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NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME (NICNAS)

FULL PUBLIC REPORT

PIB Distillate

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Street Address:	334 - 336 Illawarra Road MARRICKVILLE NSW 2204, AUSTRALIA.
Postal Address:	GPO Box 58, SYDNEY NSW 2001, AUSTRALIA.
TEL:	+ 61 2 8577 8800
FAX	+ 61 2 8577 8888.
Website:	www.nicnas.gov.au

Director
Chemicals Notification and Assessment

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1. APPLICANT AND NOTIFICATION DETAILS

APPLICANT(S)
Chevron Oronite Australia of Level 8, 520 Collins Street MELBOURNE VIC 3000.

NOTIFICATION CATEGORY
Standard: Chemical other than polymer (more than 1 tonne per year).

EXEMPT INFORMATION (SECTION 75 OF THE ACT)
Data items and details claimed exempt from publication: chemical name, CAS number, molecular formula, molecular weight, spectral data, manufacture or import volumes, and identity of manufacture sites.

VARIATION OF DATA REQUIREMENTS (SECTION 24 OF THE ACT)
Variation to the schedule of data requirements is claimed as follows: water solubility, hydrolysis as a function of pH, partition coefficient, adsorption/desorption, dissociation constant, particle size, flammability limits, autoignition temperature, and all toxicity studies.

PREVIOUS NOTIFICATION IN AUSTRALIA BY APPLICANT(S)
Not stated.

NOTIFICATION IN OTHER COUNTRIES
Canada, 2000.

2. IDENTITY OF CHEMICAL

MARKETING NAME(S)
PIB Distillate

METHODS OF DETECTION AND DETERMINATION

ANALYTICAL METHOD: GPC, IR and NMR.

3. COMPOSITION

DEGREE OF PURITY
98%

HAZARDOUS IMPURITIES/RESIDUAL MONOMERS

Chemical Name	Hexane		
CAS No.	110-54-3	*Weight %*	2
Hazardous Properties	R48: Danger of serious damage to health by prolonged exposure. R20: Harmful by inhalation.		

NON HAZARDOUS IMPURITIES/RESIDUAL MONOMERS (> 1% by weight)
None.

ADDITIVES/ADJUVANTS
None.

4. INTRODUCTION AND USE INFORMATION

MODE OF INTRODUCTION OF NOTIFIED CHEMICAL (100%) OVER NEXT 5 YEARS
Import.

MAXIMUM INTRODUCTION VOLUME OF NOTIFIED CHEMICAL (100%) OVER NEXT 5 YEARS

Year	*1*	*2*	*3*	*4*	*5*
Tonnes	30-100	30-100	30-100	30-100	30-100

USE
The notified chemical is a component of lubricating oil products for automotives.

5. PROCESS AND RELEASE INFORMATION

5.1. Distribution, Transport and Storage

PORT OF ENTRY
Not stated.

IDENTITY OF MANUFACTURER/RECIPIENTS
Chevron Oronite Australia.

TRANSPORTATION AND PACKAGING
When imported in bulk, an oil additive package containing the notified chemical is transferred via hoses from a ship to a holding tank, then to a rail car or tank truck.

After formulation the finished products will be either dispensed into tanker trucks or rail cars via pump lines, or packaged into 1 and 4 L bottles and 200 L drums. The finished lubricant will be transported to numerous sites in Australia by road.

5.2. Operation Description

The notified chemical will be imported as a component (0.3%) of an oil additive package. In Australia, the oil additive package will be blended with other ingredients to produce the finished lubricating oil which contains 0.0005-0.12% notified chemical.

The lubricating oil containing the notified chemical will be used by motor manufacturing industries, repair facilities, and public consumers throughout Australia.

5.3. Occupational exposure

Number and Category of Workers

Category of Worker	*Number*	*Exposure Duration (hour)*	*Exposure Frequency (day/year)*
Transport and storage	10-20	1-2	50
Formulation	2-3 per site	0.5-1	200
Laboratory staff	1-2 per site	0.25	200
End use	>1000	1-8	200

Exposure Details

Transport and Storage

When imported in bulk, exposure to the waterfront and transport workers to spills of the notified chemical is possible during the connection and disconnection of transfer hoses.

After formulation, the finished lubricant containing notified chemical will be transported to throughout Australia, since oil products have widespread use. Transport and storage workers are not expected to be exposed to the notified chemical during transport and storage, except in the case of accidental spill.

The main route of exposure for transport and storage workers is dermal. These workers will wear overalls, safety boots, and gloves when handling containers.

Formulation
At blending sites, the notified chemical will be transferred from drums, rail cars, or tank trucks into storage tanks on site. The transfer process from drums takes 10 minutes for a worker to place a drum pump and transfer the contents. During connection and disconnection of lines, incidental skin contact from splashes, drips, and spills is possible. The transfer process from the road or rail car will be via a 10 cm hosing. Connection of the hose takes about 10 minutes. A special air back flush system is used to prevent spillage during transfer. The notifier states that by adhering to ISO 9001 procedures, spills and leaks will be minimized. The transfer from storage tanks to blend tanks will be automated, using computer controlled valves.

