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NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME

FULL PUBLIC REPORT

Infineum C9510

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 Aged Care.

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Director
Chemicals Notification and Assessment

TABLE OF CONTENTS

FULL PUBLIC REPORT

Infineum C9510

1. APPLICANT

Infineum Australia Pty Ltd of 2/6 Riverside Quay SOUTHBANK VIC 3006 (ABN 24084581 863) has submitted a notification statement in support of their application for an assessment certificate for the synthetic polymer of low concern (PLC) Infineum C9510.

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 names: Infineum C9510

Reactive functional groups: None.

Molecular weight (MW):

Number-average MW	Weight-average MW	% MW < 1000	% MW < 500	Method
14800	63700	1.3%	< 0.1%	GPC

Structural identification method: Infrared and nuclear magnetic resonance spectroscopy.

3. POLYMER COMPOSITION AND PURITY

Details of the polymer composition have been exempted from publication in the Full Public Report.

Purity (%): > 96%

Hazardous impurities (other than residual monomers and reactants): < 0.01% of a hazardous impurity.

Non-hazardous impurities at 1% by weight or more: < 2% of a non-hazardous impurity.

Additives/adjuvants: None.

4. PLC JUSTIFICATION

The notified polymer meets the PLC criteria.

5. PHYSICAL AND CHEMICAL PROPERTIES

Property	Result	Comments
Appearance	Slightly hazy viscous liquid	
Pour point	3 ^{o}C	
Density	968 kg/m^3	
Water solubility	0.21 mg/L	See comments below
Flammability		Not provided
Flash point	102ºC	
Explosive properties	No explosive properties	
Stability/reactivity	Strong oxidising agent	
Hydrolysis as function of pH		Not provided
Partition coefficient		Not provided
Adsorption/desorption		Not provided
Dissociation constant		Not provided

5.1 Comments on physical and chemical properties

A water solubility test, using a slow-stir adaptation of the flask method suitable for poorly water-soluble hydrocarbons, was conducted in accordance with the procedures outlined in OECD TG 105. The test substance at approximately 1000 mg/L was added to distilled water and stirred very slowly to prevent formation of an emulsion. This involved stirring the solution with a magnetic stirrer for up to 5 days. Water samples were taken on days 3, 4 and 5 for analysis. A control system without the test substance was also included in the test to correct for any contamination of the sampling medium with dissolved organic carbon (DOC). The amount of dissolved test substance in water was determined from the amount of DOC at 20ºC to be 0.21 mg/L (EMBS, 2001).

The hydrolysis of the notified chemical as a function of pH was not determined. The polymer contains some ester functional groups that would be expected to undergo hydrolysis. However, due to the low water solubility, this is unlikely in the environmental pH range of between 4 and 9.

The partition coefficient and adsorption/desorption of the notified chemical were not determined. The polymer is expected to largely partition into the *n*-octanol phase rather than into water, and to become associated with the organic component of soils and sediments.

The dissociation constant of the notified chemical was not determined. The polymer has no units likely to dissociate.

6. USE, VOLUME AND FORMULATION

Use: Lubricant oil flow improver in crankcase and gear lubricant applications.

Manufacture/Import volume: 50 tonnes per annum for the first five years.

Formulation details: The notified polymer will be imported in an oil additive package at a concentration of approximately 2% and be diluted to 0.05 – 0.4% in the final lubricants but mainly the dilution factor is expected to be 1:10.

7. OCCUPATIONAL EXPOSURE

Exposure route	Exposure details	Controls indicated by notifier
Transport and storage		
dermal/ ocular	Transport and storage of the lubricant additive package contained in 205 L steel drums or bulk liquid containers (of 19 – 20 tonne capacity) involving up to 4 workers and 12 - 20 truck deliveries per year. Exposure unlikely except in the event of accidental spillage.	Material Safety Data Sheet (MSDS) recommends PVC or nitrile gloves with inner gloves if thermal protection is required. When handling the product hot a face shield is recommended to protect from splashes of hot material. Also recommended for handling hot material is a chemical resistant apron, jacket and rubber boots.
Formulation		
dermal/ ocular	Blending of the additive package into lubricant occurs at a customer facility in batches of	PPE as above. Adequate general and local exhaust

