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NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME

FULL PUBLIC REPORT

TLA-1605

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Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT

TLA-1605

1. APPLICANT

Caltex Oil (Australia) Pty Ltd., 11th Floor, 167 Kent Street, Sydney, NSW 2000.

2. IDENTITY OF THE CHEMICAL

Based on the nature of the chemical and the data provided, TLA-1605 is not considered to be hazardous. Therefore, the details of chemical name and structural formula have been exempted from publication in the Full Public Report.

Chemical Abstracts Service (CAS) Registry No.:	Not available
Other name:	Substituted bis-alkenylsuccinimide condensate with an alkylphenol and an aldehyde Alkenylsuccinimide dispersant in diluent base oil
Trade name:	TLA-1605,
Molecular formula:	Not available
Number-average molecular weight:	9000
Maximum percentage of low molecular weight species (molecular weight < 1000):	None

Monomers:

Chemical name: 2,5-Furandione, dihydro-, monopolyisobutylene derivatives
CAS No: 67762-77-0
Weight percentage: 92.42%

Chemical name: Polyethylenepolyamine
CAS No: 68131-73-7
Weight percentage: 3.70**%**

Chemical name: Glycolic acid
CAS No: 79-14-1
Weight percentage: 2.89%

Chemical name: Nonylphenol
CAS No: 84852-15-3
Weight percentage: 1.54%

Chemical name: Formaldehyde
CAS No: 50-00-0
Weight percentage: 0.84%

Method of detection and determination:

No specific analytical methods, limited to general methods used to determine properties such as % nitrogen, viscosity, flashpoint etc.

Spectral data:

. Infrared spectrum
Major identification wavenumbers (cm^{-1}) 2923, 2331, 2298, 1697-1456, 1386, 1364 1229-1159, 949, 923, 721

Comments on chemical identity:

No CAS number has been assigned to this chemical. It is referenced on the US EPA TSCA confidential inventory via Assession Number 110544.

The number average molecular weight is an estimate based on the known molecular weight of the polyisobutylene used to manufacture the modified polymer.

The product does not contain any known toxic or hazardous impurities. The only known impurities are residual amounts of the reactive monomers and polymers used to manufacture the intermediates and final dispersant.

The notifier states the polymer should not have any low molecular weight present. This was estimated from literature published on Indopol polyisobutylenes.

The notifier also states it is difficult and almost meaningless to provide a molecular formula for a polymeric molecule of this complexity.

3. PHYSICAL AND CHEMICAL PROPERTIES

The following data were obtained from tests with TLA-1605 which in a form contains 50% of the notified polymer in 50% diluent oil.

Appearance at 20°C and 101.3 kPa:	Viscous red liquid
Odour:	Slight petroleum oil odour
Melting Point/Boiling Point:	Not determined
Glass-transition Temperature:	Not determined
Specific Gravity:	0.91
Vapour Pressure:	< 0.1 mm Hg
Water Solubility:	< 0.1 weight % in water
Partition Co-efficient (n-octanol/water):	log $P_{O/W}$: Not determined (polymer is expected to partition into hydrophobic compartment)

Hydrolysis as a function of pH:	Not determined
Adsorption/Desorption:	Not determined
Dissociation Constant:	Not determined
Flash Point:	214°C (open cup)
Flammability Limits:	Not determined
Combustion Products:	Carbon monoxide, carbon dioxide, aldehydes and ketones
Autoignition Temperature:	Not determined
Explosive Properties:	The polymer is not explosive when exposed to heat, shock or friction and does not undergo hazardous polymerisation
Reactivity/Stability:	The polymer will react with strong oxidisers, but is stable under normal use conditions
Kinematic Viscosity:	128 cSt @ 100°C (175 cSt @ 100 °C for the product mixed with base oil).

Comments on physico-chemical properties:

The notifier states that there are no intermediate streams which contain the final polymer in a concentrated form and is not able to provide analytical and toxicity data on the pure polymer.

The following comments on physico-chemical properties are provided by the notifier:

. Water solubility not determined but considered low based on the molecular weight, structure of the polymer and diluent oil. The maximum water solubility of the product estimated to be less than 0.1% in water.

. Hydrolysis not determined. The polymer should not readily hydrolyse under environmental conditions.

. Partition coefficient is only provided for pure, water soluble chemicals. Oily substances such as TLA-1605 would be expected to partition into the hydrophobic compartment.

. Adsorption/desorption has not been determined, but should be similar to other oily substances.

