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NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME (NICNAS)

FULL PUBLIC REPORT

SAKURALUBE 900

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Director
NICNAS

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FULL PUBLIC REPORT

SAKURALUBE 900

1. APPLICANT AND NOTIFICATION DETAILS

APPLICANT(S)
Lubrizol International Inc, (ABN 52 073 495 603) of 28 River Street, Silverwater NSW 2128

and

Sojitz Australia Ltd (ABN 16 000 213 132) of 28th Floor, MKC Building, 459 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 Identity
Molecular Weight
Spectral Data
Purity
Manufacture/Import Volume

VARIATION OF DATA REQUIREMENTS (SECTION 24 OF THE ACT)
Variation to the schedule of data requirements is claimed as follows:
Manufacturing process
Hydrolysis as a function of pH
Absorption/desorption
Dissociation constant
Oxidising properties
Particle size
Acute Inhalation toxicity
Daphnia reproduction study

PREVIOUS NOTIFICATION IN AUSTRALIA BY APPLICANT(S)
None

NOTIFICATION IN OTHER COUNTRIES
United Kingdom (2002)

2. IDENTITY OF CHEMICAL

MARKETING NAME(S)
Sakuralube 900

3. COMPOSITION

DEGREE OF PURITY
High

HAZARDOUS IMPURITIES/RESIDUAL MONOMERS
None

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

ADDITIVES/ADJUVANTS
None

DEGRADATION PRODUCTS
None

LOSS OF MONOMERS, OTHER REACTANTS, ADDITIVES, IMPURITIES
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	<1	<1	<5	<5	<5

USE
Anti-friction additive in lubricant oil for passenger car motors. The imported concentrate contains 50-80% notified chemical. The final lubricant packages will contain less than 1% of the notified chemical.

5. PROCESS AND RELEASE INFORMATION

5.1. Distribution, transport and storage

PORT OF ENTRY
Sydney, Melbourne

IDENTITY OF RECIPIENTS
Lubrizol International Inc, NSW
Sojitz Australia Ltd, VIC

TRANSPORTATION AND PACKAGING
The notified chemical is imported as a mineral oil concentrate (50-80% notified chemical) in 200 L, steel drums, and ISO and IBC containers. The containers will be transported from the dock by road or rail to blending facilities.

The finished lubricant oil (containing <1% notified chemical) will be packaged into end-use consumer size containers. Such end-use customer containers are of various sizes, e.g. ranging from 1 to 200 L, usually sealed with screw caps, and are typically road transported Australia-wide to industrial lubricant oil customers and to retail outlets, e.g. service stations.

5.2. Operation description

Transport and Storage
Following importation, the imported concentrate will be transported in the original container to the blending site(s).

Lubricant formulation
The notified chemical will not be manufactured in Australia. At the blending site(s), the imported concentrate containing the notified chemical will be decanted from the import containers to a blending tank for mixing with oil and other additives to give the finished lubricant product (containing <1% notified chemical). The blending and delivery of the lubricant components into a blending tank will

typically occur in a fully enclosed, automated and controlled environment with local exhaust ventilation. Workers will only be involved in connecting and disconnecting pipelines and transfer hoses, and in the operation of valves and pumps via the automated equipment. Packaging of the finished lubricant product into end-use containers will also be by means of automated filling lines. Finished lubricant will be packed into containers of various sizes using enclosed and fully automated packaging equipment.

Washing of equipment after each batch of lubricant is not required as similar products are blended using the same equipment. If washing is necessary, residual material left in the blend tank or transfer lines are flushed with mineral oil and the washing is used for subsequent blending.

End Use – Service garages
The finished lubricant product (containing <1% notified chemical) will be distributed to automobile manufacturers for 'factory fill' applications, service garages for lubricant replenishment, and automobile stores for Do-It-Yourself (DIY) applications. It is expected that the lubricant will be contained in engines until it the oil is worn, replaced and disposed of. When changing lubricant oil, garage workers will drain the used lubricant into an appropriate container and replace the lubricant by opening the lubricant container and manually decanting the contents of the container.

5.3. Occupational exposure

Number and Category of Workers

Category of Worker	*Number*	*Exposure Duration*	*Exposure Frequency*
Transport	2	8hr/day	2 day/year
Formulation (unloading)	2	12hr/day	2 day/year
Quality Control	2	8hr/day	2 day/year
Automobile workers	large	short	

Exposure Details

Transport and Storage
Transport and storage workers will handle sealed drums and containers of lubricant additive (50-80% notified chemical) and finished end-use products containing <1% of the notified chemical). Occupational exposure of these workers to the notified chemical is not expected except in the event of an accidental breach of the packaging. Workers will have access to the Material Safety Data Sheet (MSDS).

Lubricant formulation
Blending operators may have dermal and accidental ocular exposure to 50-80% notified chemical as a component of the additive package while transferring the contents of the import container to the blending tank and when cleaning equipment. Packaging operators may also be exposed dermally to the finished lubricant (<1% of the notified chemical) when containers are overfilled and when the automated packaging machine malfunctions.

Workers involved in the above activities wear personal protective equipment (PPE) including nitrile or neoprene gloves, chemical goggles or face shield, protective clothing and respiratory protection equipment as necessary and have access to the MSDS.

End Use – Service garages
Exposure to <1% notified chemical by automobile workers and garage workers is expected to be confined to dermal contamination with drips and spills when replacing used lubricant. There is also potential for exposure to <1% notified chemical while handling automotive components that have been in contact with the lubricant. Workers will typically wear protective clothing and gloves when carrying out the above activities.

Retail workers are not expected to be exposed to the lubricant product (<1% notified chemical) except in the event of an accidental breach of the end-use packaging.

5.4. Release

RELEASE OF CHEMICAL AT SITE

Environmental release of the notified chemical is unlikely during importation, storage and transportation, and accidental spills and leaks. Catastrophic mechanical failure during a transport accident is the most likely reason for environmental release. Engineering controls (e.g. import container specifications), personnel training and emergency clean-up procedures (i.e. spill response instructions on the Material Safety Data Sheet and label) will limit the impact on the environment of such incidents.

Blending is conducted using automated, closed, non-dispersive systems. Drips and spills may potentially occur during manual handling (i.e. connection and disconnection of hose/pump lines); however, environmental release is not expected. After blending, the finished oil is automatically discharged into steel drums. Blending tanks are typically cleaned with lube oil, which will be recycled during subsequent blending or collected for incineration at authorised facilities. Less than 0.06% of the notified chemical is estimated to enter waste streams as a result of the blending process. No aqueous wastes are generated during the blending process.

RELEASE OF CHEMICAL FROM USE

The finished lubricants for use in engine oils will be distributed to customers throughout Australia in 1L to 200 L containers/drums. No information was available on whether the notified chemical is altered during use as a lubricant in internal combustion engines and therefore it is assumed to be unaffected. There may be some accidental losses, e.g. drips, when lubricant is added to vehicle engines, which may be about every 5000-10 000 kilometres for passenger car petrol engines. These are expected to be minor spills that which would be mostly left on the ground or cleaned up and disposed of to landfill. The amount disposed of in this way should be less than 1% of the final lubricant. In the closed system of an engine, there is no expected release of the notified chemical to the environment under normal conditions of use, except for unintended oil leaks, which would mostly drip to road and pavement surfaces. Spills/leaks from engines may potentially comprise 1% of the oil formulation. Since the use of the lubricating oils will occur throughout Australia, any releases from use of oils containing the notified chemical would be diffuse.

5.5. Disposal

Each year, about 581 million litres of lubricating oil is sold in Australia, and about 303 million litres of waste oil is generated. The remainder is consumed during engine operation, unrecoverable or unaccounted for (Meinhardt, 2002). The greatest potential for environmental release of the notified chemical is through disposal of oil product wastes. 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, i.e. 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 is disposed of responsibly, e.g. oil recycling or incineration. Assuming this is the case, negligible release of the notified chemical should result from these professional activities. The remaining 14% of oil (up to 0.7 tonnes of the estimated maximum 5 tonnes of notified chemical imported per annum) is removed by Do-It-Yourself (DIY) enthusiasts. 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 of to landfill. Meinhardt (2002) estimated that DIY activities account for 7-10% of the unaccounted used oil.