	10000 – 70000 L. Typically, after QC testing, one to 4 workers per facility pump the additive package to a storage tank and then through a flexible hose to a transfer system attached to the blending tank. The finished lubricant is fed to an automated filling line for repackaging into containers of 2 to 200 L capacity for transport to distributors, retail outlets, vehicle fleet operators and industrial users. It is estimated that little material is lost during connection and disconnection of transfer hoses as dry couplings are commonly used and the end of a hose will typically be placed on an oily drain. The additive package in the transfer system is flushed with baseoil. In a typical plant the packaging facility is usually located near the blend operation. Equipment can be automated but the tanks can also be unloaded to 205 L drums using a drum spear and the operator can receive substantial dermal exposure while manually replacing the drum bung under the still dripping outlet. Occupational exposure during packaging can also occur from broken packages or overflow.	ventilation is provided.
End use		
dermal/ ocular	Gear oil is typically factory filled on new vehicles and is designed to last for the life of the vehicle. It usually does not need to be changed. If, for some reason, a gear oil change is required, it would be done by repair shop technicians. Accidental spillage during factory fill or at a repair shop is expected to be minimal. Crankcase oil may be replaced by repair shop technicians and exposure can be high.	Gloves or eye protection are typically not worn by repair shop technicians. Gear oil is typically filled automatically to new cars.
Disposal		
dermal/ ocular	Used gear oil or crankcase oil for disposal is expected to be collected by a licensed contractor and sent for recycling or incineration.	

8. PUBLIC EXPOSURE

In the event of an accidental spillage during transport, storage and operating procedures, spills containing the notified polymer should be recovered by pumping for recycle, or soaked up with earth or sand before being transported off-site to an approved industrial facility for disposal by incineration, or disposal in accordance of regulations. Contamination of water sources should be prevented or confined. Used oil should be properly disposed of, by recycling, burning or re-refining.

Public accessibility to the notified polymer is potentially high after its incorporation at 0.05 – 0.4% into an engine oil that is a consumer product. Public exposure to the notified polymer occurs when oil changes of the car are required (estimated 80% of cars have oil changed in a garage and 20% of cars by car owners).

9. ENVIRONMENTAL EXPOSURE

9.1. Release

Release of the lubricant oil to the environment could occur at any stage in the life cycle of the lubricant product beginning with transport, storage, blending, repackaging, and at end use.

Release to the environment of the new polymer is not anticipated during transport or storage except in the event of a transport accident. Minimal release is expected during blending, drumming and repackaging of the finished lubricant because the containers are filled in automated filling lines with a prescribed quantity of blended product and sealed with screw caps. Small incidental spills may occur during the connection and disconnection of transfer hoses. However, it is expected that spills occurring during transport or any incidental spills occurring during blending will be collected with earth or sand before being transported to an approved industrial facility for disposal by incineration.

Release to the environment of the notified polymer could occur at end use through improper disposal of the used lubricant product when it is removed from vehicles. Release through improper disposal is expected to be minimal for lubricant sold to the industrial and commercial markets because most used oils are disposed of by recycling, burning or refining. Higher amounts of release are anticipated from lubricant sold to the consumer market when the oil is changed and the used oil is not disposed of appropriately.

The notifier anticipates approximately 20% of car owners may not service their vehicles at service stations, and consequently about 4 tonne per annum of C9510 could enter the environment through improper disposal.

Approximately 1 tonne of the new polymer may also be left as residues in containers. It is expected that the residues washed from the import drums during reconditioning will be incinerated. Residues left in consumer containers will be disposed of through municipal or industrial disposal routes.

9.2. Fate

Lubricant oils in vehicles require changing after a specified time to ensure the oils work effectively. As such all of the imported polymer contained in the lubricant product could potentially be presented for disposal when the lubricant oil is changed or removed from vehicles. The amount of lubricant oil resurfacing as used oil will depend on the type of use, with some applications resulting in all of the used oil being generated as waste, and others resulting in all the oil being burned or lost through leakage (Macpherson, 1997).

The fate of used oils in Australia has been the subject of a number of surveys. An Australian Institute of Petroleum survey (AIP, 1995, 1998) indicated that at least 60% of all used oils generated are collected for recycling to be resold mainly as fuel oil. The fate of the remaining 40% of used oil could include a substantial portion being reused especially in the mining, agricultural and transport sectors. The AIP report indicated no evidence that bulk used oil was being dumped, but admitted there was some uncertainty as to the fate of 40% of used oil generated, but not collected for recycling.