. Dissociation constant has not been determined. The polymer should have a very low dissociation constant based on the chemical functionality. Also, dissociation would be hard to measure in view of the low water solubility.

4. PURITY OF THE CHEMICAL

Degree of purity the notified polymer: > 88.5%

Impurity:

Chemical name:	Polyisobutylene
CAS No.:	9003-23-4
Weight percentage:	< 10.0%
Toxic properties:	None

Residual monomer:

Chemical name:	Nonylphenol
CAS No.:	84852-15-3
Weight percentage:	< 1.0%
Toxic properties:	None

Maximum content of residual monomer(s): 1%

Toxic or hazardous impurity:

Chemical name:	Maleic anhydride
CAS No.:	108-31-6
Weight percentage:	< 0.05%
Toxic properties:	LD_{50} (oral, rat) = 400 mg/kg (1) Severe eye irritant Sensitiser(1)

Additive(s)/Adjuvant(s):

Chemical name:	Petroleum distillates
CAS No.:	64742-65-0
Weight percentage:	About 40-75% of the product

5. INDUSTRIAL USE

The notified polymer is to be used as a lubricant additive in gasoline motor vehicles and light duty diesel engines. It is a dispersant, which solubilises sludge and inhibits the formation of sludge precursors. It is estimated that the formulated breakdown distribition will be 98% use for gasoline engines and 2% diesel engines. The notified polymer will be imported into Australia as a blend in a diluent base lubricant oil containing approximately 50% weight of the polymer and as a component in lubricating oil additive packages containing 25-60 wt% of the polymer. The lube oil additive packages may be supplied to approximately 25 locations at most for storage and warehousing prior to distribution and for blending motor oils which will then be widely distributed to the general public. Distribution of the additive packages containing the polymer will be by road and rail.

The product will be imported for sale to lubricant oil formulators for the manufacture and blending of automotive lubricants.

The estimated quantity of the notified polymer to be imported to Australia is 50-500 tonnes in the first year and 50-1500 tonnes per annum over the next four years.

The final lubricant product will contain approximately 3% of the notified polymer. The lubricant additive formulations are presently being marketed in the US, Japan, major European countries, South Africa and Central and South America.

6. OCCUPATIONAL EXPOSURE

During the first year 60% of the product containing the notified polymer will be imported in 205 litre metal drums and 40% in liquid tank containers consisting of approximately 20 metric tons parcels. In the next four years, depending on the demand of the

product, the bulk product may be transported in chemical parcel tanks in approximately 150 to 400 metric ton lots.

The metal drums, bulk tank containers or chemical parcel tanks will be shipped to approximately 25 separate locations in Australia for storage and reformulation into the final motor oil product. The number of workers involved in the storage/reformulation of the polymer, at each site, is likely to be in the order of 2-5 people. Handling of the product containing the notified polymer will be for no more than 4 hours a day. The blended lubricating oil containing the notified polymer will then be sold to automotive outlets or the general public.

The major route of exposure to the notified polymer will be dermal. Significant risk of exposure during transport and storage is considered unlikely, except in the event of an accidental spillage or leakage as the polymer will be in secure containers.

Workers may come into direct contact with the notified polymer during the reformulation process, and dermal contact may be high if personal protective equipment is not used. Mechanics may also come into direct contact with the polymer through the handling of lubricating oils containing 3% of the notified polymer.

7. PUBLIC EXPOSURE

Potential public exposure to the notified polymer or the diluent oil will occur during its handling and use. Home servicing of vehicles would result in dermal exposure to the notified polymer. This practice is conducted infrequently by the public. The major route of exposure to the product, TLA-1605 will be dermal. However, due to the high molecular weight, the notified polymer is not likely to cross biological membranes and induce systemic toxicity.

The notifier states that the product TLA-1605 will be contained within bunded areas for adequate treatment or disposal to prevent entry into sewers and waterways during formulation. The disposal of used oil is a potential source of environmental contamination and thus public exposure.

8. ENVIRONMENTAL EXPOSURE

. Release

The imported drums and parcels of the notified polymer in the additive packages are stored at warehouses and storage locations operated by transport companies and chemical storage companies largely in the major capital city environs.

Waste streams containing the notified polymer are confined to slops, washings and spills and contained within bunded areas for adequate treatment or disposal to prevent entry into sewers and waterways.

