydrolysis under extreme pH conditions. However, due to the expected low water solubility, this is unlikely in the environmental pH range of between 4 and 9.

The notifier did not determine the partition coefficient and adsorption/desorption of the notified polymer. These are not PLC data requirements under the Act and could not be undertaken as the notified polymer is expected to be insoluble in water and will largely partition into *n*-octanol rather than water. Due to its low water solubility, the polymer is expected to become associated with the organic component of soils and sediments.

The notifier did not determine the dissociation constant of the notified polymer, which has no dissociable groups.

4. PURITY OF THE CHEMICAL

Degree of Purity:	Very high
Hazardous Impurities:	See residual monomers
Non-hazardous Impurities (> 1% by weight):	See residual monomers
Maximum Content of Residual Monomers:	Information supplied and is treated as exempt. Residual monomers comprise < 2%, combined. One is a hazardous substance, but is present below the concentration cut-off for health effects.

Additives/Adjuvants:

Chemical name:	Hexanedioic acid, bis (2-ethylhexyl) ester
Synonyms:	Diethyl hexyl adipate
CAS No.:	103-23-1
Weight percentage:	50%
Toxic properties:	Not on NOHSC List of Hazardous Substances; RTECS*- Carcinogenic in mice; liver effects in mice; blood and liver changes in rat; IARC#- Group 3

* *Registry of Toxic Effects of Chemical Substances*

\# *International Agency for Research on Cancer*

5. USE, VOLUME AND FORMULATION

The notified polymer will not be manufactured in Australia, but will be imported as a component of VISCOPLEX products at a concentration of 0.1% per weight in 216 L steel-plate drums. The imported product will undergo further dilution, whereby it will be mixed with other products according to customer specifications to give a final polymer concentration of approximately 0.004%-0.012%.
The notified polymer will be used as a demulsifying agent in oil additives such as lubricating systems, transmission fluids or hydraulic fluids used in automotive and hydraulic engines; for example, dredging-machines, ore crushers, ore-breakers and machines for mining. The estimated import volume is approximately 250 kg/annum for the first year, and could increase to 500 kg/annum after five years.

6. OCCUPATIONAL EXPOSURE

Transport and Storage
The notified polymer, imported in 216 L steel-plate drums, will be transported to the notifier's or customer warehouses by road. Transport drivers, warehouse and customer workers would only be exposed to the notified polymer in the event of a spill from a transport or handling incident. The nature of the packaging used for transport minimises the likelihood of accidental release or loss of the chemical.

The imported VISCOPLEX product will be supplied to industrial customer sites for formulation into industrial oils. Once the VISCOPLEX product is received by and stored at the customer's warehouse, it is sampled and analysed. Although full details of the sampling procedure are not described, these will entail opening and sampling of product containers for laboratory analysis to test chemical specifications. Exposure to the notified polymer may occur via inhalation of aerosols, but this is expected to be negligible given its non-volatility and the small amounts handled during testing. The main route of exposure is expected to be via skin and/or eye contact from drips and spills. However, dermal and ocular exposure is expected to be low given that the notified polymer comprises 0.1% of the sampled product and the use of personal protective equipment such as PVC gloves and goggles when handling the product. The notifier indicated that approximately two workers at each customer site would be involved in sampling for a period of 0.2 hours/day for 20 days/year.

Workers may also be exposed to the notified polymer during formulation and dilution into other oil products. The notifier stated that formulation would involve one or two chemical workers. The major route of exposure would be via the skin or by eye contact. However, exposure is expected to be low given that the polymer is present in small concentrations (0.1% in imported product and 0.004-0.012% in formulated products) and the mandatory use of personal protective equipment.

Similarly, exposure may occur during filling of the formulated products into 200 L drums, 20 L packs, and 5 L containers. Although no details of the filling operations were provided by the notifier, it is possible that exposure may occur from spills or drips generated during automated, semi-automated or manual procedures. Approximately 2 workers at each customer site will be involved in filling operations for 3 hours/day over 20 days/year. Exposure is expected to be low for the reasons

mentioned above. The finished products are supplied to end users for use in automotive industries. End users are expected to have low exposure to the notified polymer as a result of the small concentrations in the end products (0.004-0.012%).

Cleaning of drums entails the use of base material such as mineral oil, which may be recycled for formulation or disposal. Exposure during clean up is expected to be mainly via skin or eye contact as a result of spills or drips, but is considered minimal for the reasons discussed above.