The blending process occurs in a closed system and is computer controlled, thereby excluding the potential for occupational exposure. The finished lubricant is transferred automatically to a storage tank, then either dispensed into tanker trucks via 10 cm pump lines or packaged into 200 L drums. Drum filling is also an automated process and worker intervention is not required unless the filling line operation requires adjustment. However, skin contact with contaminated drum surfaces may occur when workers are required to insert bungs and label the drums. Bulk road tanker filling is performed by transfer hose. Dermal exposure to drips and spills of blended lubricant is possible during the connection and disconnection of transfer hoses during the filling of bulk tankers.

The blending tank and transfer lines are cleaned by rinsing with clean lubricating oils. Maintenance workers handling blending and filling equipment may also come into dermal contact with residues containing the notified chemical.

Empty drums are sent to drum recyclers where they are steam cleaned.

The blending facilities are well ventilated, with control systems for accidental spills and wastewater treatment. Workers involved in the blending activities receive training in the handling of additive packages, and wear personal protective equipment such as gloves, eye protection, protective clothing and hard hats.

Laboratory Staff
Laboratory staff will take samples of the additive package as well as the blended oil products for testing. During sampling and analysis, there may be skin contact. However, minimal exposure will occur during the laboratory testing since it will only take a few minutes per batch.

End Users
Occupational exposure to the products containing the notified chemical will occur at motor manufacturing and repair facilities throughout Australia.

End users may be exposed to the blended oil products containing up to 0.12% of the notified chemical. Dermal exposure may occur during the transfer the blended oil products from the storage containers into the vehicle being serviced and during cleaning of equipment. There is also potential for exposure when oils are added to and drained from systems.

Workers will wear overalls, cotton hat and safety boots when using products containing the notified chemical.

5.4. Release

RELEASE OF CHEMICAL AT SITE

The notified chemical is not manufactured in Australia. A special air back flush system is used to prevent spillage during transfer from rail cars or tank trucks into storage tanks at the blending facilities. The formulating processes occur in a closed system and are highly automated therefore losses are not expected. The isotanks, bulk containers and blending equipment will be rinsed with clean lubricating oil, which will be used in the future blends or incinerated. In the unlikely event of an accident, the spillage will be contained within concrete bunds and either reclaimed or sent to on-site wastewater treatment facilities where residual hydrocarbon based products will be separated from the aqueous stream by the Australian Petroleum Industry (API) process, with a claimed removal of greater than 95%. The aqueous waste undergoes further treatment involving pond aeration and sand filtration before being released to the sewage system. The remaining oily waste will be incinerated.

Empty drums are steam cleaned with the resultant aqueous waste sent to on-site wastewater facilities. .

RELEASE OF CHEMICAL FROM USE

Based on estimates of the UK competent authorities, losses of up to 2.5 tonnes are expected through spills and leaks (including up to 125 kg to the water column, 1000 kg to landfill, up to 375 kg to waste as packaging and up to 1000 kg to soil and water). Used oil generated from oil drains or equipment repair work will be sent to a used oil recycling centre or incinerated. Some minor, diffuse, exposure will result from spills during addition of oil to vehicles. However, the greatest potential for exposure is through disposal of wastes containing the additive.

A survey by the Australian Institute of Petroleum (AIP, 1995) indicates that of the annual sales of automotive engine oils in Australia, some 60% are potentially recoverable (ie not burnt in the engines during use). This report also indicates that around 86% of oil changes take place in specialised automotive service centres, where old oil drained from crankcases could be expected to be disposed of responsibly - either to oil recycling or incineration. The remaining 14% are removed by “do it yourself” (DIY) enthusiasts, and in these cases some of the used oil would be either incinerated, left at transfer stations where it is again likely to be recycled, or deposited into landfill. A recent report estimated that DIY activities account for between 7 to 10% of the unaccounted for used oil (MEINHARDT, 2002).

According to a survey tracing the fate of used lubricating oil in Australia (Snow, 1997) only around 20% of used oil removed by enthusiasts is collected for recycling, approximately 25% is buried or disposed of in landfill, 5% is disposed of into stormwater drains and the remaining 50% is used in treating fence posts, killing grass and weeds or disposed of in other ways.

Consequently, assuming that oil removed by professional mechanics is disposed of appropriately (ie burning as workshop heating oil or sent for recycling), negligible release of the notified chemical should result from these professional activities. Assuming a worst case scenario of 14% of the used oil removed by the DIY enthusiasts it is possible to have 20, 25, 5 and 50% of this oil to be collected for recycling (up to 3 tonnes), buried or disposed of in landfill (up to 4 tonnes), and disposed into stormwater drains (up to 700 kg) and used in treating fence posts, to kill weeds or disposed of in other ways (up to 7 tonnes), respectively.

Therefore, an amount less than 1% of the total import volume of the notified substance could be expected to enter the aquatic environment via disposal into the storm water system. Since the use of the lubricating oils will be occur throughout Australia, all releases resulting from use or disposal of used oil will be very diffuse, and release of the notified material in high concentrations is very unlikely except as a result of transport accidents.

5.5. Disposal

Smaller consumer product containers (1 or 4 litre bottles) will be disposed of to landfill as industrial or domestic waste. Used oil generated during oil changes and maintenance on the equipment should be disposed of at used oil recycling centres or by incineration.

5.6. Public exposure

Consumer exposure may occur when automotive or truck owners change the oil containing up to

0.12% notified chemical or do their repair work. Dermal exposure is expected to be the main route of exposure, and the frequency of exposure is low. However, no personal protective equipment is usually used by the public when handling the products containing notified chemical.

6. PHYSICAL AND CHEMICAL PROPERTIES

Appearance at 20ºC and 101.3 kPa Colourless liquid with petroleum odour.