The notifier stated the spilled material is washed into a separator, a fully enclosed system comprising a series of baffle units and a skimmer to separate oil or immiscible material from the carrier water stream, followed by a unit consisting of adsorbent polypropylene (oleophilic) mats to remove the oil sheen. The water stream is further treated to ensure pH, BOD, sulphides etc comply with the parameters contained within the governmental regulatory discharge license before discharge to the outfall.

The residues from the skimmer unit pass to tanks for settling and dewatering. The oil based layer is incinerated typically as bunker fuel oil. Sludge residues are mixed with activated clay and taken by licensed industrial waste groups for ultimate disposal by land fill or incineration. Oil or product spills containing the notified polymer may also be treated with solid adsorbent and disposed of in the same manner by the licensed industrial waste groups.

In the lube oil blending process it is estimated that typically a 0.2% product loss may be experienced or 40 kg blended oil in a 20 t blend batch containing 3-7 wt % of the notified polymer. For example, 3 kg of polymer may be released as slops or washings during transfers to storage tanks and filling lines, unloading additive from drums or bulk road tankers and sampling for testing purposes. These liquid releases are contained and controlled in appropriate compounds or pits for treatment or disposal. Over one year the amount of polymer released would be ~3 t (worst case situation - assuming importation of 1500 tonnes of the notified polymer per year).

The polymer may also be released to the environment through exhaust emissions, leakage and disposal of used oil.

The notifier has stated that during engine use the chemical is oxidised to combustion products. The amount lost, which is not burned, is probably not measurable, and to the notifier's knowledge has never been determined. The notifier expects this quantity to be no different than with other engine lubricants.

It should be noted that oil emissions with the exhaust are very low (2) and the level of unoxidised polymer is likely to be higher from oil leakage from crankcase lubricated engines and the disposal of used oil.

Oil leaks have a tendency to accumulate in the environment, resulting in a significant environmental load (2). One-third of the lubricating oil sold is lost during use; some is lost on the pavement surface, in the streets, roads and in car parks. The oil remains on these surfaces until stormwater or the municipal services wash the oil off, when it is transported by stormwater drains to waterways or the ocean of urban zones, or to adjacent soils from roads in non-urban areas (3).

The notifier has stated that losses of the polymer during motor oil changes would not be expected to be any different than losses experienced with other motor oils. Used lubricant handling guidelines stress minimising personal contact and disposal in an environmentally acceptable manner. However, it should be noted a report on used lubricating oil in Australia (4) indicates that lubricating oil not collected for recycling or reuse on site as a fuel or lubricant amounts to 22% of total sales. The methods of disposal of used oil includes dust and vegetation control, and dumping in sewers and landfill.

. Fate

The notifier has stated that waste polymer from the blending process is prevented from entry into sewers and waterways.

The notified polymer will enter the environment when waste polymer from the blending process is disposed of by land fill or incineration. When the polymer is land filled it is likely to remain at the site of deposition. Leaching of the polymer is unlikely due to its large molecular weight, expected low water

solubility and likely adsorption to soil. Incineration of the polymer is unlikely to produce toxic compounds.

The amount of polymer released to the environment through the exhaust emissions is likely to be low as the chemical is oxidised during combustion and any emissions can be expected to become associated with the soil compartment (including sediment).

Any unoxidised polymer which enters the environment from engine oil leakage and is lost on the pavement surface, in the streets, roads and in car parks is washed off (by rain or the municipal services) and is transported by storm water drains in the case of urban zones to waterbodies and become associated with the sediment. When the polymer is washed off roads to adjacent soils, it is likely to accumulate at the site of deposition unless erosion events transport it to water bodies where it is likely to become associated with the sediment.

The amount of unoxidised polymer in used oil is unclear. However, the potential exists for a significant portion of oil containing the polymer to be disposed of in an environmentally unacceptable manner (eg dust and vegetation control, and dumping in sewers and landfill). Any unoxidised polymer in used oil that is used for dust and vegetation control are likely to remain at the site of application until erosion events transport the polymer to waterbodies, where the polymer is likely to become associated with the sediment. The polymer is unlikely to leach when it is dumped at landfills. The dumping of the polymer in sewers is likely to result in the polymer becoming associated with sludge during treatment.

. **Hydrolysis**

The notifier has stated the polymer should not readily hydrolyse at ambient temperature based on the structure of the polymer functionality. The polymer does contain a number of succinimide, amide and hydroxyl groups which may be susceptible to hydrolysis. However, it is unlikely that the polymer would be readily degraded by hydrolysis under environmental conditions because of limited solubility.

