File No: NA/931

August 2001

NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME

FULL PUBLIC REPORT

Sifosil

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Director
Chemicals Notification and Assessment

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Sifosil

1. APPLICANT

BASF Australia Ltd of 500 Princes Highway, Noble Park, Victoria 3174 (ABN 62 008 437 867) has submitted a limited notification statement in support of their application for an assessment certificate for Sifosil.

2. IDENTITY OF THE CHEMICAL

The chemical name, CAS number, molecular and structural formulae, molecular weight, spectral data, details of the chemical composition and details of exact import volume and customers have been exempted from publication in the Full Public Report and the Summary Report. The notified chemical is a UVCB.

Marketing Name: Glysantin G 48-24

3. PHYSICAL AND CHEMICAL PROPERTIES

Appearance at 20°C & 101.3 kPa: White powder (notified chemical)

Melting point: > 300°C

Boiling point: Not determined due to high melting point.

Density: 1.93 g/cm^3 (approximate)

Vapour Pressure: Not volatile

Water Solubility: 900 g/L at 20°C

Partition Co-efficient (n-octanol/water): log P_{ow} = -3.6

Hydrolysis as a Function of pH: Not determined

Adsorption/Desorption: Not determined

Dissociation Constant: Not determined

Flash Point:	Not applicable for a solid
Flammability Limits:	Not flammable
Autoignition Temperature:	Not determined
Explosive Properties:	Not explosive
Reactivity/Stability:	Stable
Fat Solubility:	< 0.5g/kg
Surface Tension:	0.06 N/m in 7.5% aqueous solution

3.1 Comments on Physico-Chemical Properties

All tests were performed by BASF AG Test Laboratory (1985, 1987).

The notified chemical is readily soluble in water. An excess of the notified chemical was added to water and stirred for 24 h after which time the resulting suspension was allowed to settle. The highly viscous liquid phase was removed and centrifuged for 2 h and the resulting liquid phase was analysed. This method indicates that the solubility of the notified chemical is approximately 900 g/L at 22 °C.

The notified chemical contains phosphate ester linkages that could be expected to undergo hydrolysis under extreme pH conditions. However, in the environmental pH range of 4 to 9, significant hydrolysis is unlikely to occur.

The partition coefficient was determined using a shake flask method. The log P of the notified chemical is –3.6. This equates to a P value of 2.5×10^{-4} which indicates that the notified chemical may be considered to be hydrophilic.

No adsorption/desorption tests were conducted for this notification. The partition coefficient would suggest that the notified chemical is not expected to adsorb to organic matter in soil or sediments. However, polyanionic compounds are known to absorb to soils and sediments, through their ability to chelate to metals.

No dissociation test was conducted because the notified chemical does not have any ionisable groups.

4. PURITY OF THE CHEMICAL

Degree of Purity:	87%
Hazardous Impurities:	None
Non-hazardous Impurities (> 1% by weight):	

Additives/Adjuvants: None

5. USE, VOLUME AND FORMULATION

The notified chemical is to be imported as a component of an imported anti-freeze coolant product for automotive engines at 0.15% in 224 kg steel drums. The coolant product will be distributed in 205 L or 20 L steel drums to vehicle service centres.

The notified chemical will be imported at a rate of up to 200 kg/year for the first 5 years.

6. OCCUPATIONAL EXPOSURE

Import and Transport to Warehouse

The imported 224 kg steel drums will be unloaded from the container and transported by road by one or two drivers to a single warehouse/manufacturing facility. In addition to the transport drivers, 4 storemen manipulating the import drums may come into contact with the notified chemical but as there is no requirement to open the drums prior to manufacture, exposure will only occur as a result of an accidental puncture.

Repackaging and Distribution

Four storemen working an average of 4 hours/day for 12 days/year will move import drums to the decanting area and return relabelled drums to storage prior to distribution. Two workers also with similar average working times will decant the imported coolant into 204L or 20L drums for distribution. For decanting, each import drum is fitted with a spout and then lifted mechanically and the contents poured into distribution containers.

Dermal and ocular exposure to the notified chemical may occur from spills and splashes during manual decanting. Inhalation exposure is unlikely due to the high melting point and therefore expected low volatility of the notified chemical.

Drum cleaners and reconditioners may be exposed also to the notified chemical.

Workers will be instructed to use personal protective equipment consisting of coveralls, apron, boots, chemical goggles/safety glasses and face shield.