According to a survey tracing the fate of used lubricating oil in Australia (Snow, 1997), only approximately 20% of used oil removed by DIY 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. In a worst case scenario involving the 14% of used-oil removed by DIY enthusiasts, the notified chemical could be collected for recycling (≤140 kg per annum), buried or disposed of in landfill (≤175 kg per annum), disposed of in stormwater drains (≤35 kg per annum) and used in treating fence posts, to kill weeds or disposed of in other ways (≤350 kg per annum). A proportion of the latter may potentially be disposed of to sewer. Therefore, about 0.7% (up to 35 kg per annum) of the total import volume of the notified chemical could potentially enter the aquatic environment via disposal into the stormwater system. In addition to this, considering the unknown fate of some of the oil used by DIY operators, up to 7%, i.e. 50% of 14%; <350 kg per annum, may also be sent to the sewer for disposal. Since the use of the lubricating oils will occur throughout Australia, all releases resulting from use or disposal

of used oil will be very diffuse and release of the notified chemical in the imported concentrate is very unlikely except as a result of transport accidents.

Spent packaging material and container residues are disposed of to landfill or incinerated. Emptied drums are likely to be cleaned with mineral oil and reconditioned, with oily waste potentially containing 2% of the formulation re-used in subsequent batches or concentrated and incinerated. Emptied drums may also be collected for metal recycling. Assuming approximately 2% of the imported formulation remains in emptied drums, an estimated maximum quantity of ≤100 kg per annum will be generated as waste by this route based on a total annual import volume of <5 tonnes per annum of the notified chemical.

5.6. Public exposure

It is expected that during transport and storage, and replenishment of lubricant oil at service garages, exposure of the general public to the notified chemical will be low except in the event of an accidental spill. Public exposure to <1% notified chemical may occur during intermittent DIY replenishment of lubricant and while handling automotive components that have been in contact with the lubricant. Exposure is likely to be by the dermal route, with the possibility of accidental ocular and inadvertent oral exposure. However, exposure will be low because the notified chemical is present at low concentrations (<1% notified chemical).

6. PHYSICAL AND CHEMICAL PROPERTIES

Appearance at 20ºC and 101.3 kPa Dark Brown paste

Pour Point 34 ºC

METHOD	ISO 3016 Method A1 of Commission Directive 92/69/EEC.
Remarks	For flow characteristics determination, a test sample was cooled at a specified rate after preliminary heating, and examined at intervals of 3ºC. This determination was conducted in accord with the OECD Good Laboratory Practices. No significant protocol deviations reported. Deccomposition at >242 ºC
TEST FACILITY	Safepharm Laboratories Limited (UK) 1999a

Boiling Point >241.5ºC at 101.62 kPa

METHOD	ASTM E537-86 and Method A2 of Commission Directive 92/69/EEC A.2 Boiling Temperature.
Remarks	Thermographic determination of onset of decomposition. No value for boiling temperature could be determined as the test material decomposed. This determination was conducted in accord with the OECD Good Laboratory Practices. No significant protocol deviations reported.
TEST FACILITY	Safepharm Laboratories Limited (UK) 1999a

Relative Density 1.14 kg.m^3 at 20ºC

METHOD	EC Directive 92/69/EEC A.3 Relative Density.
Remarks	This determination was conducted in accord with the OECD Good Laboratory Practices. No significant protocol deviations reported.
TEST FACILITY	Safepharm Laboratories Limited (UK) 1999a

Vapour Pressure 2 X 10^{-20}Pa at 25ºC (or 20ºC)

METHOD	EC Directive 92/69/EEC A.4 Vapour Pressure.
Remarks	The density was determined using the pycnometer method. Vapour pressure balance measurements were measured over a range of temperatures between 228–250ºC to enable extrapolation to 298.15ºK. The notified chemical is classified as very slightly volatile in respect to the environment (Mensink *et al*., 1995). This determination was conducted in accord with the OECD Good Laboratory

Practices. No significant protocol deviations reported.
TEST FACILITY Safepharm Laboratories Limited (UK) 1999j

Water Solubility <1.09 X 10^{-4} g/L at 20°C

METHOD EC Directive 92/69/EEC A.6 Water Solubility.
Remarks Flask Method. The total HPLC peak area limit value was taken from the lowest observed total peak area for the low level marker standards in which all three components were visible. This method was used since calculation of the limit of quantification by analysis of baseline noise was considered inappropriate due to the presence of three components in the test material. The notified chemical is classified as very slightly soluble in respect to the environment (Mensink *et al*., 1995). This determination was conducted in accord with the OECD Good Laboratory Practices. No significant protocol deviations reported. Measured at pH ca. 6.5.
TEST FACILITY Safepharm Laboratories Limited (UK) 1999a

Hydrolysis as a Function of pH Not determined

METHOD
REMARKS The test was not done undertaken due to low water solubility of the notified chemical. However, the notified chemical is not expected to hydrolyse in the environmental pH range (4-9).

Partition Coefficient (n-octanol/water) log Pow > 4.64 .at 23°C

METHOD EC Directive 92/69/EEC A.8 Partition Coefficient.
Remarks Flask Method. Substances having a $\log_{10} P_{OW}$ of greater than 3 are regarded as having the potential to bioaccumulate in the environment. The total HPLC peak area limit value was taken from the lowest observed total peak area for the low level marker standards in which all three components were visible. This method was used since calculation of the limit of quantification by analysis of baseline noise was considered inappropriate due to the presence of three components in the test material. The *n*-octanol saturated water was adjusted to pH 7.0 to maximise the solubility of the notified chemical in *n*-octanol. This determination was conducted in accord with the OECD Good Laboratory Practices. No significant protocol deviations reported.
TEST FACILITY Safepharm Laboratories Limited (UK) 1999a

Adsorption/Desorption log K_{oc} > 3.86 (estimated)

METHOD EC Directive 93/67/EEC
Remarks Calculated using QSAR using the relationship $\log_{10}K_{OC} = 0.81 \log_{10}P_{OW} + 0.10$. Due to the low water solubility and diversity of functional groups, the notified chemical has been classified as predominantly hydrophobic for QSAR calculations.
TEST FACILITY Safepharm Laboratories Limited (UK) 1999a

Dissociation Constant Not applicable

METHOD
Remarks There is no mode of chemical dissociation for the notified chemical
TEST FACILITY Safepharm Laboratories Limited (UK) 1999a

Particle Size Not applicable

METHOD
Remarks Notified chemical is a paste. The notified chemical is imported as a mineral oil-based product.
TEST FACILITY

Flash Point 143ºC

METHOD	EC Directive 92/69/EEC A.9 Flash Point.
Remarks	This determination was conducted in accord with the OECD Good Laboratory Practices. No significant protocol deviations reported.
TEST FACILITY	Safepharm Laboratories Limited (UK) 1999a

Flammability Limits

METHOD	
Remarks	Not considered highly inflammable.
TEST FACILITY	

Autoignition Temperature >400ºC

METHOD	92/69/EEC A.15 Auto-Ignition Temperature (Liquids and Gases). 92/69/EEC A.16 Relative Self-Ignition Temperature for Solids.
Remarks	This determination was conducted in accord with the OECD Good Laboratory Practices. No significant protocol deviations reported.
TEST FACILITY	Safepharm Laboratories Limited (UK) 1999a

Explosive Properties None

METHOD	EC Directive 92/69/EEC A.14 Explosive Properties.
Remarks	This determination was conducted in accord with the OECD Good Laboratory Practices. No significant protocol deviations reported.
TEST FACILITY	Safepharm Laboratories Limited (UK) 1999a

Reactivity None

Remarks	Notified chemical does not have oxidising properties or incompatible with other substances. The chemical is considered to be stable under normal conditions of use.