. **Biodegradation**

No information has been provided by the company. The presence of succinimide, amide and hydroxyl linkages in the polymer indicate

it would be vulnerable to cleavage in vivo with subsequent elimination. However, the polymer is unlikely to be readily biodegraded under environmental conditions.

. Bioaccumulation

The high molecular weight of the polymer (~9,000) indicates it is unlikely to bioaccumulate.

9. EVALUATION OF TOXICOLOGICAL DATA

No toxicological data are required under the *Industrial Chemicals (Notification and Assessment) Act 1989* the (Act) for polymers where the number-average molecular weight exceeds 1,000. However, the following studies were carried out on TLA-1605 which contains approximately 50% of the notified polymer in diluent oil and are reported here.

9.1 Acute Toxicity

Table 1 Summary of the acute toxicity of TLA-1605

Test	Species	Outcome	Reference
Skin irritation	Rabbit	Slightly irritating	(5)
Eye irritation	Rabbit	Slightly irritating	(6)

9.1.1 Skin Irritation (5)

A dose of 0.5 ml of TLA-1605 was applied to three separate sites on each of six New Zealand White rabbits. All sites were clipped free of hair and were located as follows: upper dorsal trunk (intact); lower dorsal (intact) and lower dorsal (abraded). The test compound was occluded under gauze patches on the single upper dorsal site for four hours and on the two lower sites for 24 hours. Observations were made on the upper dorsal site at 30-60 minutes, 24, 48 and 72 hours and daily through day 9 after removal of the gauze patches and on the lower dorsal sites 24, 48

and 72 hours, and daily through day 9, after application. Irritation was scored according to the method of Draize (7).

Slight to well defined redness (erythema) which persisted up to three days, was observed at all sites in all treated animals. Slight to well defined swelling (oedema) which persisted up to two days, was observed at all sites in all treated animals. On day four, slight to well defined erythema persisted on upper dorsal site in three animals and on lower dorsal sites in five animals. On day three, slight oedema persisted on upper dorsal site in four animals and on lower dorsal sites in five animals and on day four in two animals. The possibility of the red colour of the test substance mimicking erythema cannot be ruled out.

The results of this study indicate that TLA-1605 is slightly irritanting to the skin of rabbit at the concentration tested.

9.1.2 Eye Irritation (6)

Six New Zealand White rabbits (three of each sex) received a single 0.1 ml dose of the TLA-1605 in the conjunctival sac of one eye. The other untreated eye served as the control. Treated eyes were examined at 1, 24, 48 and 72 hours after treatment.

Conjunctival effects were apparent after one hour. Moderate redness (erythema), slight swelling (chemosis) and severe discharge were observed in all treated eyes at 1 hour. Effects had decreased by 24 and 48 hours with slight redness and some discharge remaining. All eyes were normal at 72 hours indicating complete reversibility. The test was therefore terminated at 72 hours. The possibility of red colour of the test substance mimicing erythema cannot be ruled out.

Under the conditions of this study, the notified polymer is considered as slightly irritating to the rabbit eye at the concentration tested.

9.2 Overall Assessment of Toxicological Data

The toxicity data presented indicate that the product is a slight skin and eye irritant. However, these effects are probably due to the diluent oil which is a known skin and eye irritant, rather than the polymer.

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

Since the chemical being notified is a polymer of greater than 1000 molecular weight, environmental effects information is not required.

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

Although up to ~3 tonnes (worst-case situation) of polymer per annum may be lost from the blending process, the hazard presented to the environment is likely to be low, due to the release being spread over a number of sites across Australia, and the notifier states that waste is prevented from entering sewers and waterways. The disposal of the waste polymer from the blending process by land fill or incineration is unlikely to present a hazard to the environment.

Emissions during engine use are unlikely to present a hazard to the environment as the amount of intact polymer being lost is likely to be very low due to the oxidation of the polymer during combustion.