End-Use

Dermal and ocular exposure to the notified chemical may occur from spills and splashes during end-use when the anti-freeze is added to or drained from automotive radiators at the vehicle service centres. Although it is likely that workers involved in these procedures will wear coveralls and safety boots as personal protection, the use also of gloves and eye protection to prevent dermal and ocular exposure is uncertain.

7. PUBLIC EXPOSURE

Public exposure to the notified chemical may occur in the event of a major transport accident

involving the breakage of drums or the rupture of radiators containing the coolant. While many vehicle owners will top up the radiator with water, most will not be involved in the draining and refilling of radiators and little exposure is expected to occur in this way.

Because of the ultimate containment of the notified chemical within a vehicle radiator and the restriction of its supply to vehicle service centres, public exposure to the notified chemical is expected to be very limited and infrequent.

8. ENVIRONMENTAL EXPOSURE

8.1 Release

After importation the notified chemical will be transported *via* road without repackaging. The notifier expects that up to 2 kg per annum of the notified chemical will be released through spills prior to repackaging. Spills will be will be soaked up using absorbent material prior to disposal in landfill.

The notifier estimates that approximately 1 kg of the anti-freeze product will remain as residues in the importation drums. This equates to less than 0.5 kg of the notified chemical per annum. Import drums will be recycled according to local government regulations while the repackaged containers will be disposed of by licensed waste disposal contractors or in domestic landfill.

The majority of the notified chemical will be released to the environment during the servicing of radiators. The notifier estimates that service centres will release between 105-150 kg of the notified chemical annually. Of this, 60-80% (a maximum of 63-120 kg of the notified chemical) will be released to the sewer and 20-40% (a maximum of 21-60 kg of the notified chemical) will be collected for disposal by licensed waste disposal contractors.

8.2 Fate

The notifier indicates that empty drums and their residues will be sent to either licensed drum reconditioners. Presumably, drum reconditioners will also dispose of residue from drums to licensed waste landfill sites or into the sewer.

The notifier has provided the results of a ready biodegradation test in an aerobic aqueous media following modified OECD screening test, OECD TG 301E (BASF Aktiengesellschaft 1986a). The biodegradation was determined by the measurement of dissolved organic carbon produced after the medium was inoculated with a mixed population of aquatic microorganisms and stored in the dark at 24ºC for 28 days. Sodium benzoate was used as the standard material. The results indicated that 5% of the chemical had degraded over this time, while 100% of the standard degraded in 28 days. The results indicate that Sifosil is not readily biodegradable.

The majority of the notified chemical will be released into the sewer. Here, despite it high water solubility, the notified chemical is expected to adsorb to sediments and be immobile due to its polyanionic nature. It is also expected that some of the notified chemical will find its way to landfill. Here it will also adsorb to soil and sediment and be immobile due to its polyanionic nature. It should not bioaccumulate (Connell 1990) as the chemical is water

soluble with a very low log P.

9. EVALUATION OF TOXICOLOGICAL DATA

9.1 Acute Toxicity

Summary of the acute toxicity of Sifosil.

Test	*Species*	*Outcome*	*Reference*
acute oral toxicity	rat	LD_{50} > 1000 mg/kg	Kieczka (1986a)
acute dermal toxicity	rat	LD_{50} > 2000 mg/kg	Kirsch (1987a)
skin irritation	rabbit	slight irritant	Kieczka (1986b)
eye irritation	rabbit	severe irritant	Kieczka (1986c)
skin sensitisation	guinea pig	mildly sensitising	Kirsch (1987b)

9.1.1 Oral Toxicity (Kieczka, 1986a)

Species/strain: Rat, Wistar

Number/sex of animals: 5 males, 5 females

Observation period: 14 days

Method of administration: Gavage

Test method: OECD TG 401

Mortality: Doses of 3,160 and 2,150 mg/kg were lethal to all animals. A dose of 1,470 mg/kg produced 60% mortality and a dose of 1000 mg/kg was without mortality.

Clinical observations: Dyspnoea and apathy for up to 4 hours and piloerection for up to 3 days were observed following a 1000 mg/kg dose. With 1470 mg/kg, similar symptoms were observed accompanied by staggering, spastic gait, piloerection and exsiccosis, all for up to 6 days post dosing. Piloerection was observed also up to 10 days post dosing.

Morphological findings: With 1000 mg/kg, sacrificed animals showed plica marginata thickening and slight glandular stomach swelling. These changes were exacerbated severely at 1470 mg/kg.

