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NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME

FULL PUBLIC REPORT

TLA-1609

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For the purposes of subsection 78(1) of the Act, copies of this full public report may be inspected by the public at the Library, Worksafe Australia, 92-94 Parramatta Road, Camperdown NSW 2050, between the hours of 10.00 a.m. and 12.00 noon and 2.00 p.m. and 4.00 p.m. each week day except on public holidays.

For Enquiries please contact Ms Tina Anderson at:

Street Address: 92 Parramatta Rd Camperdown, NSW 2050, AUSTRALIA
Postal Address: GPO Box 58, Sydney 2001, AUSTRALIA
Telephone: (61) (02) 565-9466 **FAX (61) (02) 565-9465**

Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT

TLA-1609

1. APPLICANT

Caltex Oil (Australia) Pty Ltd, Caltex House, 167-187 Kent Street, Sydney NSW 2000.

2. IDENTITY OF THE CHEMICAL

Based on the nature of the chemical and the data provided, TLA-1609 is considered to be non-hazardous. Therefore, the chemical name, molecular and structural formulae, spectral data, component monomer names and residual monomer names have been exempted from publication in the Full Public Report and the Summary Report.

Chemical Abstracts Service (CAS) Registry No.: None assigned

Other names: Substituted bis-alkenylsuccinimide condensate with an aromatic amine and an aldehyde dispersant in diluent base oil

Trade names: PC-738
TLA-1609

(these two names refer to the notified polymer in diluent oil)

Lowest Number-average molecular weight: 5000

Maximum percentage of low molecular weight species (molecular weight < 1000): none present

Method of detection and determination:

No specific analytical methods are available for this polymer.

3. PHYSICAL AND CHEMICAL PROPERTIES

The notified polymer is synthesised overseas in the presence of diluent oil and does not exist anywhere during the manufacturing process in a pure form. Consequently, all analytical data are for TLA-1609, the polymer in diluent oil.

Appearance at 20°C and 101.3 kPa:	TLA-1609 is a brown viscous liquid.
Odour:	Slight "petroleum" odour due to diluent base oil.
Boiling Point:	Unknown but assumed to be very high based on the high molecular weight of the polymer and diluent oil.
Density:	0.915 kg/m^3
Vapour Pressure:	Not provided, however expected to be that of the diluent oil < 0.1 mm Hg.
Water Solubility:	Not provided, however estimated at < 0.1% w/w. The substance has a very polar central portion with very hydrophobic polymeric chains attached.
Fat Solubility:	Not provided.
Partition Co-efficient: (n-octanol/water) log $P_{O/W}$:	Not provided but expected to partition to the hydrophobic compartment due to base oil.

Hydrolysis as a function of pH:	Not provided but this polymer is not expected to readily hydrolyse at ambient temperature based on the structure of the polymer.
Adsorption/Desorption:	Not provided but expected to be similar to that of other oily substances.
Dissociation Constant:	Expected to be low due to water insolubility and molecular structure.
Flash Point:	214°C (Cleveland open cup)
Flammability Limits:	Not determined.
Combustion Products:	Carbon monoxide, carbon dioxide.
Pyrolysis Products:	Short chain aldehydes, acids and ketones at > 200°C.
Decomposition Temperature:	Not provided.
Decomposition Products:	There are no known degradation products produced under normal use conditions.
Autoignition Temperature:	Not provided, but is expected to be similar to that of similar base oil products (approximately 354°C.)
Explosive Properties:	Does not exhibit explosive properties when exposed to heat, friction or flame.
Reactivity/Stability:	Reacts vigorously with strong oxidisers, but not with air or water under normal heating conditions.
Viscosity:	300 cSt at 100°C

4. PURITY OF THE CHEMICAL

Degree of purity (of the notified chemical only): 88.95%

Maximum content of residual monomers: 11.05%

Additives/Adjuvants:

(a)	**Chemical name:**	Formaldehyde
	Synonyms:	Methanal
	CAS No.:	50-00-0
	Weight percentage:	0.3
(b)	**Chemical name:**	Acetic acid, hydroxy
	Synonyms:	Glycolic acid
	CAS No.:	79-14-1
	Weight percentage:	1.9
(c)	**Chemical name:**	Mineral oil, petroleum distillates, solvent-dewaxed heavy paraffinic
	Synonyms:	distillates (petroleum), solvent-dewaxed heavy paraffinic (9CI).solvent-dewaxed heavy paraffinic
	CAS No.:	64742-65-0
	Weight percentage:	approximately 50
	Toxic Properties:	carcinogen group I IARC (2) Exposure Standard (NOHSC) 5mg/m_3