Boiling Point 60-220ºC at $3x10^{-4}$ kPa

METHOD Not stated.

Density 789.3 kg/m^3 at 15ºC

METHOD Not stated.

Vapour Pressure 6.2 kPa at 37.8ºC

METHOD Mini Reid method.
Remarks No report was provided. Based on the results the notified substance is highly volatile.

The Henry's Law constant (H) calculated from the molecular weight, the measured water solubility, and the estimated vapour pressure according to the following equation: H = MW (g/mol) x Vapour Pressure (Pa)/Water Solubility (mg/L) is H = 428.6 10^6 Pa m^3/mol. Accordingly, the test substance is highly volatile from water (Mensink e*t al*. 1995).

Water Solubility 3 X 10^{-3} g/L (Estimated based on literature)

Remarks The water solubility of the notified chemical was estimated based on the 2.7 mg/L value for 1-octane cited from literature (Wiesberger 1955). The branched C8 olefinic material in the notified chemical is expected to have a similar water solubility of ~ 3 mg/L and the higher oligomers are expected to be even less water-soluble.

The test substance is very slightly soluble (Mensink *et al.* 1995).

Hydrolysis as a Function of pH Not determined.

Remarks No hydrolysable functionalities as the notified chemical is an alkene.

Partition Coefficient (n-octanol/water) log Pow for propylene tetramer > 3.84
log Pow for triisobutylene = 5 ± 0.4

Remarks From literature (Chemicals Inspection and Testing Institute 1992).

The high log P_{ow} is consistent with the low water solubility indicating a high affinity for the organic phase and component of soils and sediments.

Adsorption/Desorption Not determined.

Remarks The notified chemical is likely to be lipophilic.

Dissociation Constant Not determined

Remarks The notified chemical does not contain any groups that can dissociate.

Particle Size Not determined.

Remarks	Not determined for a liquid.	
Flash Point		7°C (ASTM D93)
Remarks	Highly flammable. The MSDS states the flash point = 16°C (Cleveland Open Cup).	
Flammability Limits		Upper: 1.7% Lower: 1.2%
METHOD	Not stated.	
Remarks	Based on hexane data.	
Autoignition Temperature		224°C
METHOD	Not stated.	
Remarks	Based on hexane data.	
Explosive Properties		Not detonate as a result of heat, shock or friction.
METHOD	Not stated.	
Reactivity		May react with strong oxidizing agents, such as chlorates, nitrates and peroxides. Hazardous polymerisation will not occur.
Viscosity		2.09×10^{-6} m^2/sec at 40°C
METHOD	Not stated.	
Remarks	Data from MSDS.	

7. TOXICOLOGICAL INVESTIGATIONS

No toxicity study on the notified chemical has been provided. The notifier provided the following reports to support their notification:

(1) SIDS Initial Assessment Report (SIAR) Summary Conclusions for the Alpha Olefin Category that contains C6 - C14 even-numbered, unbranched aliphatic chains with no other functional groups (OECD, 2001).

(2) American Chemistry Council's (ACC) Higher Olefins High Production Volume (HPV) Robust Summaries submitted to the USEPA as part of the HPV Chemical Challenge Program. This report summarizes the available toxicological data for olefins from C6 to C54 contained in the category (American Chemistry Council, Higher olefins panel, 2001a);

(3) Test Plan for the Higher Olefins Category, which describes the substances in the category, identifies existing data of adequate quality, and outlines future testing needs (American Chemistry Council, Higher olefins panel, 2001b);

(4) A toxicological summary for the propylene tetramer, which is a C10 to C15 branched oligomer made from the oligomerisation of propene.

(5) A toxicological summary for Alkane 4 Poly-alpha Olefin, which is a branched hexatricontane, a branched saturated C36 hydrocarbon.

Chemical (CAS No.)	*Acute toxicity endpoint*	*Genotoxicity endpoint*	*Other studies*

C6 Alkenes (68526-52-3)		Ames test: negative Micronucleus test*	
C6 (1-Butene, 3,3-dimethyl-) (558-37-2)	LD50≥5000 mg/kg (oral) LC50>51000 ppm (4 h, inhalation)	Ames test: negative Sister chromatid change: negative	
C6-8 Alkenes (68526-53-4)	LD50>3160 mg/kg (dermal) LC50>4230 mg/cm^3 (6 h, inhalation)	Micronucleus test: negative	
C7-9 Alkenes (68526-54-5)	LD50>5000 mg/kg (oral) LD50>3160 mg/kg (dermal) LC50>3170 mg/cm^3 (6 h, inhalation, rat & mouse) LC50<3170 mg/cm^3 (6 h, inhalation, guinea pig)		
C8-10 Alkenes (68526-55-6)	LD50>2332 mg/kg (oral) LD50>2332 mg/kg (dermal) LC50>1110 mg/cm^3 (6 h, inhalation)	Ames test: negative Micronucleus test: negative	
C11-13 Alkenes (68526-58-9)	LD50>7740 mg/kg (oral) LD50>2446 mg/kg (dermal) LC50>4400 mg/cm^3 (6 h, inhalation)		
C12 (1-propene tetramers) (6842-15-5)	LD50>5 g/kg (oral) LD50>2 g/kg (dermal) LC50>5060 mg/m^3 (4 h, inhalation)	Ames test: negative Micronucleus test: negative	Slightly irritating to skin and eye, not a skin sensitiser
C12-16 α-Olefin			NOAEL=1000 mg/kg/d, based on severe skin reaction and reduced body weight gain (14 day dermal in rat)
C14-18 α-Olefin	LD50>10 g/kg (oral)		
C16 α-Olefin (629-73-2)	LD50>10 g/kg (oral) LC50>8500 mg/cm^3 (1 h, inhalation) LC50=6359 mg/cm^3 (4 h, inhalation)	Ames test: negative Micronucleus test: negative	
C16 isomerised α-Olefin (26952-14-7)	LD50>5050 mg/kg (oral) LD50>2020 mg/kg (dermal)		
C16-18 isomerised olefin			NOAEL=1000 mg/kg/d (top dose), (28 day oral in rat)
C18 α-Olefin linear (112-88-9)		Ames test: negative Mitotic gene conversion: negative Chromosomal aberration: negative	
C18 isomerised	LD50>5050 mg/kg (oral)		