7. TOXICOLOGICAL INVESTIGATIONS

Endpoint and Result	*Assessment Conclusion*
Rat, acute oral LD50 >2000 mg/kg bw	low toxicity
Rat, acute dermal LD50 >2000 mg/kg bw	low toxicity
Rat, acute inhalation	no data available
Rabbit, skin irritation	irritating
Rabbit, eye irritation	slightly irritating
Guinea pig, skin sensitisation – adjuvant test.	no evidence of sensitisation
Rat, repeat dose oral toxicity – 28 days.	NOAEL = 1000 mg/kg bw/day
Genotoxicity – bacterial reverse mutation	non mutagenic
Genotoxicity – in vitro Chinese Hamster Lung	non genotoxic
Genotoxicity – in vivo	no data available
Pharmacokinetic/Toxicokinetic studies	no data available
Developmental and reproductive effects	no data available
Carcinogenicity	no data available

7.1. Acute toxicity – oral

TEST SUBSTANCE	Sakuralube 900
METHOD	OECD TG 423 Acute Oral Toxicity – Acute Toxic Class Method.
Species/Strain	Rat/Sprague-Dawley CD strain

Vehicle	Arachis oil
Remarks - Method	In accord with the OECD Good Laboratory Practices. No significant protocol deviations reported.

RESULTS

Group	*Number and Sex of Animals*	*Dose mg/kg bw*	*Mortality*
1	3 per sex	2000	0/10

LD50	>2000 mg/kg bw
Signs of Toxicity	No clinical signs of toxicity. All animals showed expected gains in body weight over the 14 days test period.
Effects in Organs	No abnormalities noted at necropsy.
Remarks - Results	None

CONCLUSION The notified chemical is of low toxicity via the oral route.

TEST FACILITY Safepharm Laboratories Limited (UK) 1999b

7.2. Acute toxicity – dermal

TEST SUBSTANCE	Sakuralube 900
METHOD	OECD TG 402 Acute Dermal Toxicity – Limit Test.
Species/Strain	Rat/ Sprague-Dawley CD strain
Vehicle	None
Type of dressing	Semi-occlusive
Remarks - Method	In accord with the OECD Good Laboratory Practices. No significant protocol deviations reported.

RESULTS

Group	*Number and Sex of Animals*	*Dose mg/kg bw*	*Mortality*
I	5 per sex	2000	0/10

LD50	>2000 mg/kg bw
Signs of Toxicity - Local	Signs of dermal irritation were very slight to well-defined erythema, haemorrhage of the dermal capillaries and crust formation. The treatment sites appeared normal two to seven days after treatment.
Signs of Toxicity - Systemic	No signs of systemic toxicity were noted during the study.
Effects in Organs	No abnormalities were noted at necropsy.
Remarks - Results	All animals showed an expected gain in bodyweight during the study.

CONCLUSION The notified chemical is of low toxicity via the dermal route.

TEST FACILITY Safepharm Laboratories Limited (UK) 1999c

7.3. Acute toxicity – inhalation

Remarks - Method	Test was not performed. Inhalation exposure would be unlikely due to the expected low vapour pressure of the notified chemical. Acute oral and dermal toxicity were considered to be the most appropriate studies to evaluate the acute toxicity hazards of the notified chemical.

7.4. Irritation – skin

TEST SUBSTANCE	Sakuralube 900
METHOD	OECD TG 404 Acute Dermal Irritation/Corrosion.
Species/Strain	Rabbit/New Zealand White
Number of Animals	3 males

Vehicle	None
Observation Period	14 days
Type of Dressing	Semi-occlusive.
Remarks - Method	In accord with the OECD Good Laboratory Practices. No significant protocol deviations reported.

RESULT

Lesion	*Mean Score* Animal No.*			*Maximum Value*	*Maximum Duration of Any Effect*	*Maximum Value at End of Observation Period*
	1	2	3			
Erythema/Eschar	2	2	1.66	2	48	0
Oedema	2	1.66	0.66	2	48	0

*Calculated on the basis of the scores at 24, 48, and 72 hours for EACH animal.

Remarks - Results	Very slight erythema was noted at all treated skin sites at the 1-hour observation with very slight to well-defined erythema at the 24-hour observation and well-defined erythema at the 48- and 72-hour observations. Very slight oedema was noted at one treated skin site at the 1-hour observation. Very slight to slight oedema was noted at two treated skin sites at the 4-hour observation and all treated sites at the 28- and 72-hour observations. Crust formation, which prevented accurate evaluation of erythema and oedema, was noted in all treated skin sites at the 7-day observation. Moderate desquamation was noted at all treated skin sites at the 14-day observation.. No corrosive effects were noted. The test material produced a primary irritation index of 3.2.
CONCLUSION	The notified chemical is irritating to the skin.
TEST FACILITY	Safepharm Laboratories Limited (UK) 1999e

7.5. Irritation – eye

Test Substance	Sakuralube 900
Method	OECD TG 405 Acute Eye Irritation/Corrosion.
Species/Strain	Rabbit/New Zealand White
Number of Animals	One female, 2 males
Observation Period	72 hours
Remarks - Method	In accord with the OECD Good Laboratory Practices. No significant protocol deviations reported.

RESULTS

Lesion	*Mean Score* Animal No.*			*Maximum Value*	*Maximum Duration of Any Effect*	*Maximum Value at End of Observation Period*
	1	2	3			
Conjunctiva: redness	0	0	0	1	24 h	0
Conjunctiva: chemosis	0	0	0	0	0 h	0
Conjunctiva: discharge	0	0	0	2	24 h	0
Corneal opacity	0	0	0	0	0 h	0
Iridial inflammation	0	0	0	0	0 hr	0

*Calculated on the basis of the scores at 24, 48, and 72 hours for EACH animal.

Remarks - Results	No ocular effects were noted at the 24-hour observation period. Dark brown-coloured residual test material was noted around the treated eyes of all animals throughout the study. No corneal or iridial effects were noted during the study. Minimal conjunctival irritation was noted in all treated eyes at the 1-hour observation period. Alopecia (loss of fur

around the treated eye) was noted in all animals at the 48- and 72-hour observations.

CONCLUSION The notified chemical is slightly irritating to the eye.

TEST FACILITY Safepharm Laboratories Limited (UK) 1999d

7.6. Skin sensitisation

TEST SUBSTANCE Sakuralube 900

METHOD OECD TG 406 Skin Sensitisation – Magnusson and Kligman Maximisation study in the guinea pig
In accord with the OECD Good Laboratory Practices. No significant protocol deviations reported.

Species/Strain Guinea pig/albino Dunkin Hartley

PRELIMINARY STUDY Maximum Non-irritating Concentration:
intradermal: 5% v/v in arachis oil
topical: 100% test material

MAIN STUDY

Number of Animals Test Group: 10 Control Group: 5

INDUCTION PHASE Induction Concentration:
intradermal: 5% v/v in arachis oil
topical: 100% test material

Signs of Irritation Discrete or patchy to moderate and confluent erythema was noted at the intradermal induction site of all test group animals at the 24 and 48-hour observations. Discrete or patchy erythema was noted at the induction site of four control group animals at the 24-hour observation and in three control group animals at the 48-hour observation.

Brown-coloured residual test material, preventing accurate evaluation of erythema was noted at the induction site of all test group animals after topical induction at the 1-hour and 24-hour observations. No skin reactions were noted at the treatment sites of the control group animals at the 1-hour and 24-hur observations.

CHALLENGE PHASE

1st challenge topical: 100% test material and 75% v/v in arachis oil

Remarks - Method Staining was noted at the topical challenge sites of test and control group animals at the 24- and 48-hopur observations. The staining did not effect evaluation of skin responses.