5. INDUSTRIAL USE

The alkenylsuccinimide polymer will be imported into Australia as a solution in diluent oil and as a 25-60% component in lubricant oil additive packages. Products containing the new polymer will include TLA-1609 and other additive packages. It will be used as a dispersant additive in the manufacture of crankcase lubricants by the petroleum and related industries. The dispersants are used to solubilise sludge and inhibit the formation of sludge precursors in lubricants. The crankcase lubricants containing the notified polymer will be used in petrol engines (predominantly passenger car motor vehicles and light commercial vehicles) and diesel engines. Approximately 45% of total diesel

oil sales will be to off-highway equipment, comprising 80% mobile trucking equipment and 20% stationary equipment. 55% of the total sales will be used by on-highway equipment. Currently there are no railway diesel engine applications.

Import volumes of alkenylsuccinimide polymer into Australia are estimated at 50-500 metric tonnes in the first year and 50-1500 metric tonnes per annum in years two to five.

Lubricant additive formulations containing this alkenylsuccinimide polymer dispersant will also be marketed in the United States.

6. OCCUPATIONAL EXPOSURE

TLA-1609 will be imported in large 205 litre metal drums or in bulk liquid tanks. The bulk liquid will be shipped in containers in approximately 20 tonne parcels, or in chemical parcel tankers in 150-400 tonne lots. The containers will be transported by road and rail to approximately 25 locations.

Worker exposure may occur during the following activities:

- unloading the additive packages from the vessel at the port,
- transportation of the containers from the port to the storage tanks, warehouses or lubricant oil manufacturer's blending plants,
- blending operations at the lubricant oil manufacturer's blending plants,
- maintenance of pumps and associated equipment at all locations.

Approximately 2-5 workers will be involved at each location. Worker exposure is estimated at 1 hour/day for the sampling operation, 4 hour/day for tanker loading/unloading and drum filling, and 4 hour/day for blending operations for approximately 220 days/year. The blending procedure involves the introduction of TLA-1609 into a heated blending kettle containing a stirrer , followed by the addition of premixed additives via a pump. The notifier states that exposure levels will be minimal during blending operations due to the use of contained liquid handling systems.

After reformulation the blended motor oil will be packaged and sold to automotive outlets. The motor oil will contain 3.0-7.0 weight % of the polymer.

7. PUBLIC EXPOSURE

It appears that there is low potential for public exposure to the notified polymer during shipment and transportation. The public may come into contact with the blended chemical in the final commercial motor oil when it is used in automobile crank cases.

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 cities.

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 EPA (State) 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 lubricant oil blending process it is estimated that typically a 0.2% product loss may be experienced or 40 kg blended

oil in a 20 tonne 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 tonne (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.

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 (4) 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 (4). 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 (5).

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 guide-lines stress minimising personal contact and disposal in an environmentally acceptable manner. However, it should be noted a report on used lubricating oil in Australia (6) 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 becomes 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 transports it to water bodies where it is likely to become associated with the sediment.

The fate of the polymer in lubricating oils lost during use in motor vehicles, diesel trucks compared to off-highway diesel engines is likely to be different. Where off-highway diesel engines are stationary, they will create a localised effect whereas the effect of motor vehicles will be dispersed over a wider area.

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 is likely to remain at the site of application until erosion transports 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 due to insolubility.

. **Bioaccumulation**

The high molecular weight of the polymer (NAMW > 5000) indicates it is unlikely to bioaccumulate.

9. EVALUATION OF TOXICOLOGICAL DATA

No toxicity data were provided for the notified polymer. This is acceptable for a synthetic polymer with number-average molecular weight greater than 1000 under the Industrial Chemicals (Notification and Assessment) Act 1989. However, toxicity tests on TLA-1605, which contains an alkenyl succinimide polymer related to the notified chemical in TLA-1609, are stated by the notifier to have revealed slight skin and eye irritation.

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 tonne (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;

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 (NAMW > 5000) 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 in diluent oil. It is expected to contain no polymeric species with molecular weight below 1000 (lowest number-average molecular

weight > 5000). The notified chemical is therefore unlikely to cross biological membranes and is expected to present a low health hazard. Hazardous impurities are present at levels below their cut-off values for classification as a hazardous substance (7) and therefore are unlikely to pose a concern to human safety.