α-Olefin (27070-58-2)	LD50>2020 mg/kg (dermal)		
C18-24 α-Olefin	LD50>10 g/kg (oral) LD50>10 g/kg (dermal)		
C18-26 α-Olefin	LD50>10 g/kg (oral) LD50>10 g/kg (dermal)		
C20-24 α-Olefin (93924-10-8)	LD50>15g/kg (oral) LD50>5000 mg/kg (oral) LD50>5 mL/kg (dermal)		
C20-24 Alkenes, branched and linear (even-numbers only) (182636-03-9)	LD50>5000 mg/kg (oral) LD50>2000 mg/kg (dermal)	Ames test: negative Chromosomal aberration: negative Micronucleus test: negative	NOAEL=1000 mg/kg/d (top dose), (90 day oral in rat)
C22-28 α-Olefin (even-numbers only) (1599-67-3)	LD50>5000 mg/kg (oral)		
C24-30 Alkenes, branched and linear (even-numbers only) (182636-05-1)	LD50>5000 mg/kg (oral)	Ames test: negative	
C30+ α-Olefin (131459-42-2)	LD50>15g/kg (oral) LD50>2000 mg/kg (oral) LD50>5 mL/kg (dermal)		
C36 (1-dodecene, trimer, hydrogenated) (151006-62-1)	LD50>5 g/kg (oral) LD50>2 g/kg (dermal) LC50>5060 mg/m3 (inhalation)	Ames test: negative Chromosomal aberration: negative Micronucleus test: negative	Slightly irritating to skin, not an eye irritant or skin sensitiser. NOEL=1 g/kg/d (28 day oral in rat)

* There were 2 micronucleus tests for alkenes C6 (CAS No 68526-52-3). The first test performed in 1991 showed C6 were clastogenic to the bone marrow of B6C3F1 mice when administered by oral gavage at 5.0 g/kg 24 hours prior to analysis, but not at 48 and 72 hours post-exposure. The second micronucleus test in 1993 used same stain of mouse by administered by inhalation (6 hours per day for 2 consecutive days). Under the conditions of this assay, Alkenes C6 were not clastogenic following inhalation exposure in mice.

Overall, all the existing data showed that the C6 to C36 olefins are of low acute oral, dermal and inhalation toxicity. They may be slight skin and eye irritants, but not skin sensitiser. On repeated dose studies, the NOAEL for these chemicals are around 1000 mg/kg/day, the top dose used. These olefins are not mutagenic in Ames tests, clastogenic in chromosomal aberration tests, or genotoxic in micronucleus tests.

8. ENVIRONMENT

No environmental fate or ecotoxicity data were provided. The structure of the notified chemical lies within a range defined by the C8 olefin on the low end and C36 olefins on the high end with molecular weight range from 112-504. The notifier provided several reports (listed under Section 7) that contained summarised reports on existing chemicals similar to the notified chemical with similar structures (the C8 olefin having a molecular weight of 112 and the poly-alpha olefin a molecular weight of 506).

The physical and chemical properties of these existing chemicals are reasonably close to that of the notified chemical. Therefore, it is acceptable to approximate the fate and ecotoxicity of the notified chemical by reading across from the data on these existing chemicals.

8.1. Environmental fate

8.1.1 Biodegradation - Robust summaries for C6-C54 -Higher Olefins Category (American Chemistry Council, 2001a)

Chemical (CAS No.)	*Test/Inoculum*	*Biodegradability*	*Comments*
C6 Rich (68526-52-3)	OECD 301F Manometric Respirometry Test Domestic activated sludge	21% on day 28.	Not readily biodegradable.
C7-9, C8 Rich (68526-54-5)	OECD 301F Manometric Respirometry Test Domestic activated sludge	29% on day 28.	Not readily biodegradable.
C9-11, C10 Rich (68526-56-7)	OECD 301F Manometric Respirometry Test Domestic activated sludge	21% on day 28.	Not readily biodegradable.
C12-14, C13 Rich (68526-58-9)	OECD 301F Manometric Respirometry Test Domestic activated sludge	8% on day 28.	Not readily biodegradable.
C11-13, C12 Rich (68526-58-9)	OECD 301F Manometric Respirometry Test Domestic activated sludge	23% on day 28.	Not readily biodegradable.
C16 Alkenes (629-73-2)	OECD 301C Modified MITI Test (I) Mixture from several sources	55 to 77% after 28 days.	Results valid with restrictions. Does not mention whether the 10 day window criterion on ready biodegradability was met.
C16-18 Alkenes (26952-14-7)	"Marine BODIS" ISO/TC 147/SC5/WG 4N 141 Inoculum not specified	48% in 28 days.	Study does not meet validity criteria.
C16-18 Alkenes (27070-58-2)	"Marine BODIS" ISO/TC 147/SC5/WG 4N 1415 Inoculum not specified	48% after 28 days.	Study does not meet validity criteria.
C18 Alkenes (112-88-9)	EEC Directive 84/449/EEC Similar to OECD 301D Closed Bottle Test Activated sludge	39 to 48% of the ThOD by day 28.	Not considered to be readily biodegradable.