Mortality with 1470 mg/kg was associated with general congestive hyperaemia in one female and diffusely reddened glandular stomach, atonic intestines with reddened mucosa

	and partly haemorrhagic contents in 3 males and 4 females. One female showed adhesions between the stomach, liver and peritoneum indicating repaired perforations. Mortality with 2150 and 3160 mg/kg was associated with similar general congestive hyperaemia, diffuse reddening of the glandular stomach and atonic intestines with diarrheal haemorrhagic contents.
LD_{50}:	> 1000 mg/kg
Result:	The notified chemical was of low acute oral toxicity in rats.

9.1.2 Dermal Toxicity (Kirsch, 1987)

Species/strain:	Rat, Wistar
Number/sex of animals:	5 males, 5 females
Observation period:	14 days
Method of administration:	24 hour application to shaved skin via 50 x 50 cm porous gauze pad covered with waterproof dressing.
Test method:	OECD TG 402
Mortality:	None
Clinical observations:	Mean body weights increased during the study. No other clinical observations were provided.
Morphological findings:	Sacrificed animals showed full skin thickness necroses.
LD_{50}:	> 2000 mg/kg
Result:	The notified chemical was of low dermal toxicity in rats.

9.1.3 Inhalation Toxicity

Data were not provided.

9.1.4 Skin Irritation (Kieczka, 1986b)

Species/strain:	Rabbit, White Vienna
Number/sex of animals:	1 male, 2 females

Observation period: 3 days

Method of administration: 4 hour application of 40% aqueous solution (0.5mL) of test substance to shaved skin via a 2.5 x 2.5 cm porous gauze pad covered with elastic adhesive dressing.

Test method: OECD TG 404

Draize scores:

	Time after treatment			
Animal #	***4 hours***	***24 hours***	***48 hours***	***72 hours***
Erythema				
1	0[a]	0	0	0
2	1	1	0	0
3	1	0	0	1
Oedema				
1	0	0	0	0
2	0	0	0	0
3	0	0	0	0

[a] See Attachment 1 for Draize scales

Comment: No additional observations were reported.

Result: The notified chemical was slightly irritating to the skin of rabbits.

9.1.5 Eye Irritation (Kieczka, 1986c)

Species/strain: Rabbit, White Vienna

Number/sex of animals: 2 males, 1 females

Observation period: 14 days

Method of administration: Approximately 56 mg (0.1 mL) of test substance instilled into the lower everted lid of one eye; contralateral eye remained untreated.

Test method: OECD TG 405

Draize scores of unirrigated eyes:

	Time after Instillation			
Animal	***1 hour***		***24 hours***	
Cornea	***o***		***o***	
1	4[1]		4	
2	4		4	
3	4		4	
Iris				
1	-		-	
2	-		-	
3	-		-	
Conjunctiva	***r***	***c***	***r***	***c***
1	1	2	2	2
2	2	2	2	2
3	1	2	2	2

[1] see Attachment 1 for Draize scales
o = opacity r = redness c = chemosis - = not determined

Comment: For all three animals, blood discharge was observed one hour post instillation. Twenty-four hours post instillation, pus discharge was noted and the study was discontinued due to the severe irritation.

Result: The notified chemical was a severe irritant to the eyes of rabbits.

9.1.6 Skin Sensitisation (Kirsch, 1987)

Species/strain: Guinea pig, Pirbright White, Dunkin/Hartley

Number of animals: Control groups: 20 females
Test group: 20 females

Induction procedure: Intradermal injections followed by dermal application

test group:
day 0 Three pairs of 0.1ml intradermal injections into the shaved shoulder region:

- Freunds complete adjuvant (FCA)/water 1:1
- Test substance 5% in water
- Test substance 5% in FCA/water 1:1

day 7
- 0.3 g of test substance in water (15%) applied via filterpaper patch to shaved shoulder region and held under occlusive dressing for 48 hours.

control groups: Treated similarly to test animals omitting test substance from intradermal injections and topical applications.

Challenge procedure:

day 21: 0.15 g test substance in water (10%) applied via filterpaper patch to shaved neck region and held under occlusive dressing for 24 hours.

day 28: 0.15 g test substance in water (10%) applied via filterpaper patch to shaved neck region and held under occlusive dressing for 24 hours.

Test method: OECD TG 406, Magnusson and Kligman maximisation test

Challenge outcome:

Challenge concentration	***Control Animals***			***Test Animals***		
	24 hours*	***48 hours***	***72 hours***	***24 hours***	***48 hours***	***72 hours***
10%	5/20	0/20	0/20	11/20	2/20	0/20

* time after patch removal
** number of animals exhibiting positive response

Comment: At 24 hours after patch removal, 4 control animals showed grade 1 (barely perceptible) and one showed grade 2 (well-defined) erythema at challenge sites. At the same time, 5 test animals showed grade 1 and 6 showed grade 2 erythema at challenge sites. At 48 hours, 2 test animals showed grade 1 erythema.