Approximately 14% of oil is sold to the "do it yourself" (DIY) market or back yard operators. This oil could potentially be disposed of inappropriately. Snow (1997) traced the fate of used lubricant oils removed by DIY enthusiasts, and found that about 20% is collected for recycling, 25% is sent to landfill, 5% is disposed of into stormwater drains, and the remaining 40% is reused to treat wooden fence posts, kill grass and weeds, or suppress dust.

On the basis of the preceding information, the fate of the notified polymer contained in lubricant could include any of the following: (1) combustion and loss through leakage during use; (2) recycling and reuse through a licensed dealer; (3) disposal by incineration or dumping either in stormwater drains or landfill; and finally (4) reuse for a range of purposes for which the product is not intended.

Any notified polymer burned in the engine, recycled for fuel, or disposed of by incineration would result in the evolution of water vapour and oxides of carbon. Sludges from waste treatment plants or oil recycling facilities may also be incinerated. Any product sent to landfill or used for suppressing dust, treating fence posts, killing weeds would eventually be absorbed into the soil and become associated with organic components and mineral particles in the soil matrix. The polymer is not expected to be mobile or to leach from landfill sites because of its poor water solubility.

During the water solubility test, the substance was observed to float on the surface of the water, even after gentle stirring for up to 5 days (EMBS, 2001), suggesting that any polymer released into the aquatic environment through improper disposal of used oils or from leaks washed from road surfaces, pavements, and car parks, would float on the surface of the water. Eventually, the polymer would become adsorbed to sediment, or enter sewage treatment facilities where it would become adsorbed onto sewage sludge.

No degradation data were provided in the notification dossier. The polymer is not expected to biodegrade in sewage treatment facilities. However, in the soil environment, the polymer is expected to slowly degrade through abiotic and biotic processes. The ester groups in the notified polymer are amenable to hydrolysis, and may enhance abiotic breakdown. Ready biodegradability of lubricant oils containing synthetic esters, assessed using the OECD 301B

tests, generally show ultimate degradation percentages ranging between 55 and 97% (Battersby, 2000).

In soil environments, aerobic degradation by microorganims requires that the soil be sufficiently aerated. The presence of oil in soil pores or forming a film over the soil surface could hamper access to oxygen and hence reduce aerobic biodegradation. On the other hand, in soils where used motor oils are dispersed, an increase in the numbers and species of microorganisms able to degrade hydrocarbons is also frequently observed (Vazquez-Duhalt, 1989).

The notified chemical is not expected to cross biological membranes and to bioaccumulate given its low water solubility and high molecular weight.

10. EVALUATION OF HEALTH EFFECTS DATA

No toxicological data were submitted.

The residual levels of constituents and hazardous impurities would not render the notified polymer hazardous according to the NOHSC *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 1999).

11. EVALUATION OF ENVIRONMENTAL EFFECTS DATA

No ecotoxicological data were provided.

12. ENVIRONMENTAL RISK ASSSESSMENT

Usage patterns indicate that all of the imported polymer contained in the lubricant product could be generated for disposal when the lubricant oil is changed or removed from vehicles. The exact figures for losses to the environment due to improper disposal are difficult to estimate, but a worst case figure could be as high as 40% on the basis of the uncertain fate of used oils generated. The actual figures are, however, expected to be much lower than this.

The notifier anticipates that 46 tonnes the polymer contained in the lubricant product would be disposed of by incineration or recycling, while the remaining 4 tonnes could be disposed through improper means in stormwater drains, or in the soil environment. These estimates are in agreement with the AIP survey figures, which indicate about 45% of DIY users (using 14% of all lubricant products) may dispose of oil inappropriately.

Incineration of the notified polymer would result in the production of water vapour and oxides of carbon. Disposal of the notified polymer into the soil environment would result in the material being immobilised through adsorption onto soil particles, while release into waterways would eventually result in the polymer entering sewage treatment facilities and becoming associated with sewage sludge. The sewage sludge is likely to be disposed of in landfill. The new polymer is not readily biodegradable, but in soil environments is expected

to slowly degrade through biological and physicochemical processes. The material is considered to have low potential for bioaccumulation.