C18 Alkenes (112-88-9)	EEC Directive 84/449/EEC Similar to OECD 301B Modified Sturm Test Activated sludge	77 to 81% of the theoretically possible CO_2 evolved in 28 days (80 to 83% after 41 days).	Although biodegradable, it was not known whether the 10 day window criterion was met.
C20-24 Alkenes Branched and linear (even numbered C only) (182636-03-9)	OECD 301B Modified Sturm Test Sewage sludge predominantly domestic	92% after 28 day	Readily biodegradable.
C24-30 Alkenes Branched and linear (even numbered C only) (182636-05-1)	OECD 301B Modified Sturm Test Sewage sludge predominantly domestic	51% after 28 day	Not readily biodegradable.

The above data suggests that the higher olefins (i.e. > than C16) are more biodegradable. The biodegradability of C6 to C13 varied from 8 to 29% while the C16 alkenes biodegraded 55 to 77% after 28 days.

Evaluation of existing data on higher olefins have shown that they can biodegrade aerobically to a larger extent within a few weeks while some chemicals fit the OECD criteria for ready biodegradability (American Chemistry Council, Higher Olefins Panel 2001b). Based on their atmospheric oxidation potential the more volatile C6 to C14 alpha olefins are expected to degrade rapidly in the atmosphere and not to persist in the environment (OECD 2001).

Since the notified mixture has a significant proportion of lower chain olefins it is not expected to be readily biodegradable.

8.1.2. Bioaccumulation

Bioaccumulation data were not provided. The low average molecular weight and the high partition coefficient indicate a higher potential for bioaccumulation. However, the expected inherent biodegradability should reduce the availability of the chemical to the aquatic compartment and thus reduce the bioaccumulation potential.

8.2. Ecotoxicological investigations

8.2.1 Robust summaries for C6-C54 -Higher Olefins Category (American Chemistry Council, 2001a)

Chemical (CAS No.)	*Test/Condition /Species*	*LC50/EC50*	*NOEC*	*Comments*
Fish				
C6 Rich (68526-52-3)	OECD 203 (Semi-static) Rainbow trout	96 h LC50 = 6.6 mg/L based on measured values 96 h LL50 = 12.8 mg/L based on loading rates		80% of each solution renewed daily by fresh WAF. 5 loading levels from 6.25 to 100 mg/L and measured levels from 2.9 to 44 mg/L.
C7-9, C8 Rich (68526-54-5)	OECD 203 (Semi-static) Rainbow trout	96 h LC50 = 0.87 mg/L based on measured values 96 h LL50 = 8.9 mg/L based on loading rates		80% of each solution renewed daily by fresh WAF. 5 loading levels from 2.6 to 20 mg/L and measured levels from

				0.2 to 2.5 mg/L.
C9-11, C10 Rich (68526-56-7)	OECD 203 (Semi-static) Rainbow trout	96 h LC50 = 0.12 mg/L based on measured values 96 h LL50 = 4.8 mg/L based on loading rates		80% of each solution renewed daily by fresh WAF. 5 loading levels from 0.2 to 10 mg/L and measured levels from 0.01 to 2.6 mg/L.
C11-13, C12 Rich (68526-58-9)	OECD 203 (Semi-static) Rainbow trout	96 h LL0 = 86.0 mg/L based on loading rate.		A limit test with one loading level. 80% of each solution renewed daily by fresh WAF at the single loading rate of 86 mg/L. Analytical results were below 0.2 mg/L. Test substance is not sufficiently water soluble to cause mortality in 96 hours.
C16 Alkenes (629-73-2)	OECD 203 (Semi-static) Rainbow trout	96 h LC50 > 1,000 mg/L – Loading rate Water Accommodated Fraction (WAF)	1,000 mg/L – Loading rate WAF	Test substance incompletely soluble. Not toxic to limit of water solubility.
C16-18 Alkenes (26952-14-7)	OECD 203 (Semi-static) Turbot	96 h LC50 > 10,000 mg/L		Presence of undissolved test substance was not stated. Test results valid with restrictions due to the use of constant illumination.
C16-18 Alkenes (27070-58-2)	OECD 203 (Semi-static) Turbot	96 h LC50 > 10,000 mg/L		Presence of undissolved test substance was not stated. Test results valid with restrictions due to the use of constant illumination.
C18 Alkenes (112-88-9)	Similar to OECD 203 (Semi-static) Rainbow trout	96 h LC50 > 1,000 mg/L		Test substance incompletely soluble above 10 mg/L. Solids were observed floating at the surface. Therefore, test results not totally reliable but not toxic to limit of water solubility.
C20-24 Alkenes Branched and linear (even numbered C only) (182636-03-9)	OECD 203 (Semi-static) Rainbow trout	96 h Lethal Loading Rate (LLR50) > 1,000 mg/L – Loading rate WAF	≥1,000 mg/L – Loading rate WAF	Not toxic to limit of water solubility.
C20-24 Alkenes (93924-10-8)	OECD 203 (Semi-static)	96 h LC50 > 1,000 mg/L – Loading rate WAF	560 mg/L – Loading rate	Not toxic to limit of water solubility.