The hazard to the environment from the leaking of oil from engines and the disposal of used oil containing the polymer in an environmentally unacceptable manner (eg dust and vegetation control, and dumping in sewers and landfills) is likely to be low because:

The release will be dispersed across Australia (predominantly in the urban regions) and the environmental concentration of the polymer should be very low (below 1 ppb);

The bulk of this release is likely to become associated with soil/sediment;

The toxicity of such modified polyisobutylene polymers is low because of low bioavailability; and

Where the polymer is contained in urban and rural runoff and enters aquatic environments, the expected very low concentration of the polymer and its high molecular weight (~9,000) indicates it is unlikely to present a hazard to organisms inhabiting these environments.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

The notified chemical is a high molecular weight polymer (>1000) and therefore unlikely to be absorbed across biological membranes such as the skin, gut and respiratory tract to bring about systemic effects. Toxicity data on the product, TLA-1605 indicate that it is a slight skin and eye irritant. Workers involved in formulating operations (50% of the notified polymer) and mechanics using motor oils (handling 3% of the notified polymer), if sufficiently exposed to the product containing the polymer, may suffer skin and eye irritation. The concentrations of the residual monomers present in the polymer are not expected to pose a health hazard.

The physico-chemical properties indicate that the notified polymer is unlikely to present any significant safety hazard to workers.

Significant public exposure to the notified polymer is anticipated as it is to be marketed in a motor oil.
Home servicing of vehicles would result in dermal exposure to the notified polymer. As this practice is conducted infrequently by the public, the level of the polymer in the product is considerably low and skin absorption is unlikely; the hazard to the public would be tolerable from this aspect of the chemicals use.

13. RECOMMENDATIONS

When using products containing the notified chemical the following guidelines and precautions should be observed:

. good work practices should be implemented to avoid splashings or spillages;

. good housekeeping and maintenance should be practised, spillages should be dealt with promptly with absorbents and discarded according to local or State regulations;

. spent oil should be discarded according to local or State regulations;

. good personal hygiene should be observed;

. if engineering controls and work practices are insufficient to reduce exposure to a safe level, the following personal protective equipment which complies with Australian Standards should be worn such as splash proof goggles {AS 1336-1982 (8), AS 1337-1984 (9)} gloves {AS 2161-1978 (10)}, and overalls {AS 3765.1-1990 (11)}; and

. a copy of the Material Safety Data Sheet (MSDS) for TLA-1605 and for products containing it should be readily accessible to employees.

14. MATERIAL SAFETY DATA SHEET

The Material Safety Data Sheet (MSDS) for TLA-1605 (Attachment 1) was provided in Worksafe Australia format (12). This MSDS was provided by Caltex Oil (Australia) Pty Ltd as part of their notification statement. It is reproduced here as a matter of public record. The accuracy of this information remains the responsibility of Caltex Oil (Australia) Pty Ltd.

15. REQUIREMENTS FOR SECONDARY NOTIFICATION

Under the *Industrial Chemicals (Notification and Assessment) Act 1989* (the Act), secondary notification of TLA-1605 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. RTECS. Register of the Toxic Effects of Chemical Substances. United States National Institute of Occupational Safety and Health, Cincinnati. Silver Platter CD-Rom, 1992.

2. Van Donkelaar P, "Environmental Effects of Crankcase and Mixed Lubrication", The Science of the Total Environment, 92 (1990), p165-179.

3. Vazquez-Duhalt R, "Environmental Impact of Used Motor Oil", The Science of the Total Environment, 79 (1989), p1-23.

4. Australian and New Zealand Environmental Council, (1991), "Used Lubricating Oil Generation, Recovery and Reuse in Australia", p11.

5. Primary Dermal Irritation Study in Rabbits with L-087-1724.00 (TLA-1605): Study No. PH 420-TX-001-88. Pharmakon Research International, Inc., Waverly, Pennsylvania, 1988.

6. Primary Eye Irritation Study in Rabbits with l-087-1724.00 (TLA-1605): Study No. PH421-TK-006-88. Pharmakon Research International, Inc., Waverly, Pennsylvania, 1988.

7. Draize, J.H., et al., J. Pharm, Exp. Ther. 82 : 377 - 390, 1944.

8. Australian Standard 1336-1982, "Eye protection in the Industrial Environment", Standard Association of Australia Publ. Sydney, 1982.

9. Australian Standard 1337-1984, "Eye protectors for Industrial Applications", Standard Association of Australia Publ. Sydney, 1984.

10. Australian Standard 2161-1978, "Industrial Safety Gloves and Mittens (excluding Electrical and Medical Gloves)", Standard Association of Australia Publ., Sydney, 1978.

11. Australian Standard 3765.1-1990, "Clothing for Protection against Hazardous Chemicals", Standard Association of Australia Publ., Sydney, 1990.

12. National Occupational Health and Safety Commission, Guidance Note for Completion of a Material Safety Data Sheet, 2nd Edition, AGPS, Canberra, 1990.