All animals gained weight during the study.

Result: The notified chemical was mildly sensitising to the skin of guinea pigs.

9.2 28-Day Repeated Dose Toxicity (Kühborth, 1989)

Species/strain: Rat, Wistar

Number/sex of animals: 5 males and 5 females per dose

Method of administration: Drinking water

Dose/Study duration: 1000, 3000 and 9000 ppm in water for 28 days

Test method: OECD TG 407

Clinical observations:
Food consumption was reduced markedly in the first week for all high dose animals (32%

for males; 37% for females) and for 2 male rats receiving 3000 ppm. During the remainder of the study, food consumption was reduced in rats of both sexes receiving 9000 ppm (13 – 16% for males; 11 – 18% for females) compared to controls.

Drinking water consumption was also reduced throughout the study for all rats receiving the highest dose (11 – 13% for males; 26 – 33% for females) and for female rats receiving the intermediate dose (6 – 12%). Large reductions (33% for males; 45% for females) were observed in the first week.

In animals receiving the highest dose, body weights were reduced for both sexes 16 – 19% below that of control animals.

No other clinical signs attributable to the test substance were observed and no deaths occurred during the treatment period.

Clinical chemistry/Haematology
In animals receiving the highest dose, plasma urea concentrations increased significantly in male rats. A similar non-statistically significant trend was also observed in female rats. These were attributable to reduced water consumption. Female animals also showed significantly lowered total protein levels, haemoglobin, erythrocyte and haematocrit values, reduced prothrombin times and increased erythrocyte haemoglobin values. No changes in clinical chemistry/haematology were observed in rats receiving the intermediate and lowest doses.

Organ Weights and Histopathology:
In animals receiving the highest dose, mean absolute liver weights were reduced significantly in both sexes compared to controls. These were regarded as a consequence of reduced food and water intakes. No other changes in organ weights were recorded.

One female animal receiving the highest dose showed slight focal hyperkeratosis in the region of the plica marginata. This was regarded as treatment-related as similar pathology was reported in an acute oral toxicity study of the test substance. One female rat from each of the high and low dose groups and one male rat in the intermediate dose group showed chronic progressive nephropathy with the high dose female additionally showing pyelitis and urolithiasis with urothelial proliferation in the renal pelvis and bladder. These urological effects were considered spontaneous and unrelated to the test substance.

Result:
On the basis of changes in body weight and clinical chemistry/haematology observed at the highest dose, a NOEL of 3000 ppm was established for the test substance. In the absence of adverse health effects, the NOAEL was 9000 ppm.

9.3 Genotoxicity

9.3.1 *Salmonella typhimurium* Reverse Mutation Assay (Engelhardt, 1985a)

Strains:	*Salmonella typhimurium* TA98, 100, 1535, 1537
Metabolic activation:	Aroclor 1254-induced rat liver microsomal fraction S9

Concentration range:	0, 20, 100, 500, 2500, 5000 μg/plate
Test method:	OECD TG 471
Comment:	Over two independent mutation tests, toxicity was observed depending on strain and test conditions at ≥ 2500 μg/plate. No significant increases in revertant colony numbers were observed in any strains in the presence or absence of metabolic activation. Concurrent positive controls showed large increases in reversion rate confirming the sensitivity of the test system.
Result:	The notified chemical was non mutagenic under the conditions of the test.

9.3.2 Micronucleus Assay in the Bone Marrow Cells of the Mouse (Engelhardt, 1985b)

Species/strain:	Mouse, NMRI, Charles River
Number and sex of animals:	15 males and 15 females for the highest dose and 5 males and 5 females each for intermediate and lowest doses; 5 males and 5 female each for positive and negative controls.
Doses:	14, 28 and 56 mg/kg
Method of administration:	Oral administration (gavage) using phosphate buffer (pH 7.4) as vehicle.
Test method:	OECD TG 474
Comment:	The test substance induced irregular respiration and piloerection 15 minutes after administration at all three doses. Apathy was observed additionally at the highest dose 30 minutes after administration. For the tested doses, no statistically significant increases in the frequency of micronucleated immature erythrocytes were observed compared to controls.
Result:	The notified chemical was non clastogenic under the conditions of the test.

9.4 Overall Assessment of Toxicological Data

In oral and dermal toxicity tests in rats, the notified chemical was of low acute toxicity with an LD_{50} for each of >1000 and >2000 mg/kg respectively. A skin irritation test in rabbits showed mild irritation. In contrast, the results from an eye irritation study in rabbits showed

the notified chemical to be a severe eye irritant.