	Rainbow trout		WAF	
Daphnia				
C18 Alkenes (112-88-9)	Similar to OECD 202 (Static) *Daphnia magna*	48 h EC50 > 1000 mg/L		4 concentrations from 100 to 1000 mg/L (were not completely soluble and floating globules were visible at the surface). No physical effects were reported. Less than 4% daphnia were immobilised during 48 h at 1000 mg/L. Not toxic to limit of water solubility.
C20-24 Alkenes Branched and linear (even numbered C only) (182636-03-9)	OECD 202 (Static) *Daphnia magna*	48 h Effective Loading Rate (ELR50) > 1,000 mg/L – Loading rate Water Accommodated Fraction (WAF)	≥1,000 mg/L – Loading rate WAF	Not toxic to limit of water solubility. No physical effects were reported.
Algae				
C12 Alkenes (112-41-4)	Method not specified. *Scenedesmus subspicatus*	72 h E_bC50 = 15.4 mg/L		Not possible to determine the 72 h E_rC50. The EC50 is above the water solubility of the test substance.
C16 Alkenes (629-73-2)	OECD 201 (Static) *Selenastrum capricornutum*	72 h E_bC50 > 1,000 mg/L – Loading rate WAF	≥1,000 mg/L – Loading rate WAF	Not toxic to limit of water solubility.
C18 Alkenes (112-88-9)	Similar to OECD 202 (Static) 4 day growth inhibition test *Selenastrum capricornutum*	96 h LC50 > 1000 mg/L based on nominal values		10 concentration levels from 1 to 1000 mg/L (Analar acetone as a solvent). Test substance was not completely soluble above 10 mg/L.
C20-24 Alkenes Branched and linear (even numbered C only) (182636-03-9)	OECD 201 (Static) *Selenastrum capricornutum*	96 h ELR50 > 1,000 mg/L – Loading rate WAF	≥1,000 mg/L – Loading rate WAF	Not toxic to limit of water solubility.
C20-24 Alkenes (93924-10-8)	OECD 201 (Static) *Selenastrum capricornutum*	72 h E_bC50 > 1,000 mg/L – Loading rate WAF	≥1,000 mg/L – Loading rate WAF	Not toxic to limit of water solubility.

8.2.2 Ecotoxicity/biodegradability results for Propylene Tetramer (a C12 fraction as provided by the notifier)

Note that the method and other details of the tests were not provided.

Test	*Species*	*LC50/EC50/Biodegradability*	*NOEC*
Acute toxicity	Sheepshead Minnow	96 h LC50 > 1000 mg/L - WAF	= 1,000 mg/L - WAF
Acute toxicity	Mysid Shrimp	96 h LC50 = 8.8 mg/L - WAF	= 3.5 mg/L WAF
Algal growth inhibition	Not available	72 h E_bC50> 1000 mg/L – WAF 72 h E_rC50> 1000 mg/L – WAF	≥1,000 mg/L WAF NOELR ≥1,000 mg/L WAF
Ready Biodegradation OECD 301D		6% degraded in 28 days. Not readily biodegradable.	

8.2.3 Ecotoxicity summaries for Alkane 4 hydrogenated branched trimer from dodecene (C12, provided by the notifier)

Note that the method and other details of the tests were not provided.

Test	*Species*	*LC50/EC50/Biodegradability*	*NOEC*
Acute toxicity	Rainbow trout	96 h LC50 > 1000 mg/L - WAF	≥1,000 mg/L WAF
Acute toxicity	Daphnia	48 h EC50 > 1000 mg/L - WAF	≥1,000 mg/L WAF
Algal growth inhibition	Not available	96 h E_bC50> 1000 mg/L – WAF 24-48 h E_rC50> 1000 mg/L – WAF	≥1,000 mg/L WAF
Ready Biodegradation OECD 301B		6% degraded in 28 days. Not readily biodegradable.	

The highest acute toxicity test result was the 96 hour LC50 value for fish of 0.12 mg/L (for C9-11, C10) based on measured concentrations. The test results indicate that C18-C24 fractions are not toxic to daphnia and C16-C24 not toxic to algae up to the limit of its water solubility. Testing with WAF of these higher olefins has shown no acute aquatic toxicity in fish, daphnia or algae.

The above test results show that lower homologs (that are expected to be relatively more water soluble) have produced higher acute toxicity values (e.g. toxicity to fish of C6 to C13 olefins or algae of C12 alkene). Overall, the results for olefins above C13 indicate lower acute toxicity, most probably due to their low water solubilities. Evaluation of existing data for selected similar substances has shown that the water solubility (which is inversely proportional to the length of the alkyl chain) influences the acute toxicity level of the substance. The higher olefins (> C12) with low water solubilities are not expected to cause acute aquatic toxicities (American Chemistry Council 2001b).

Based on the data provided on its composition, the notified chemical has about a half of components above C12 that are relatively less soluble. The mixture should therefore show some toxicity to fish and probably also to daphnia and algae.