The notifier stated that workers should have access to the Material Safety Data Sheet (MSDS) and protective clothing and equipment (PVC gloves and goggles).

Spills and residues of products containing the notified polymer should be treated as hazardous waste and are to be disposed of according to recommendations provided in the MSDS and in compliance with state and territory regulations.

7. PUBLIC EXPOSURE

The final automotive and hydraulic systems products are for industrial use only and will be available to tradesmen, industrial workers and farmers. Therefore, public exposure to the chemical can only occur in a case of accidental release.

8. ENVIRONMENTAL EXPOSURE

Release

The notifier indicates that any waste product generated during formulation will be minimal and would be handled by licensed waste oil disposal companies who will be expected to dispose of the notified polymer waste through either oil recycling or incineration.

The industrial oil products sold and transported in the 200 L drums, 20 L packs and 5 L containers to customers will be added to hydraulic systems of heavy-duty vehicles by a semi-automated filling process. The low volumes of waste generated during the filling process are expected to be handled in an appropriate manner by licensed waste oil disposal companies.

A report by the Australian and New Zealand Environment Council (ANZEC 1991) found that hydraulic systems lose very little volume of oil over the service life of the oil. Therefore, it is estimated the total amount of industrial oil lost to the environment due to leaks during use is < 1% of the total volume imported. That is, if 500 kg of the notified chemical were imported per year then approximately 5 kg of notified chemical would be lost per year during use in a dispersed fashion.

The time between oil changes is based upon service life; an oil change is usually recommended between 6000 to 7000 hours of operation. The ANZEC report estimated that up to 65% of automotive oil is collected and disposed of in an approved manner. The notifier indicates that the industrial oil products will not be sold to the public but to industrial customers only. As a result, it is estimated that > 70% of the recovered oil from oil changes will be disposed of in an approved manner since the majority of such changes would be expected to be carried out by professional

organisations with trained staff. These centres would have controlled handling techniques for the removal and disposal of waste hydraulic oil containing the notified chemical *via* approved reclaimers and waste processors. If 500 kg of the notified chemical is imported per year, an estimated maximum of 150 kg (<30%) may not be disposed of properly. As well as improper disposal down water drains waste oil containing the notified chemical maybe liberated into the environment by, for example, being used as a dust suppressor and to paint and treat wooden fences.
Some waste residue will remain in the 'empty' containers after use. It is estimated by that < 2% per year of the container contents, approximately 10 kg of the notified polymer, will remain as residue in the containers. Drums of the industrial oil product containing the notified polymer are expected to be disposed of by registered waste drum disposal companies by either recycling or landfill.

Release of the notified polymer to the environment would only be significant in cases of spills. The MSDS and material handling instructions provide directions for the proper containment, collection and disposal of wastes in accordance with local regulations and would be by either incineration or landfill.

Fate

As the notified polymer will be a component of industrial hydraulic oil, environmental exposure is likely to be limited during use. If there is leakage, the amount of notified chemical exposed to the terrestrial environment would be widespread and difficult to collect. The chemical is highly hydrophobic and will tend either to adsorb to or be associated with soils. It is unlikely that the notified chemical would become a part of the aquatic compartment due to its expected low water solubility.

It is expected that most used and waste hydraulic oil containing the notified polymer will be either disposed of by incineration or recycled. Combustion of the notified polymer will produce water and oxides of carbon.

The majority of notified polymer released to the environment would result from loss of hydraulic oil product at the filling stage, accidental spills and improper disposal by 'backyard' repairers and mechanics. Spills from the filling stage and accidental spills are expected to be handled by operators according to the MSDS instructions for the proper containment, collection and disposal of wastes in accordance with local regulations to incineration or landfill. Up to 30% of the hydraulic oil maybe disposed of in an inappropriate manner. If this were released into the environment *via* water drains, the notified polymer is not expected to enter the aquatic compartment but to settle out of water and adsorb to or be associated with soils. For example, notified chemical waste used for dust suppression and the treatment of wooden fences, would also be expected to either adsorb to or associate with soils. However, 30% loss by inappropriate means is seen as an overestimate since the majority of oil changes would be expected to be carried out by professional organisations with trained staff.

Drum residues are expected to be handled by licensed oil waste and registered waste drum disposal companies where the waste chemical will be either recycled or incinerated. If the empty drums are not rinsed and recycled as expected, the hydraulic oil residues contained within them will end up in

landfill, where the notified polymer will tend either to adsorb to or be associated with soils and be immobile.