RESULTS

Animal	*Challenge Concentration*	*Skin Reactions*	*Number of Animals Showing Skin Reactions after 1st challenge*	
			24 h	*48 h*
Test Group	100%	*Erythema*	0/10	0/10
	75%	*Oedema*	0/10	0/10
		Erythema	0/10	0/10
		Oedema	0/10	0/10
Control Group	100%	*Erythema*	0/10	0/10
		Oedema	0/10	0/10
	75%	*Erythema*	0/10	0/10
		Oedema	0/10	0/10

Remarks - Results No skin reactions were noted at the topical challenge site in the test or control group animals at the 24- or 48-hour observations with either 100% test material or 75% test material in arachis oil. The test material

produced 0% (0/10) sensitisation rate.

CONCLUSION There was no evidence of reactions indicative of skin sensitisation to the notified chemical under the conditions of the test.

TEST FACILITY Safepharm Laboratories Limited (UK) 1999f

7.7. Repeat dose toxicity

TEST SUBSTANCE Sakuralube 900

METHOD Twenty-eight day repeated dose oral (gavage) toxicity study in the rat, equivalent to OECD TG OECD TG 407 Repeated Dose 28-day Oral Toxicity Study in Rodents.

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Species/Strain	Sprague-Dawley Crl:CDBR
Route of Administration	Oral – gavage
Exposure Information	Total exposure days: 28 days Dose regimen: 7 days per week Post-exposure observation period: 14 days
Vehicle	Arachis oil
Remarks - Method	In accord with the OECD Good Laboratory Practices. No significant protocol deviations reported. The dose levels were chosen based on the results of a range finding study. The doses in arachis oil were prepared at a treatment volume of 4 ml/kg bw/day.

RESULTS

Group	*Number and Sex of Animals*	*Dose* mg/kg bw/day*	*Mortality*
I (control)	5 per sex	0	0/10
II (low dose)	5 per sex	15	0/10
III (mid dose)	5 per sex	150	0/10
IV (high dose)	5 per sex	1000	0/10
V (control recovery)	5 per sex	0	0/10
VI (high dose recovery)	5 per sex	1000	0/10

* Incorporating a correction factor for purity of the test material.

Mortality and Time to Death
There were no deaths during the study.

Clinical Observations
No clinical observable signs of toxicity were detected during the study. Increased salivation either before or up to ten minutes after dosing and up to one hour post dosing together with isolated incidents of red/brown staining of the external surface were detected from study day 9 onwards among animals of either sex treated with 1000 mg/kg bw/day. Such signs were attributed to an unpleasant tasting or local irritant formulation rather than an indication of systemic toxicity.

No adverse effects on body weight development or dietary intake were detected. Females treated with 1000 mg/kg bw/day showed a slight but statistically ($p < 0.05$) significant reduction (25%) in bodyweight gain during week 1 of the study compared with controls. In the absence of any impact on subsequent bodyweight development or further toxicological changes, this isolated reduction was considered to be of no toxicological importance.

No overt inter-group differences in water consumption were detected during the study. No treatment related behavioural differences, differences in functional performance or sensory differences were detected.

Laboratory Findings – Clinical Chemistry, Haematology, Urinalysis
No treatment related haematological, blood chemistry or urinalysis changes were detected.

Statistically significant ($p < 0.05$) inter-group differences included: an increase in erythrocyte count (females 1000 mg/kg bw/day) arising from a low control group mean; an increase in lymphocyte count (males 150 mg/kg bw/day) showing no dose response relationship; increases in activated partial thromboplastin time and eosinophil count among recovery 1000 mg/kg bw/day animals not evident at the end of the treatment period. Accordingly, these changes were considered to be of no toxicological significance.

A number of incidental statistically significant ($p < 0.05$ or $p < 0.01$) inter-group differences in blood chemistry (increase in total plasma protein, albumin and decrease plasma triglyceride, cholesterol) were detected between treated animals 1000 mg/kg bw/day and control but in the absence of any dose-response relationship and/or associated changes in parameters which might indicate target organ toxicity such as the liver, these inter-group differences were considered to be of non toxicological significance. Males from all treatment groups showed a statistically significant reduction (17-22%) in plasma cholesterol when compared to controls. However, as the dose-response relationship was unconvincing with no histopathological evidence of hepatic dysfunction and no similar effect detected in the high dose recovery animals, such an effect was not considered to be of toxicological importance.

Effects in Organs
No treatment-related macroscopic or microscopic abnormalities were detected. Statistically significant inter-group differences were confined to recovery 1000 mg/kg bw/day animals. Recovery 1000 mg/kg bw/day males showed a slight but statistically significant ($p < 0.05$) increase in heart weight, both absolute (10% increase) and relative (14% increase) compared to controls, recovery 1000 mg/kg bw/day females showed a statistically significant ($p < 0.05$) though slight reduction (2%) in absolute brain weight compared to controls . However, in the absence of any changes in the same parameters at the end of the treatment period, such changes were considered to be of no toxicological importance.

At necropsy, one male treated with 1000 mg/kg bw/day showed a small, light patch on the right kidney at termination, however, in the absence of any histopathological or blood chemical correlation, this isolated finding was considered to be of no toxicological significance.

Remarks – Results
None

CONCLUSION	The No Observed (Adverse) Effect Level (NO(A)EL) was established as 1000 mg/kg bw/day in this study, based on systemic effects.
TEST FACILITY	Safepharm Laboratories Limited (UK) 1999h

7.8. Genotoxicity – bacteria

TEST SUBSTANCE	Sakuralube 900
METHOD	OECD TG 471 Bacterial Reverse Mutation Test. Plate incorporation procedure
Species/Strain	*S. typhimurium*: TA1535, TA1537, TA98, TA100 *E. coli*: WP2uvrA
Metabolic Activation System	S9 fraction from phenobarbitone and β-naphthoflavone induced rat liver
Concentration Range in Main Test	a) With metabolic activation: 50-5000 µg/plate b) Without metabolic activation: 50-5000 µg/plate
Vehicle	Acetone
Remarks - Method	In accord with the OECD Good Laboratory Practices. No significant protocol deviations reported. Incorporating a correction factor for purity of the test material.

RESULTS

Metabolic Activation	*Test Substance Concentration (µg/plate) Resulting in:*			
	Cytotoxicity in Preliminary Test	*Cytotoxicity in Main Test*	*Precipitation*	*Genotoxic Effect*
Absent				
Test 1	>5000	>5000	5000	Negative

Test 2	>5000	>5000	5000	Negative
Present				
Test 1	>5000	>5000	5000	Negative
Test 2	>5000	>5000	5000	Negative

Remarks - Results

All the positive control chemicals used in the test induced marked increases in the frequency of revertant colonies, both with and without metabolic activation. Thus the sensitivity of the assay and the efficacy of the S-9 mix were validated. An oily precipitate with associated opaque film was observed at 5000 µg/plate, however, this did not prevent the scoring of revertant colonies.

The test material caused no visible reduction in the growth of the bacterial background lawn at any dose level. No significant increases in the frequency of revertant colonies were recorded for any of the bacterial strains with any dose of the test material in two separate experiments either with or without metabolic activation.

CONCLUSION

The notified chemical was not mutagenic to bacteria under the conditions of the test (5000 µg/plate).

TEST FACILITY

Safepharm Laboratories Limited (UK) 1999i

7.9. Genotoxicity – in vitro

TEST SUBSTANCE

Sakuralube 900

METHOD

In vitro Chromosomal Aberration Test, equivalent to OECD TG 473 In vitro Mammalian Chromosomal Aberration Test

Cell Type/Cell Line: Chinese Hamster Lung (CHL) cells

Metabolic Activation System: S9 fraction from phenobarbitone and β-naphthoflavone induced rat liver.

Vehicle: Acetone

Remarks - Method: In accord with the OECD Good Laboratory Practices. No significant protocol deviations reported.