9. RISK ASSESSMENT

9.1. Environment

9.1.1. Environment – exposure assessment

The used oil collected and the sludge collected from the on-site wastewater treatment facilities may be incinerated. This will generate water vapour and oxides of carbon. The main environmental exposure is expected to result from inappropriate disposal of waste lubricant product. Assuming a worst case scenario of about 14% of oil changes in Australia are

performed by DIY enthusiasts, only about 3 tonnes of the notified chemical is expected to be collected for recycling. It is expected that up to 4 and 7 tonnes will be disposed of in landfill and in other ways (treat fence posts, kill weeds etc.), respectively. A further 700 kg is estimated to be released into the stormwater drains.

This improper disposal is however, widespread across Australia. Most of the improperly released notified chemical due to DIY activities is likely to become associated with soils or sediments, as will the notified chemical released to landfill as container residues. The notified chemical released into the aquatic environment would be expected to then become associated with the sediments. While some components of the notified chemical are not readily degradable, these can be expected to slowly degrade due to the biotic and abiotic processes.

The amount released to stormwater drains (less than 1% of the import volume) can enter the aquatic compartment and could be expected to become associated with suspended organic material (due to the high Pow), settle out into the sediments and eventually be biodegraded.

9.1.2. Environment – effects assessment

Of the data provided, the most sensitive species was fish with a 96 hour LC50 value of 0.12 mg/L for C10 fraction but the 96 hour LL0 for C12 was 86 mg/L. As no data is available for daphnia and algae, a greater uncertainty has to be incorporated in extrapolating the available toxicity data to assess the toxicity of the notified chemical. Therefore, using the lowest datum of 0.12 mg/L, a predicted no effect concentration (PNEC for aquatic ecosystems) of 0.00012 mg/L (0.12 μg/L) has been derived by dividing the LC50 value by an uncertainty (safety) factor of 1000 (instead of a safety factor of 100 used when toxicity data is available for three trophic levels). However, this showed to be offset as greater than 75% of the mixture is C12 or greater. A PNEC of 50 μg/L will be used.

9.1.3. Environment – risk characterisation

It is difficult to estimate the Predicted Environmental Concentration (PEC) of the notified chemical released into the stormwater drains, which have the potential to enter the aquatic environment. However, a worst case estimated PEC might be calculated if it is assumed that all of the 5% of the notified substance (i.e. 700 kg) expected to be released into the stormwater drains in a single metropolitan area with a geographical footprint of 500 square kilometres, an average annual rainfall of 50 cm. With a maximum annual release into this localised stormwater system of 700 kg and the annual volume of water drained from this region estimated to be approximately 250 X 10^6 m^3, the resultant PEC is approximately 2.8 X 10^{-18} μg/L. It should be stressed that this result is very much a worst case scenario, and that in reality releases of the chemical would be very much more diffuse than indicated here, and also at significantly reduced levels.

Reading across from the data on similar existing chemicals, some of the components of the notified chemical are shown to be not toxic to daphnia or algae up to the limit of their solubility, but some are very toxic to fish. However, the worst-case PEC is significantly below possible toxic levels and the resulting risk quotient (Q = PEC/PNEC) is significantly below 1. Further, the low water solubility of the notified chemical and its limited release to the aquatic environment (mainly via stormwater drainage) can expect to reduce the possibility of sufficient amounts to remain in solution to cause acute toxicity. The notified chemical's ability to become associated with the sediments, high volatility and biodegradation will further reduce the risk to the aquatic life.

Overall, the environmental hazard from the proposed reformulation and use of the notified chemical is expected to be low. However, the potential exists for physical fouling of aquatic organisms by undissolved material in the advent of a sizeable release to waterways. For this reason and the potential and the uncertainty of toxic effects to fish and other aquatic organisms the notified chemical should be prevented from entering waterways.

9.2. Human health

9.2.1. Occupational health and safety – exposure assessment

Skin contact is possible during transfer operations (hose coupling/uncoupling) of the oil additive package and the blended oil products containing the notified chemical at waterfront, formulation sites, and customers' facilities.

At the formulation sites, inhalation exposure is unlikely as the process as described is unlikely to generate aerosols and ventilation systems are in place. During the automatic blending, operators will have low exposure of skin contact since they are required to take samples of the lubricant for quality control purposes. During packaging of the finished lubricant into bottles and drums, skin contact may occur for operators involved in overseeing the filling process where manual intervention is required and during bunging and labelling of the drums. Skin contact is also identified for workers involved in steam cleaning of plant equipment. However, in all instances personal protective equipment will be worn, thus minimising any dermal exposure.

Automechanics may have repeated skin or eye contamination with the finished lubricants containing the notified chemical during manufacturing and servicing of vehicles. As the concentration of the notified chemical in the formulated products is low (<0.12%), the occupational exposure for these end users is low considering gloves and eye protection are worn by this trade group.

9.2.2. Public health – exposure assessment

Individuals who maintain their automotive, recreational and/or garden equipment requiring lubricant replenishment and replacement will have contact with finished lubricants containing the notified chemical. Infrequent dermal exposure (most likely to the hands and forearms), and accidental ocular, oral and inhalation exposure could occur in these individuals. The notified chemical comprises at less than 0.12% of finished lubricants, thus the public exposure is considered to be low.

9.2.3. Human health - effects assessment

Based on data from a number of olefinic compounds in the C6-C54 range, the notified chemical is expected to be of low oral, dermal and inhalation toxicity. It may be slightly irritating eyes and skin, but not a skin sensitiser.