There are no toxicological data available for the notified chemical. However, the notifier states that toxicity studies with a similar chemical product indicated slight skin and eye irritancy effects. It is therefore recommended that skin and eye contact with the chemical should be avoided. The notifier mentions that prolonged or repeated exposure to TLA-1609 may result in dermatitis in some individuals.

As the polymer will be present in diluent oil which is more hazardous than the polymer, the methods proposed by the notifier to reduce exposure to the diluent oil will also be sufficient to reduce exposure to the polymer.

TLA-1609 is stable in ambient conditions, has negligible vapour pressure, low water solubility and is not explosive and therefore should not present a significant hazard to workers.

The major route of exposure to the notified polymer will be dermal. Exposure during transport and storage is considered unlikely except in the event of spillage or leaks, as the polymer will be contained in secure containers. Workers may come into direct contact with the notified chemical during the reformulation process and dermal contact may be high if personal protection is not implemented. Mechanics may also come into direct contact with the polymer through handling of motor oils. However, the concentration of the notified polymer in the motor oils is low at approximately 3% w/w.

The public may be exposed to TLA-1609 in the final blended commercial product, which is to be used in automobile crankcases. However the exposure is likely to be infrequent and skin contact will be to small amounts only.

Based on the above information, it is considered that TLA-1609 will not pose a significant risk to occupational or public health when used in the proposed manner.

13. RECOMMENDATIONS

To minimise occupational exposure to the notified polymer in TLA-1609 the following guide-lines and precautions should be observed:

. If engineering controls and work practices are insufficient to significantly reduce exposure to a safe level, then personal protective devices which conform to and are used in accordance with Australian Standards (AS) for chemical-type goggles with face shield (AS 1336; AS 1337) (8,9), impermeable gloves (AS 2161) (10) and protective clothing (AS 3765.1 AS 3765.2) (11,12) should be worn.

. Good work practices should be implemented to avoid splashing or spillages.

. Good personal hygiene adopted.

. A copy of the MSDS for products containing the notified polymer in diluent oil, such as TLA-1609 and other additive packages, should be easily accessible to employees working with products containing the chemical.

14. MATERIAL SAFETY DATA SHEET

The Material Safety Data Sheet (MSDS) for TLA-1609 (Attachment 1) was provided in Worksafe Australia format (Ref No:13). 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-1609 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. Canadian Centre for Occupational Health and Safety, ChemInfo data base, 1991.

2. Register of Toxic Effects of Chemical Substances (RTEC), U.S. Department of Health and Human Services (NIOSH), August 1992.

3. National Occupational Health and Safety Commission, *Exposure Standards for Atmospheric Contaminants in the Occupational Environment*, Australian Government Publishing Service, Canberra, NOHSC:3008 (1991).

4. Van Donkelaar P, *Environmental Effects of Crankcase- and Mixed Lubrication*, The Science of the Total Environment, 92 pp165-179, 1990.

5. Vazquez-Duhalt R, *Environmental Impact of Used Motor Oil,* The Science of the Total Environment, 79 pp1-23, 1989.

6. Australian and New Zealand Environment Council, *Used Lubricating Oil: Generation, Recovery and Reuse in Australia*, p11, 1991.

7. National Occupational Health and Safety Commission, *Guidance Note for Determining and Classifying a Hazardous Substance*, 2nd Edition, Australian Government Publishing Service Publ., Canberra, 1991.

8. Australian Standard 1336-1982 *Eye Protection in the Industrial Environmental*, Standards Association of Australia Publ, Sydney, 1982.

9. Australian Standard 1337-1984 *Eye Protectors for Industrial Applications*, Standards Association of Australia Publ, Sydney, 1984.

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

11. Australian Standard 3765.1-1990 *Clothing for Protection against Hazardous Chemicals Part 1 Protection against General or Specific Chemicals* Standards Association of Australia Publ, Sydney, 1990.

12. Australian Standard 3765.2-1990 *Clothing for Protection against Hazardous Chemicals Part 2 Limited Protection Against Specific Chemicals* Standards Association of Australia Publ, Sydney, 1990.

13. National Occupational Health and Safety Commission, *Guidance Note for Completion of a Material Safety Data Sheet*, 3rd Edition, Australian Government Publishing Service Publ., Canberra, 1991.