Metabolic Activation	*Test Substance Concentration (µg/mL)*	*Exposure Period*	*Harvest Time*
Absent			
Test 1	0*, 19.55*, 39.06*, 78.13*, 156.25, 234.38, 312.5	6	24
Present			
Test 1	0*, 39.06, 78.13*, 156.25*, 312.5*, 625, 937.5	6	24
Test 2	0*, 39.06, 78.13, 156.25*, 312.5*, 390.63*, 468.75*	6	24
	0*, 4.88, 9.77*, 19.53*, 39.06*, 78.13, 156.25	24	24
	0*, 4.88*, 9.77*, 19.53*, 39.06, 58.60, 78.13	48	48

*Cultures selected for metaphase analysis.

RESULTS

Metabolic Activation	*Test Substance Concentration (µg/mL) Resulting in:*			
	Cytotoxicity in Preliminary Test	*Cytotoxicity in Main Test*	*Precipitation*	*Genotoxic Effect*
Absent				
Test 1	>78.1	>156.25	>625	Negative
Present				
Test 1	>312.5	>312.5	>625	Negative
Test 2	>312.5	>468.75	>468.75	Negative
	>5000	>78.13	>156.25	Negative
	>39	>39.06	>78.13	Negative

Remarks - Results	*Short term treatment test – Experiment 1* The test material was shown to be toxic to CHL cells in all treatment cases. Both of the vehicle control cultures had frequencies of cells with chromosome aberrations within the expected range. Both the vehicle control cultures had frequencies of cell chromosome aberrations within the expected range. The positive control treatment groups gave statistically significant increases in the frequency of cells with aberrations. The metabolic activation system was therefore satisfactory and the test method was operating as expected. The test material did not induce any statistically significant, dose-related increases in the frequency of cells with chromosome aberrations either in the presence or absence of a liver enzyme metabolising system or after various exposure times. The test material did not induce statistically significant increases in the number of polyploid cells at any dose level in the presence or absence of activation. *Continuous and Short term test – Experiment 2* Both the vehicle control cultures had frequencies of cell chromosome aberrations within the expected range. The positive control treatment groups gave statistically significant increases in the frequency of cells with aberrations. The metabolic activation system was therefore satisfactory and the test method was operating as expected. The test material did not induce any statistically significant increase in the frequency of cells with aberrations in the presence or absence of metabolic activation with 24- and 48-hour continuous exposure. The test material did not induce statistically significant increases in the number of polyploid cells at any dose level in any treatment case.
CONCLUSION	The notified chemical was not clastogenic to CHL treated in vitro under the conditions of the test.
TEST FACILITY	Safepharm Laboratories Limited (UK) 1999g

8. ENVIRONMENT

8.1. Environmental fate

8.1.1. Ready biodegradability

TEST SUBSTANCE	Sakuralube 900
METHOD	OECD TG 301 B Ready Biodegradability: CO_2 Evolution Test.
Inoculum	Activated sewage sludge
Exposure Period	29 days
Auxiliary Solvent	None
Analytical Monitoring	Inorganic Carbon, CO_2
Remarks - Method	In view of the difficulties associated with the evaluation of the biodegradability of organic compounds with low water solubility, a modification to the standard method of preparation of the test concentration was performed. An approach endorsed by the International Standards Organization is to weigh out the test material onto a solid support prior to dispersion in the test vessels. Using this method the surface area of test material exposed to the test organisms is increased thereby increasing the potential for biodegradation. As such, 61.5 mg of notified chemical was smeared onto a glass slide prior to dispersal in inoculated culture medium. The volume was adjusted to 3 litres to give a final concentration of 20.5 mg/L, equivalent to 10 mg carbon/L. All preparations were carried out under a non-actinic safety light as data supplied by the Sponsor indicated that the test material was unstable in

natural or artificial daylight. Analysis of the concentration, homogeneity and stability of the test material in the test solutions were not appropriate to the Test Guideline.

For the purposes of the study, a standard material (sodium benzoate) and a toxicity control were used. Degradation of the test material was assessed by analysis of CO_2 production after collection of CO_2 in Dreschel bottles containing 0.05 M NaOH.

RESULTS

Notified Chemical		*Sodium benzoate*	
Day	*% Degradation*	*Day*	*% Degradation*
0	0	0	0
2	3	2	51
7	3	7	83
14	9	14	87
20	7	20	88
28	6	28	93
29	7	29	95

Remarks - Results The toxicity control attained 38% degradation after 28 days thereby confirming that the test material was not toxic to the sewage treatment microorganisms. Sodium benzoate attained 93% degradation after 28 days thereby confirming the suitability of the inoculum and test conditions.

CONCLUSION The notified chemical attained 6% degradation after 28 days and therefore, cannot be considered to be readily biodegradable under the strict terms and conditions of OECD Guideline No 301B.

TEST FACILITY SafePharm Laboratories (1999).

8.1.2. Bioaccumulation

Not determined

REMARKS The notified chemical has a partition coefficient $\log_{10} P_{OW}$ >4.64 at 23.0 ± 0.5ºC, a relatively low biodegradation potential and has a relatively high affinity to lipids. However, the relatively high molecular weight of the notified chemical suggests it may not be capable of crossing biological membranes.

8.2. Ecotoxicological investigations

8.2.1. Acute toxicity to fish

TEST SUBSTANCE Sakuralube 900

METHOD OECD TG 203 Fish, Acute Toxicity Test - Semi-static conditions.

Species	Rainbow Trout (*Oncorhynchus mykiss*)
Exposure Period	96 hours
Auxiliary Solvent	None
Water Hardness	100 mg $CaCO_3$/L
Analytical Monitoring	HPLC
Remarks – Method	Following a preliminary range-finding study, fish were exposed, in groups of 10, to filtered Water Accommodated Fractions (WAFs) of the test material over a range of concentrations of 100, 180, 320, 560, and 1000 mg/L for a period of 96 hours under semi-static test conditions.

The samples were prepared by adding amounts of test material in such a way that it adhered to the sides of the glass mixing vessels in order to prevent fouling of the magnetic stirrers used to stir each loading rate. Dechlorinated tap water was then added and stirred by magnetic stirrer using a stirring rate such that a vortex of approximately 25% of the overall height of the water column was achieved. The stirring was stopped after 23 hours and the mixtures allowed to stand for 1 hour. The mixtures were then filtered through 0.2 μm filters to give the individual loading rate filtered WAFs.

The number of mortalities and any sub-lethal effects of exposure in each test and control vessel were determined 3 and 6 hours after the start of the exposure and then daily throughout the study until termination after 96 hours. Water temperature, pH and dissolved oxygen concentrations were recorded daily and were acceptable throughout the study.

The sponsor indicated that the test material may undergo photo-oxidation. Therefore, media preparation was conducted under laboratory safety lighting, whilst the remainder of the study was conducted, shielded from the light.

The LL_{50} values and associated confidence limits at 24, 72 and 96 hours were calculated by the trimmed Spearman-Karber method of Hamilton *et al* (1997) and at 3, 6, and 48 hours the LL_{50} values were calculated using the geometric mean method. When only one partial response is shown the trimmed Spearman-Karber method is appropriate.

RESULTS

Concentration mg/L		*Number of Fish*	*Mortality*				
Nominal	*Actual*		*1h*	*24h*	*48h*	*72h*	*96h*
0		10	0	0	0	0	0
100		10	0	0	0	0	0
180		10	0	0	0	0	0
320		10	0	0	0	1	1
560		10	0	5	10	10	10
1000		10	10	10	10	10	10

LL50 560 mg/L WAF at 24 hours.
420 mg/L WAF at 48 hours.
400 mg/L WAF at 96 hours 95% CI: 360-450 mg/L.

NOEL 180 mg/L WAF at 96 hours.

