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NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME

FULL PUBLIC REPORT

TLA-7700

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Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT

TLA-7700

1. APPLICANT

HTX Corporation Pty. Ltd., 17th Floor, 360 Elizabeth Street, Melbourne, Victoria.

2. IDENTITY OF THE CHEMICAL

Trade name: TLA-7700
(this name refers to the reaction product which contains the notified polymer in the diluent oil)

The nature and toxicological profile of the chemical indicate that it is likely to be non-hazardous. Therefore its chemical name, structural formula, molecular formula, spectral data and monomers have been exempted from publication in the Full Public Report and Summary Report.

Number-average Molecular Weight : 80,000-140,000

Maximum amount of low molecular weight species: 5% < 5000 molecular weight

Methods of detection and determination:

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

3. PHYSICAL AND CHEMICAL PROPERTIES

Note: The notified polymer is synthesised in the presence of a diluent oil and is never isolated, therefore some of the physico-chemical properties listed below relate to the reaction product, TLA-7700, rather than the notified polymer itself.

Appearance at 20°C and 101.3 kPa:	Dark liquid (reaction product)
Odour:	Amine like (reaction product)
Glass-transition Temperature:	Not determined
Specific Gravity:	0.86 (reaction product)
Vapour Pressure:	< 0.013 kPa
Water Solubility: based	Expected to be negligible on nature of polymer
Partition Co-efficient (n-octanol/water):	Log $P_{O/W}$: Not determined
Hydrolysis as a function of pH:	Not determined due to expected low water solubility
Adsorption/Desorption:	Not determined
Dissociation Constant:	Not determined: polymer has no readily dissociable groups
Flash Point:	193°C (reaction product)
Flammability Limits:	Not flammable
Autoignition Temperature:	Does not autoignite
Explosive Properties:	Polymer is not explosive
Reactivity/Stability:	Polymer is stable under use conditions
Boiling point:	very high

Comments on physico-chemical properties

The notifier states there are no intermediate streams which contain the final polymer in a concentrated form. Consequently

the notifier is not able to provide analytical or toxicity data on the pure polymer.

The following comments on physico-chemical properties has been provided by the company:

. The exact boiling point has not been determined. However, the product has a very high boiling point based on the molecular weights of the synthetic polymer and the diluent oil;

. The vapour pressure will be very low based on the molecular weight of the polymer and the diluent oil.

. Water solubility has not been determined but will be very low based on the molecular weight and structure of the polymer and diluent oil. The maximum water solubility for the product is estimated to be less than 0.1% in water.

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

. Dissociation constant has not been determined. This polymer should have a very low dissociation constant based on the chemical functionality. It has one basic nitrogen but dissociation would be hard to measure in view of the low water solubility.

4. PURITY OF THE CHEMICAL

Degree of purity of the notified polymer: Approx. 100%

Toxic or hazardous impurity:

Chemical name:	Maleic anhydride
CAS No.:	108-31-6
Weight percentage:	<0.1%
Toxic properties:	LD_{50} (rat)= 400 mg/kg. Severe eye irritant (1) Sensitizer (2)

Maximum content of residual monomer(s): <0.1%

Additive(s)/Adjuvant(s):

	Chemical name:	Petroleum distillates
	CAS No.:	64742-65-0
	Weight percentage:	84%
and	**Chemical name:**	Ethoxylated nonylphenol
	CAS No.:	9016-45-9
	Weight percentage:	2%
or	**Chemical name:**	Ethoxylated C_{12-14} linear alcohols
	CAS No.:	68439-50-9
	Weight percentage:	2%

5. INDUSTRIAL USE

TLA-7700, which contains the notified polymer at a range of 11.00 - 19.99% in diluent oil is to be used as a viscosity index improver for motor oils. The polymer will also act as an antioxidant and dispersant to solubilise sludge and inhibit sludge formation in motor oils. The notified polymer will be incorporated into motor oils at a final concentration of 0.3-2.0% by weight. The estimated quantity of the notified polymer to be imported is 50-300 tonnes in the first year and 50-1000 tonnes per year for the next 4 years.

6. OCCUPATIONAL EXPOSURE

The notified polymer will be imported into Australia as a solution in diluent oil. It will either be imported in large (205 litre) metal drums or as a bulk liquid. The bulk liquid will be shipped in bulk liquid containers in approximately 20 tonne parcels or in chemical parcel tankers in 150 to 400 tonne lots. The metal drums or parcels will then be shipped to approximately 25 separate locations for storage and reformulation into the final motor oil product.