The notified chemical is not expected to cross biological membranes due to its high molecular weight and large size, and as such it 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

Waste hydraulic oil product generated during the filling process will be handled by licensed waste oil disposal companies and will be disposed of either through oil recycling or incineration.

In the event of accidental spillage of the hydraulic oil into waterways, the notified polymer with a high molecular weight is not expected to disperse into the water, but settle out onto sediments. If the chemical is spilt on land, either during usage or transport, it is expected to become immobilised in the soil layer. Contaminated soil can then be collected and disposed to landfill.

In a worst case situation up to 30% of the waste hydraulic oil maybe disposed of in an inappropriate manner. If this were released into the environment *via* water drains, the notified polymer is not expected to enter the aquatic compartment, but to settle out of water and adsorb to or be associated with soils. For example, notified polymer waste used for dust suppression and the treatment of wooden fences would also be expected to either adsorb to or associate with soils.

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

Conclusions
The notified polymer is not likely to present a hazard to the environment when it is stored, transported and used in the described manner.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

No toxicological data is provided for the polymer in VISCOPLEX. Therefore, no hazard assessment can be made against the NOHSC *Approved Criteria for Classifying Hazardous Substances* (NOHSC 1999). The high molecular weight (greater than 1 000) indicates that polymer in VISCOPLEX products is unlikely to be bioavailable. It has no functional group of concern, less than 1% low molecular weight fractions and a total of $\leq$ 2% residual monomers.

As described in the MSDS, VISCOPLEX 5367 may cause mild and transient eye irritation. Skin irritation may also occur upon dermal contact with the product. However, these acute effects are related to the additive diethyl hexyl adipate and not the notified polymer itself. Chronic administration of diethyl hexyl adipate in rats and mice resulted in peroxisome proliferation in liver cells. According to the notifier, no injuries related to occupational exposure to the notified polymer are known.

Occupational Health and Safety

Transport and Storage
Exposure to the notified chemical is not expected during transport or storage as long as the packaging remains intact. Exposure after a spill to 0.1% notified polymer in the VISCOPLEX mixture would be controlled by use of the recommended practices for spillage clean up given in the MSDS supplied by the notifier. The risk of adverse health effects for transport and storage workers is considered low.

Occupational Exposure
Exposure to the polymer at 0.1% in VISCOPLEX products may result from drips and spills generated during sampling and as the product is unloaded for mixing into other mineral oil products. Inhalation exposure is negligible because the notified polymer is non-volatile. Skin contact will be the main route of exposure, although eye contact is also possible. Although details of the sampling and mixing operations were not supplied, the risk of adverse health effects to workers when handling products containing the notified polymer is expected to be low because the polymer is expected to be of low toxicity, is present at low concentrations, and the likely low exposure. In addition, the polymer has a high molecular weight (greater than 1 000), and thus absorption through intact skin is not expected. Nonetheless, the imported product contains diethyl hexyl adipate with known mild eye and skin irritancy effects, and accordingly workers handling these products will need to wear PVC gloves, and safety goggles.

Dermal and ocular exposure may also occur during filling of the formulated polymer products and clean up of residues and containers. The risk of adverse health effects to workers is expected to be negligible given the physico-chemical characteristics of the notified polymer, its non-hazardous nature, low concentration in the formulated end-user products (0.004-0.012%) and the use of personal protective equipment such as PVC gloves and goggles.

The finished products will be used in a variety of industrial applications involving engines, such as lubricating systems, transmission fluids or hydraulic fluids. Workers exposure to the polymer from such activities may occur as a result of leaks and spills and would mainly be via skin and eye contact.

End users of the finished products have a negligible risk of exposure and accordingly low risk of adverse health effects.

Adequate precautionary measures should also be implemented in the disposal of the notified polymer to ensure that exposure is avoided.

The potential for public exposure to the notified polymer and its products during transport, storage, formulation, application and disposal is considered to be low. Moreover, the notified polymer (< 0.1% in the final products) itself is not bioavailable due to its water insolubility, extremely low vapour pressure, no charged chemical groups and high molecular weight.
Based on the above information, it is considered that VISCOPLEX 5367 will not pose a significant hazard to public health when used in the proposed manner.

13. RECOMMENDATIONS

To minimise occupational exposure to Polymer in VISCOPLEX products 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 3765.1 (Standards Australia 1990); impermeable gloves should conform to AS/NZS 2161.2(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 polymer 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 polymer in VISCOPLEX 5367 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

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