Remarks – Results Analysis of the test solutions at 0, 24, and 96 hours showed the measured test concentrations to be below the limit of quantitation of the analytical method which was assessed down to a concentration of 0.020 mg/L. It was considered that the analytical method was not sufficiently sensitive enough to detect the low levels of dissolved test material in the WAFs or that the bioavailable component of the test material was not detected. Although extensive efforts were made to develop a method capable of establishing the origin of the toxicity, such as analysis for specific chemical functionalities which were considered to be possible sources of toxicity, none could be developed or were available. However, a clear dose-related biological response was shown by the test fish during the study, indicating that, although less than the limit of quantitation, a proportion of the test material had dissolved and become bioavailable. The dissolved material may have been one or several components of the test material. Therefore, given that toxicity cannot be attributed to a single component or a mixture of components but to the test material as a whole, and the dissolved test material was below the quantifiable limit of the analytical method, the results are based on nominal loading rates only.

Sub-lethal effects of exposure were observed at loading rates of 320 and 560 mg/L. These response were swimming at the surface, loss of equilibrium and the presence of moribund fish. After 72 hours exposure, the surviving fish at the 320 mg/L loading rate filtered WAF were observed to be moribund. However, after approximately 74 hours exposure (2 hours after renewal of test media) these fish were observed to have recovered slightly showing only signs of loss of equilibrium. This apparent recovery of the fish is considered to possibly be due to slight differences in the water quality used to prepare the test media, giving slight changes in the water solubility of the test material. However, given that chemical analysis showed measured test concentrations of less than the limit of quantitation throughout the study, this could not be confirmed.

CONCLUSION

The acute toxicity of the notified chemical to the freshwater fish rainbow trout (*Oncoryhnchus mykiss*) has been investigated and gave a 96-hour LL_{50} value of 400 mg/L loading rate filtered WAF with 95% confidence limits of 360-450 mg/L loading rate filtered WAF. The No Observed Effect Loading rate was 180 mg/L loading rate filtered WAF.

However, as there was a clear dose response, the notified chemical is toxic to fish below the level of its solubility.

TEST FACILITY

SafePharm Laboratories (2000a)

8.2.2. Acute toxicity to aquatic invertebrates

TEST SUBSTANCE

Sakuralube 900

METHOD

OECD TG 202 Daphnia sp. Acute Immobilisation Test and Reproduction Test – Static conditions.

Species	*Daphnia magna*
Exposure Period	48 hours
Auxiliary Solvent	None
Water Hardness	250 mg $CaCO_3$/L
Analytical Monitoring	HPLC

Remarks - Method

Following a preliminary range-finding test, twenty daphnids (2 replicates of 10 animals) were expose to Water Accommodated Fractions (WAFs) of the test material over a range of nominal loading rates of 1.0, 1.8, 3.2, 5.6, 10, 18, 32, 56, and 100 mg/L for 48 hours at a temperature of approximately 21ºC under static test conditions.

The samples were prepared by adding separately weighed amounts of test material onto a microscope slide which was suspended below the surface of reconstituted water to give the loading rates. The test material was weighed onto microscope slides to ensure accuracy of weighing due to the small amounts used and the highly viscous nature of the test material. After addition of the test material, the re-constituted water was stirred by magnetic stirrer using a stirring rate such that a vortex of approximately 25% of the overall height of the water column was achieved. The stirring was stopped after 23 hours and the mixtures allowed to stand for 1 hour prior to removing the aqueous phase or WAF by mid-depth siphoning to give the individual loading rate filtered WAFs. The media was not filtered and water clarity was not mentioned (however, see algal test below). Water temperature, pH and dissolved oxygen concentrations were recorded daily and were acceptable throughout the study.

The numbers of immobilised *Daphnia* were recorded after 24 and

48 hours. The EL_{50} values and associated confidence limits at 24 and 48 hours were calculated by the maximum-likelihood method (Finney 1971) using the ToxCalc computer software package (ToxCalc 1999).

The study report indicated that the test material may undergo photo-oxidation. Therefore, media preparation was conducted under laboratory safety lighting and all stirring, test and sample vessels were shielded from the light.

RESULTS

Concentration mg/L		*Number of D. magna*	*Number Immobilised*	
Nominal	*Actual*		*24 h [acute]* *14 d [chronic]*	*48 h [acute]* *21 d [chronic]*
0		10	0	0
1.0		10	0	0
1.8		10	0	0
3.2		10	0	0
5.6		10	0	0
10		10	0	3
18		10	0	6
32		10	0	10
56		10	2	10
100		10	8	10

LC50 78 mg/L WAF at 24 hours
15 mg/L WAF at 48 hours 95% CI: 13-18 mg/L

NOEC 5.6 mg/L WAF at 48 hours

Remarks - Results Samples were analysed following centrifugation at 40 000 G for 30 minutes.

As for the fish study, analysis of the samples taken throughout the test showed measured test concentrations of less than the limit of quantitation (LOQ) of the analytical method. These results were in line with the recovery and stability analyses conducted.

As a clear dose related biological response was shown by the test organisms during the study, it was considered that although concentrations of less than the LOQ of the analytical method were obtained, a proportion of the test material had dissolved in the WAFs and hence become bioavailable.

The dissolved test material may have been one or several components of the test material. Therefore, given that toxicity cannot be attributed to a single component or a mixture of components but to the test material as a whole and that the dissolved, and hence bioavailable, test material was below the LOQ of the analytical method, the results were based on nominal loading rates only.

CONCLUSION The acute toxicity of the notified chemical to the freshwater invertebrate *Daphnia magna* has been investigated and have a 48-hour EL_{50} (EL = Effective Loading rate) value of 15 mg/L loading rate WAF with 95% confidence limits of 13–18 mg/L loading rate WAF. The No Observed Effect Loading rate was 5.6 mg/L loading rate WAF.

However, as there was a clear dose response, the notified chemical is toxic to *Daphnia magna* below the level of its solubility.

TEST FACILITY SafePharm Laboratories (2003)

8.2.3.1 Algal growth inhibition test

TEST SUBSTANCE	Sakuralube 900
METHOD	OECD TG 201 Alga, Growth Inhibition Test.
Species	*Scenedesmus subspicatus*
Exposure Period	72 hours
Concentration Range	Nominal: 3.12, 6.25, 12.50, 25.00, and 50.00 mg/L
Auxiliary Solvent	None
Analytical Monitoring	HPLC
Remarks - Method	Following preliminary range-finding studies, *Scenedesmus subspicatus* was exposed to Water Accommodated Fractions (WAFs) prepared as for the Daphnia test, of the test material over a range of nominal loading rates for 72 hours, under constant illumination and shaking at a temperature of 24 ± 1ºC. Water temperature, pH and dissolved oxygen concentrations were recorded daily and were acceptable throughout the study. The study report indicated that the test material may undergo photo-oxidation. Therefore, media preparation was conducted under laboratory safety lighting. Samples of the algal populations were removed daily and cell concentrations determined for each control and treatment group, using a Coulter® Multisizer II Particle Counter. One way analysis of variance incorporating Bartlett's test for homogeneity of variance (Sokal and Rohlf 1981) and Dunnett's multiple comparison procedure for comparing several treatments with a control (Dunnett 1955) was carried out on the are under the growth curve data at 72 hours for the control and the 3.12 and 6.25 mg/L loading rate WAFs to determine any statistically significant differences between the test and control groups. All statistical analyses were performed using the SAS Computer software package (SAS 1996). The 12.5, 25 and 50 mg/L loading rate WAF test groups were not included in the analysis as visual inspection of the data showed a significant effect on growth.