From the results of repeated dose studies, the NOAEL is predicted to be approximately 1000 mg/kg/d in rats based on severe skin reaction and reduced bodyweight gain via dermal applications, and the top dose via oral administrations.

The notified chemical is expected neither to be mutagenic in Ames test, clastogenic in vitro, nor genotoxic in micronucleus test in vivo.

The viscosity of the notified chemical is 2.09×10^{-6} m^2/sec at 40°C. In the presence of surface tension data, the notified chemical is assigned with R65 (Harmful: May cause lung damage if swallowed) (NOHSC, 1999).

9.2.4. Occupational health and safety – risk characterisation

The notified chemical is predicted to be of low toxicity profile but may be slightly irritating eyes and skin. It is unlikely to exhibit irritant effects at the low concentrations. Risk from repeated exposure is considered to be low since at 1000 mg/kg/day, the amount of product equivalent will be large and workers would not be expected to be exposed repeatedly to large amounts.

Dermal contact will be the main route of exposure and the occupational exposure is considered to be low. Pumps are used for transferring processes and automatic equipment is used for formulation. In addition, the engineering controls are in place and workers will wear personal protective equipment. Therefore, the adverse health risk for workers handling the notified chemical is assessed to be low.

9.2.5. Public health – risk characterisation

Lubricate products containing the notified chemical in 1 and 4 L bottles are for sale to the general public. Members of the public will make dermal contact and possibly accidental ocular contact with products containing the notified chemical. However, the health risk for public will be low because of the low toxicity profile of the notified chemical, low concentrations of notified chemical presented in the products, and the intermittent use pattern.

10. CONCLUSIONS – ASSESSMENT LEVEL OF CONCERN FOR THE ENVIRONMENT AND HUMANS

10.1. Hazard classification

Based on NOHSC *National Code of Practice for the Labelling of Workplace Substances,* risk phrase assigned for the notified chemical is:

R11: Highly flammable

Based on the available data the notified chemical is classified as hazardous under the NOHSC *Approved Criteria for Classifying Hazardous Substances*. The classification and labelling details are:

R65: Harmful: may cause lung damage if swallowed

According to the Globally Harmonised System for the Classification and Labelling of Chemicals (UN, 2003), the notified chemical is categorised as:

	Hazard category	***Hazard statement***
Flammable liquids	2	Danger: Highly flammable liquid and vapour
Target organ systemic toxicity	2	Warning: May cause damage to lung if swallowed.

10.2. Environmental risk assessment

The chemical is not considered to pose a risk to the environment based on its reported use pattern.

10.3. Human health risk assessment

10.3.1. Occupational health and safety

There is Low Concern to occupational health and safety under the conditions of the occupational settings described.

10.3.2. Public health

There is No Significant Concern to public health based on its reported use pattern.

11. MATERIAL SAFETY DATA SHEET

11.1. Material Safety Data Sheet

The MSDS of the notified chemical and products containing the chemical provided by the notifier were in accordance with the NOHSC *National Code of Practice for the Preparation of Material Safety Data Sheets* (NOHSC, 1994a). It is published here as a matter of public record. The accuracy of the information on the MSDS remains the responsibility of the applicant.

11.2. Label

The label for the notified chemical 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.

12. RECOMMENDATIONS

REGULATORY CONTROLS
Hazard Classification and Labelling

- The NOHSC Chemicals Standards Sub-committee should consider the following health, and physico-chemical hazard classification for the notified chemical:
  - R11: Highly flammable
  - R65: Harmful: may cause lung damage if swallowed

- Use the following risk phrases for products/mixtures containing the notified chemical:
  - Concentration cut-off (≥10%): R65 (Harmful: may cause lung damage if swallowed)

- The notified chemical should be classified as follows under the ADG Code:
  - Class 3: Flammable

- Suppliers should label the notified chemical as a Class 3 dangerous good with the signal word Flammable and the risk phrases listed above.

CONTROL MEASURES
Occupational Health and Safety

- Employers should implement the following engineering controls to minimise occupational exposure to the notified chemical:
  - enclosure of mixing tanks during formulation
  - local exhaust ventilation during transfer of notified chemical from drum to mixing tank.

- Employers should implement the following safe work practices to minimise occupational exposure during handling of the notified chemical:
  - during transfer to mixing tank, avoid splashing
  - for use of products containing the notified chemical, minimise spray use during cleaning operations

- Employers should ensure that the following personal protective equipment is used by workers to minimise occupational exposure to the notified chemical:
  - neoprene or nitrile rubber gloves
  - protective clothing
  - safety eye protection.

  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 chemical 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.

Environment

Disposal

- The notified chemical should be disposed of by placing contaminated material in disposable containers and dispose of according to the applicable regulations.

- The notified chemical should not be disposed into waterways and stormwater drains.

Emergency procedures

- Spills/release of the notified chemical should be handled by containing release to prevent further contamination of soil, surface water or groundwater. It should be prevented from entering waterways and stormwater drains.

- Clean up spill as soon as possible using appropriate techniques such as applying non-combustible absorbent materials or pumping.

- All equipment used when handling the spill must be grounded.

- A vapour suppressing foam may be used to reduce vapours and use clean non-sparking tools to collect absorbed material.

- When feasible and appropriate, remove contaminated soil.

- Report spills to local authorities.

12.1. 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 Subsection 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.

No additional secondary notification conditions are stipulated.

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