The number of workers involved in the storage or reformulation of the polymer, at each site, is likely to be in order of 2-5 people. Reformulation will involve decanting of the polymer in diluent oil, blending with motor oils and packaging. Blending

usually takes place in a stainless steel vessel fitted with a paddle stirrer.

The blended motor 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 leak 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 (0.3-2.0% w/w).

7. PUBLIC EXPOSURE

Widespread public exposure to the notified polymer is anticipated as it will be marketed to the public in motor oils.

Potential public exposure to the notified polymer will occur during use of the motor oils. The major route of exposure will be dermal. Since the level of the polymer in the motor oils is low (0.3-2.0% w/w) and use is infrequent, public exposure is likely to be low.

TLA-7700 will be contained within bunded areas for adequate treatment or disposal to prevent entry into sewers and water ways during formulation. The disposal of used oil is a potential source of environmental contamination and thus public exposure.

8. ENVIRONMENTAL EXPOSURE

The crankcase lubricants containing the notified polymer are used in petrol engines (predominantly passenger car motor vehicles and light commercial vehicles) and diesel engines (approximately 55% total diesel oil sales to on-highway trucks and 45% to off-highway equipment). The off-highway diesel oil sales comprise approximately 80% for mobile trucking equipment and 20% to

stationary equipment largely for power generation in large mining operations.

The fully formulated lubricants are manufactured by a physical blending process involving mixing of additive packages containing the notified polymer with lubricating oil base stocks and other additive packages. The notified polymer in TLA-7700 provides viscosity index improvement and some dispersion and antioxidant properties. The viscosity index improvers are normally used to formulate a multigrade motor oil and control the viscosity for all seasons performance. The notified polymer in a solution of diluent oil (as TLA-7700) also acts to inhibit oxidation of a lubricant disperse sludge and inhibit the formation of sludge precursors.

Products containing the polymer will include both TLA-7700 and other additive packages. The finished motor oil will contain approximately 0.3 - 2.0 weight percent of the polymer and typically 1.1% in an SAE20W50 multigrade motor oil.

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 be widely distributed to the general public. Distribution of the additive packages containing the polymer will be by road and rail.

. 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 environments.

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

It is anticipated that 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 absorbent polypropylene (oleophilic) mats to remove the oil sheen. The water stream is further treated to ensure pH,

Biological Oxygen Demand (BOD), sulphides etc comply with the parameters contained within the State Environmental Protection Agency (EPA) licence 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 absorbent 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 tonne blend batch containing
0.3-2.0 weight % of the notified polymer. For example, 0.4 kg of polymer may be released as slops or washings during transfers to the 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 and disposal. Over one year the amount of polymer released would be 2000 kg (based on 1000 tonnes imported per annum).

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

During engine use the polymer is oxidised to combustion products. The amount lost, which is not burned, is probably not measurable, and so far has not been determined. It is envisaged that this quantity will be no different than with other engine lubricants.

It should be noted that oil emissions with the exhaust are very low (3) 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 (3). One third of the lubricating oil sold is lost during use; some is lost on the pavement surface, in the streets, roads and 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 (4).

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 that a report on used lubricating oil in Australia (5) indicated that lubricating oil which is 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 include dust and vegetation control, and dumping in sewers and landfill.

. Fate

It is noted that the waste polymer from the blending process is prevented from entry into sewers and waterways.

The polymer will enter the environment when the 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 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 in the pavement surface, in the streets, roads and in car parks is washed off and is transported by stormwater 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 events transport it to water bodies where it is likely to be associated with the sediment.

The fate of the polymer in the lubricating oils during use in motor vehicles, diesel trucks compared to off-highway diesel engines is likely to be different. The main difference will occur where off-highway diesel engines are stationary, as this will result in the continual emission of the polymer and products of its combustion at a specific point in the environment.

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 events transport the polymer to water bodies, 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 the sludge during treatment.

. **Hydrolysis**

The polymer contains linkages which may be susceptible to hydrolysis. However, it is unlikely that the polymer will be readily degraded by hydrolysis under environmental conditions because of limited solubility.

. **Biodegradation**

The presence of 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 (~ 80,000) indicates it is unlikely to bioaccumulate.

9. EVALUATION OF TOXICOLOGICAL DATA

The *Industrial Chemicals (Notification and Assessment) Act 1989* does not require the provision of toxicology data for polymers where the number-average molecular weight exceeds 1,000. Nevertheless, some tests have been conducted on the reaction product, TLA-7700, containing the notified polymer and were submitted as part of the notification statement. The concentration of the notified polymer in the reaction product was in the range of
11.00 - 19.99% by weight.