RESULTS

Biomass		*Growth*
E_bL_{50} (72 h)	*NOEL (72 h)*	*E_rL_{50} (72 h)*
3.4 mg/L	3.12 mg/L	3.4 mg/L

Remarks - Results	Based on the variable results obtained from the pre-test recovery analyses, it was considered appropriate to analyse samples taken from the definitive study both untreated and after centrifugation (40 000 G, 30 minutes). The results of the untreated analyses give a measure of the total dissolved and dispersed test material in the WAF, whilst the centrifuged analyses gave a measure of the dissolved and hence bioavailable test material concentration. Analysis of the untreated analyses at 0 hours showed the measured concentrations to range from less than the LOQ of the analytical method to 0.0226 mg/L. The results obtained did not follow a concentration dependent pattern. This was considered to be due to the heterogeneous nature of the WAFs produced when stirring a given loading rate for this test material and was in line with the variable results obtained throughout the pre-study analyses conducted on the notified chemical.

Analysis of the centrifuged 0-hour samples showed the measured concentration in all loading rates to be less than the LOQ of the analytical method which was assessed down to 0.00083 mg/L.

Analysis of both the untreated and centrifuged samples at 72 hours indicated that the measured test material concentration was less than the LOQ. These results were in line with the pre-study analyses conducted that indicated the test material was unstable in culture medium.

As above, the dissolved test material may have been one or several components of the test material. Therefore, given that toxicity cannot be attributed to a single component or a mixture of components but to the test material as a whole and that the dissolved, and hence bioavailable, test material concentration was below the quantifiable limit of the analytical method, the results are based on nominal loading rates only.

CONCLUSION The results suggest that the notified chemical is toxic to algae below the level of its solubility.

TEST FACILITY SafePharm Laboratories Ltd. (2002)

8.2.3.2 Algal growth inhibition test

TEST SUBSTANCE Sakuralube 900

METHOD OECD TG 201 Alga, Growth Inhibition Test.

Species	*Scenedesmus subspicatus*
Exposure Period	72 hours
Concentration Range	Nominal: 6.25, 12.5, 25, 50 and 100 mg/L
Auxiliary Solvent	None
Analytical Monitoring	HPLC
Remarks - Method	As for previous test, apart from using notified chemical from a different batch.

RESULTS

Biomass		*Growth*
E_bL_{50} *(72 h)*	*NOEL (72 h)*	E_rL_{50} *(72 h)*
26 mg/L	6.25 mg/L	45 mg/L

Remarks - Results As for the previous test, except for lower toxicity, possibly caused by inter-batch or inter-test variation.

CONCLUSION The results confirm that the notified chemical is toxic to algae below the level of its solubility.

TEST FACILITY SafePharm Laboratories Ltd. (2000b)

8.2.4. Inhibition of microbial activity

TEST SUBSTANCE Sakuralube 900

METHOD OECD TG 209 Activated Sludge, Respiration Inhibition Test.
EC Directive 88/302/EEC C.11 Biodegradation: Activated Sludge Respiration Inhibition Test

Inoculum	Activated sewage sludge
Exposure Period	3 hours

Concentration Range	Nominal: 1000 mg/L
Remarks – Method	Following a preliminary range-finding study, activated sewage sludge was exposed to an aqueous dispersion of the test material at a concentration of 1000 mg/L for a period of 3 hours at 21ºC with the addition of a synthetic sewage as a respiratory substrate. The rate of respiration was determined after 30 minutes and 3 hours contact time and compared to data for the control and a reference material, 3,5-dichlorophenol.
RESULTS	
IC50	> 1000 mg/L (nominal)
NOEC	1000 mg/L (nominal)
Remarks – Results	The effect of the test material on the respiration of activated sewage sludge gave a 3-hour EC_{50} greater than 1000 mg/L. Correspondingly the No Observed Effect Concentration was equal to 1000 mg/L. The reference material, 3,5-dichlorophenol gave a corresponding EC_{50} of 8.0 mg/L, thus validating the study.
CONCLUSION	The notified chemical was not found to be inhibitory to microbial respiration at a nominal concentration of 1000 mg/L.
TEST FACILITY	SafePharm Laboratories (2000c)

9. RISK ASSESSMENT

9.1. Environment

9.1.1. Environment – exposure assessment

The notified chemical has a very low water solubility at $<1.09 \times 10^{-4}$ g/L. With log P_{OW} >4.64 (estimated), the notified chemical is expected to partition with organic matter, suspended particulates and accumulate in sediments and soils in the environment. In soils, the notified chemical is expected to be immobile. It has a low vapour pressure of 2×10^{-23} kPa at 25ºC, indicating that volatilisation to air is probably an insignificant migration pathway.

Although the formulation containing the notified chemical is not readily biodegradable over a 28-day test period, it is expected that any material disposed of to soil would biodegrade over time within a landfill or field environment.

Predicted Environmental Concentrations (PEC)

Stormwater

Spills/leaks from engines may comprise 1% of the oil formulation. These may enter the soil and stormwater compartments over a diffuse area based on the widespread use pattern along with material disposed of improperly by DIY enthusiasts. A worst case may involve all of this estimated quantity (≤35 kg/annum) being discharged into the stormwater drains in a single metropolitan area with a geographical footprint of 500 square kilometres, and an average annual rainfall of 500 mm. With a maximum annual release into this localised stormwater system of 250×10^9 µg/y and the annual volume of water drained from this region estimated to be approximately 250×10^9 L, the resultant PEC in the stormwater is ≤0.140 µg/L, with additional dilution, dispersion and sedimentation also likely to occur in the receiving environment.

9.1.2. Environment – effects assessment

Toxicity data were available for 3 taxonomic groups (freshwater fish, *Daphnia*). A predicted no effect concentration (PNEC) for freshwater organisms for the notified chemical of 34 µg/L has been derived by dividing the lowest EC_{50} value (Algae: 3.4 mg/L) by an assessment factor of 100 to account for interspecies sensitivity. In the absence of marine toxicity data, the $PNEC_{freshwater}$ is tentatively extrapolated to the marine environment, an approach supported by a preliminary review of comparative data by ECETOC (2003).

The notified chemical did not inhibit the growth of sewage sludge microbes at a concentration

of >1000 mg/L when exposed for 3 hours. Eventual degradation of the notified chemical to release simpler compounds is unlikely to pose an unacceptable risk to the environment

9.1.3. Environment – risk characterisation

Risk quotient (RQ) values, where RQ = PEC/PNEC, for freshwater and marine receiving environments were calculated as follows:

$RQ_{Freshwater}$ = 0.140 µg/L / 34 µg/L = 4.12 X 10^{-3}
RQ_{Marine} = 0.140 µg/L / 34 µg/L = 4.12 X 10^{-4}

The probable degradation of the notified chemical in municipal STPs and the aquatic compartment is expected to reduce the risk to the environment from that estimated.

9.2. Human health

9.2.1. Occupational health and safety – exposure assessment

Skin contact will be the main route of exposure although eye contact by means of inadvertent splashes is also possible. Given the molecular weight range of the notified chemical, absorption through intact skin is not expected to be significant.

Transport and Storage
Exposure to the notified chemical is not expected during transport, storage and supply provided the packaging containing the notified chemical remains intact. Transport, storage and supply workers would be exposed to the notified chemical (50-80%) only in the event of an accidental spill or breach of the packaging.

Lubricant formulation
During formulation, blending, packaging and cleaning procedures, dermal and ocular exposure will potentially occur due to drips and spills of the notified chemical (50-80%) particularly when workers connect or disconnect transfer hoses, pump the imported product containing the notified chemical from bulk containers into a blend tank, or pack the resultant lubricant oil (<1% notified chemical) into customer containers.

Workers may also make dermal contact with contaminated surfaces and residues of the notified chemical when inserting bungs and labelling the containers or when flushing blend tanks and transfer lines to effluent. However, the blending and packaging processes are mainly automated and will occur in an enclosed system, worker intervention is not required unless the machine malfunctions or needs adjustment. The plant operators generally receive adequate training in handling lubricant products, observe safe work practices and wear personal protective equipment such as gloves, chemical goggles, protective clothing, and respirators as necessary. Quality control, maintenance and cleaning workers may be exposed to <1% notified chemical in final lubricant products. Exposure to odours and vapours generated during lubricant oil formulation is expected to be low given the enclosed process, low vapour pressure for the notified chemical and the use of local exhaust ventilation.