The environmental hazard from the notified chemical is considered to be small provided that the material is used as indicated, and that disposal of used oil takes place via the proper routes such as recycling and incineration.

13. HEALTH AND SAFETY RISK ASSESSMENT

13.1. Hazard assessment

The notified polymer fulfils the criteria for a synthetic polymer of low concern and can be considered not to be a health hazard. It will be present in oil additive packages at a concentration of 2% but the formulation is yet to be finalised.

13.2. Occupational health and safety

During import and transport of the notified polymer, worker exposure is unlikely except in the event of a spill. Exposure after a spill would be controlled by use of the recommended practices for spillage clean up outlined in the MSDS supplied by the notifier.

During reformulation into a finished lubricant and repackaging of the lubricant into consumer sized containers, workers will not experience adverse health effects from their low exposure to the notified polymer as little of the lubricant additive package will be spilt during transfer, the notified polymer is at a low concentration and it is not a health hazard. The MSDS recommends the use of PVC or nitrile gloves with inner gloves if thermal protection is required. If handling hot material workers are advised to wear a face shield and don chemical resistant apron, jacket and rubber boots.

Customers of the finished lubricant and their employees will receive negligible exposure to the notified polymer because of its low concentration in the final lubricant. In addition, gear oil is filled automatically into new cars. Therefore, the risk of adverse health effects for these workers arising from exposure to the notified polymer is negligible.

Used gear oil or crankcase oil for disposal is expected to be collected by a licensed contractor and sent for recycling or incineration. Again the low concentration of the notified polymer in the final lubricant together with its expected low hazard should prevent any adverse health effects to workers.

Conclusion

The notified polymer is of low concern to human health and safety and no specific risk reduction measures are necessary.

13.3. Public health

The imported lubricating oil additive package will not be sold to the public. There is public accessibility to the notified polymer after its incorporation into engine oil. Public exposure to

the notified chemical occurs when oil changes of the car are required. However, taking into account its physical and chemical properties, its expected low toxicity, and the low concentrations in end use lubricating oil, the exposure is unlikely to cause significant public health concerns.

14. MSDS AND LABEL ASSESSMENT

14.1. MSDS

The MSDS for the notified polymer provided by the notifier was in accordance with the NOHSC *National Code of Practice for the Preparation of Material Safety Data Sheets* (NOHSC, 1994a). It is published here as part of the assessment report. The accuracy of the information on the MSDS remains the responsibility of the applicant.

14.2. Label

The label for the additive package containing notified polymer provided by the notifier was in accordance with the NOHSC *National Code of Practice for the Labelling of Workplace Substances* (NOHSC, 1994b). The accuracy of the information on the label remains the responsibility of the applicant.

15. RECOMMENDATIONS

Control Measures

No specific precautions are required to control exposure to the notified polymer. However, in the interests of good occupational health and safety, the following guidelines and precautions should be observed:

Occupational Health and Safety

- Employers should implement the following engineering controls to minimise occupational exposure to the notified polymer during formulation:
  - General and local exhaust ventilation.

- Employers should implement the following safe work practices to minimise occupational exposure during handling of the notified polymer as introduced:
  - Spillage should be avoided; spillage should be cleaned up using appropriate absorbents and placed into container for disposal.

- Employers should ensure that the following personal protective equipment is used by workers to minimise occupational exposure to the notified polymer:
  - Nitrile or neoprene gloves.
  - Protective clothing which protects the body, arms and legs
  - Safety glasses

Guidance in selection of personal protective equipment can be obtained from Australian, Australian/New Zealand or other approved standards.

- A copy of the MSDS should be easily accessible to employees.

- If products and mixtures containing the notified polymer are classified as hazardous to health in accordance with the NOHSC *Approved Criteria for Classifying Hazardous Substances*, workplace practices and control procedures consistent with provisions of State and Territory hazardous substances legislation must be in operation.

Disposal

- The notified polymer should be disposed of by incineration.

Secondary notification

The Director of Chemicals Notification and Assessment must be notified in writing within 28 days by the notifier, other importer or manufacturer:

(1) Under Section 64(1) of the Act; if
  – the notified polymer is introduced in a chemical form that does not meet the PLC criteria.

or

(2) Under Section 64(2) of the Act:
  - if any of the circumstances listed in the subsection arise.

The Director will then decide whether secondary notification is required.

17. REFERENCES

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