9.1 Acute Toxicity

Table 1 Summary of the acute toxicity of TLA-7700

Test	Species	Outcome	Reference
Skin irritation	Rabbit	Moderate irritant	(6)
Eye irritation	Rabbit	Moderate irritant	(7)

9.1.1 Skin Irritation (6)

A dose of 0.5 ml of the reaction product 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 (8).

Slight to well defined erythema, which persisted for up to six days, was observed on the upper dorsal site in all treated animals.

On the two lower sites, after 24 hour occlusion, slight to severe erythema accompanied by slight oedema was observed in all treated animals up to 48 hours post-application. Erythema persisted in all treated animals up to day eight. In general, the degree of erythema and oedema was greater, as expected, for the abraded areas.

Under the conditions of this test the reaction product containing the notified polymer was considered to be moderately irritating to the skin.

9.1.2 Eye Irritation (7)

Six New Zealand White rabbits (three of each sex) received a single 0.1 ml dose of the reaction product 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 and 7 and 14 days after treatment.

Moderate to severe erythema, slight chemosis and moderate to severe discharge were observed in all treated eyes at 1 and 24 hours. At 48 hours, irritation had subsided and by day 7 only one animal exhibited erythema.

Under the conditions of this study, the reaction product containing the notified chemical was moderately irritating to the rabbit eye.

9.2 Overall Assessment of Toxicological Data

The toxicity data presented for the reaction product TLA-7700, indicate that the product is a moderate skin and eye irritant. However, these effects are probably due to the diluent oil and solubilisers which are present in the product rather than the polymer itself.

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 under the *Industrial Chemicals (Notification and Assessment) Act 1989*.

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

Although up to approximately 2000 kg of polymer per annum may be lost from the blending process, the hazard to the environment is likely to be low, due to the release being spread over a number of sites across Australia. The notifier states that waste is prevented from entering sewers and waterways. The disposal of the waste polymer from the blending process by landfill 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 polyalkylene copolymers 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 (~ 80,000) 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 (~ 80,000) and therefore unlikely to be absorbed across biological membranes such as the skin, gut and respiratory tract. Toxicity data on the reaction product, TLA-7700, indicate that it is a skin and eye irritant. These effects may be due to the diluent oil and solubilisers which are present in the reaction product. Workers involved in formulating operations (11.00 - 19.99% w/w of the notified polymer) and mechanics using motor oil (up to to 2.0% w/w of the notified polymer) if sufficiently exposed to the product containing the polymer may suffer skin and eye irritation. The negligible amount of impurities and residual monomers present in the polymer are unlikely to pose a significant health hazard.

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

13. RECOMMENDATIONS

To minimise occupational and public exposure to the notified polymer the following guidelines and precautions should be observed:

. good work practices should be implemented to avoid splashing 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;

. good personal hygiene should be observed;

. when direct contact with the chemical is anticipated, personal protective equipment which complies with Australian Standards should be worn such as splash proof goggles {AS 1336-1982 (9), AS 1337-1984 (10)} gloves {AS 2161-1978 (11)} and overalls {AS 3765.1-1990 (12)}; and,

. employees using TLA-7700 and/or products containing it should have access to appropriate MSDS.

14. MATERIAL SAFETY DATA SHEET (MSDS)

The Material Safety Date Sheet (MSDS) for TLA-7700 (Attachment 1) was provided in Worksafe Australia format(13). This MSDS was provided by HTX Corporation Pty. Ltd. as a part of their notification statement. It is reproduced here as a matter of public record. The accuracy of this information remains the responsibility of HTX Corporation Pty Ltd.

15. REQUIREMENTS FOR SECONDARY NOTIFICATION

Under the *Industrial Chemicals (Notification and Assessment) Act 1989* (the Act), secondary notification of the notified polymer present in TLA-7700 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) Register of Toxic Effects of Chemical Substances (RTEC), U.S. Department of Health and Human Services (NIOSH), August 1992.

(2) TOXLINE, U.S. National Library of Medicine.

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

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

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

(6) TLA-7700. Skin Irritation Study in Rabbits. Data on File, Pharmakon Research International Inc., Pennsylvania, USA, Order # 88-013, July 1988.

(7) TLA-7700. Eye Irritation Study in Rabbits. Data on File, Pharmakon Research International Inc., Pennsylvania, USA, Order # 88-013, February 1989.

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

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

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

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

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

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