End Use – Service garages
End users of the lubricant oil may be exposed to <1% notified chemical during oil replacement or handling equipment components that have come into contact with the oil. Such workers typically wear gloves, overalls, safety boots, and observe industrial hygiene and safe work practices.

Retail workers are unlikely to be exposed to <1% notified chemical. In the event of an accident, spills will be removed in accordance with the manufacturers instructions.

Overall, on the basis of the engineering controls, industrial hygiene, safe work practices and personal protective equipment, occupational exposure to the notified chemical would be low.

9.2.2. Public health – exposure assessment

The notified chemical will be available to the public by means of Do-It-Yourself (DIY) oil

lubricant packages. The public may be exposed intermittently to <1% notified chemical during DIY oil replacement or via engine equipment components that have come into contact with the lubricant oil. Once formulated into the end-use product and added to engines, the lubricant oils containing the notified chemical are not expected to leak during normal use. While members of the public will make dermal contact and possibly accidental ocular contact with additive products containing the notified polymer, such exposure is assessed as low on the basis that the notified chemical is present at low concentrations in the final product (<1% notified chemical) and given the molecular weight of the notified chemical, absorption through intact skin is not expected.

Indirect exposure via accidental spill or environmental release will be negligible taking into account the low concentration of the notified chemical in the final product and physicochemical characteristics of the chemical such as low vapour pressure and water solubility.

The public exposure is therefore determined to be negligible.

9.2.3. Human health – effects assessment

Toxicological data for the notified chemical for the following health end points were submitted:

- acute oral and dermal toxicity
- primary dermal irritation
- eye irritation
- skin sensitisation
- 28-day subacute oral toxicity (gavage); and
- mutagenicity.

An acute oral and dermal toxicity study in the rat and rabbit, respectively, indicated the notified chemical is of low toxicity via the oral and dermal routes. A primary dermal irritation test in rabbits showed the notified chemical is irritating to skin with a Primary Irritation Index value of 3.2. An eye irritation study in the rabbit showed a maximum group mean score of 2 and indicated the notified chemical is slightly irritating to the eye. Alopecia (loss of fur around the treated eye) was noted in all animals at the 48- and 72-hour observations. A skin sensitisation (Magnusson & Kligman Maximisation) test in guinea pigs produced 0% (0/10) sensitisation rate and indicated no evidence of reactions indicative of skin sensitisation under the conditions of the test. A reverse mutation test in *Salmonella typhimurium* and chromosomal aberration tests in Chinese Hamster Lung Cells (*in vitro*) indicated the notified chemical was not mutagenic to bacteria nor clastogenic under the conditions of the tests. The NOAEL for the notified chemical was established as 1000 mg/kg bw/day based only on the systemic effects observed in a 28-day repeat dose oral study in rats.

Based on the available data, the notified chemical is classified as a hazardous substance in accordance with the NOHSC *Approved Criteria for Classifying Hazardous Substances* (NOHSC 2004) on the basis of its skin irritant effects.

9.2.4. Occupational health and safety – risk characterisation

Dermal contact will be the main route of exposure with the potential for accidental ocular exposure. The notified chemical is unlikely to be acutely toxic, sensitising or genotoxic and is slightly irritating to eyes. The notified chemical is irritating to skin and the imported product would be classified as a skin irritant solely on the basis of the content of the notified chemical. The end-use products would not be classified as a skin irritant solely on the basis of the content of the notified chemical which is <1% of the finished product.

Lubricant formulation
The OHS risk presented by the notified chemical is expected to be low, given the automated process and engineering controls implemented at blending facilities, the industrial hygiene, good work practices and safety measures including use of appropriate personal protective equipment by workers. Moreover, the notified chemical will be used at formulation sites where operatives are familiar in using such products and good handling procedures and good housekeeping are the

norm and workers wear personal protective equipment.

End Use – Service garages
Large numbers of workers in automotive industries will be potentially exposed to the lubricant oil containing the notified chemical. However, such workers are typically trained in good handling procedures and wear suitable protective clothing and gloves when replacing the used oil. Such workers are advised to avoid eye and skin contact with lubricant and oil products and observe general hygiene practices such as washing of hands thoroughly once completing tasks. In addition, the concentration of the notified chemical in the oil lubricant products will not exceed 1%.

Risk from repeated exposure is considered to be low since at 1000 mg/kg/day (NOAEL) the amount of product equivalent will be large and workers would not be expected to be exposed repeatedly to large amounts of the notified chemical.

The notified chemical may be present in formulations containing hazardous ingredients. If these formulations 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.

The adverse health risk for workers handling the notified chemical is assessed as low under the current circumstances.

9.2.5. Public health – risk characterisation

Dermal contact will be the main route of exposure with the potential for accidental ocular exposure. Given the molecular weight range of the notified chemical, absorption through intact skin is not expected to be significant.

Public use is likely to be negligible and intermittent so further reducing the risk of adverse health effects. Given the low concentration (<1%) of the notified chemical in the oil lubricant product and limited exposure scenario when used in the reported use pattern, the risk to public health is assessed as negligible.

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

10.1. Hazard classification

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:

R38: Irritating to skin

As a comparison only, the classification of notified chemical using the Globally Harmonised System for the Classification and Labelling of Chemicals (GHS) (United Nations 2003) is presented below. This system is not mandated in Australia and carries no legal status but is presented for information purposes.

	Hazard category	***Hazard statement***
Skin corrosion/irritation	2	Irritant

10.2. Environmental risk assessment

On the basis of the PEC/PNEC ratio the notified chemical is not considered to pose an unacceptable 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 Negligible Concern to public health when used in lubricant oil as described.

11. MATERIAL SAFETY DATA SHEET

11.1. Material Safety Data Sheet

The MSDS of the notified chemical provided by the notifier was in accordance with the NOHSC *National Code of Practice for the Preparation of Material Safety Data Sheets* (NOHSC 2003). 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 1994). 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 hazard classification for the notified chemical:
  - R38 Irritating to skin
  - S 37 Wear suitable gloves
  - ≥ 20% R38 Irritating to skin
  - ≥ 1% S24 Avoid contact with skin

- Use the following risk phrases for products/mixtures containing the notified chemical:
  - Products containing ≥20% R38

CONTROL MEASURES
Occupational Health and Safety

- Employers should implement the following engineering controls to minimise occupational exposure to the notified chemical as introduced and during formulation:
  - Enclosed and automated transfer, mixing and packaging operations
  - Ventilation during manufacture of engine oil products

- Employers should implement the following safe work practices to minimise occupational exposure during handling of the notified chemical as introduced and during formulation:
  - - Avoid splashing during transfer operations and when cleaning

- Employers should ensure that the following personal protective equipment is used by workers to minimise occupational exposure to the notified chemical as introduced and during formulation:
  - Chemical resistant gloves, protective overalls, and goggles/faceshield.

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.

Disposal

- Wastes containing the notified chemical should be disposed of in a manner consistent with local jurisdiction waste management regulations by incineration.

Emergency procedures

- Spills/release of the notified chemical should be handled as specified in the MSDS (absorb spillages with inert material, transfer to labelled containers for disposal; avoid release to drains or ground water systems; clean spillage area with water and detergent).

- Spills/release of lubricants containing the notified chemical should not be released to waterways or sewer. Do not contaminate groundwater. Spills/leaks should be contained by applying absorbent materials, e.g. sand, soil, diatomaceous earth, to the spill, or pumping of spilled material, into labelled containers. Clean the spillage area with water and detergent. Dispose of in a manner consistent with local jurisdiction waste management regulations by incineration.

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 Section 64(1) of the Act; if
  – use other than car motor oil

or

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

The Director will then decide whether secondary notification is required.

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