A skin sensitisation study in guinea-pigs showed minor responses suggesting mild sensitisation properties.

In a 28-day repeated dose toxicity drinking water study, the notified chemical at the highest dose of 9000 ppm induced decreases in food and water consumption and body weights, adaptive decreases in liver weights and alterations in clinical chemistry/haematology values. On the basis of these changes, a NOEL of 3000 ppm was established for the test substance. The NOAEL was 9000 ppm.

In a bacterial reverse mutation assay and mouse micronucleus assay, the notified chemical was shown to be non mutagenic and non clastogenic respectively.

In accord with the NOHSC *Approved Criteria for Classifying Hazardous Substances* (National Occupational Health and Safety Commission, 1999) the notified chemical is classified Irritant (Xi) with the risk phrase R41 - Risk of Serious Damage to Eyes.

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

Full test reports on the ecotoxicity studies for Sifosil were provided by the notifier.

Test	***Species***	***Results***
96 h Acute Toxicity	Zebra fish *Brachydanio rerio*	LC_{50} = 342 mg/L NOEC = 100 mg/L
24 h Acute Toxicity	*Daphnia magna*	EC_{50} = 308 mg/L
72 h Algal Growth Inhibition	*Scenedesmus subspicatus*	72 h E_bC_{50} > 100 mg/L 72 h E_rC_{50} > 100 mg/L

* NOEC - no observable effect concentration

The tests on fish (BASF Aktiengesellschaft 1986b) were performed using a static methodology. Observations were performed at 2, 24, 48, 72 and 96 hours. The test was performed using ten specimen fish per test concentration at a temperature of 24 °C. The tests were conducted using nominal concentrations of 10, 21.5, 46.4, 100, 215 and 464 mg/L. Tests were also conducted using pH adjusted solutions at nominal concentrations of 100 and 464 mg/L. The results of the definitive study showed that no mortalities or sublethal effects were observed in the test vessel containing nominal concentrations below 100 mg/L of the notified chemical. At various stages throughout the test at the nominal concentrations of 215 and 464 mg/L fish exhibited apathy, gasping, a narcotic-like effect and swam near the surface of the test vessel. After 96 h, 80 % mortality was observed at a test concentration of 464 mg/L. However, no mortality was experienced in the pH adjusted solutions at nominal concentrations of 100 and 464 mg/L. The 96-hour LC_{50} for the notified chemical to *Brachydanio rerio* is 342 mg/L as determined by probit analysis.

The immobilisation test with daphnia (BASF Aktiengesellschaft 1985) were also performed under static conditions with observations performed at 24 h. The test was performed using 5 daphnids per flask at a temperature of 20°C. The tests were conducted using nominal concentrations of 7.81, 15.6, 31.2, 62.5, 125, 250 and 500 mg/L. After 48 h, no immobilised daphnids were observed in the test vessels with less than 250 mg/L of the notified chemical and 100 % mortality was observed after 24 h at test concentrations at 500 mg/L. The 48-hour EC50 for the notified chemical to Daphnia magna is 308 mg/L of the notified chemical as determined by probit analysis.

Algae were exposed to the test substance at concentrations of 0.39, 0.78, 1.56, 3.13, 6.25, 12.5, 25, 50 and 100 mg/L for 72 h at 23°C under constant illumination and shaking (BASF Aktiengesellschaft 1991). After 72 h, the percentage inhibition of biomass for the test vessels containing 0.39, 0.78, 1.56, 3.13, 6.25, 12.5, 25, 50 and 100 mg/L of the notified chemical was 7.1, 2.4, -3.1, -2.1, -6.7, -7.9, -14, -14.4 and –12.9 %, respectively, and the percentage inhibition of growth rate was 5.7, 3.8, 1.9, 3.8, 1.9, 0, -1.9, -1.9 and -1.9 %, respectively. The 72 h EbC50 and ErC50 for the notified chemical to *Scenedesmus subspicatus* is >100 mg/L.

The ecotoxicity data indicate the notified chemical is practically non-toxic to fish, daphnia and algae.

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

The intended use pattern of the notified chemical is expected to result in the majority of the chemical being eventually released to the environment. However, this will be in dilute manner as the notified chemical contained within the anti-freeze solution released from service centres and from domestic use will be at a low concentration. The ecotoxicity data provided indicates the notified chemical is practically non-toxic to fish, daphnia and algae.

In a worst case based on maximum annual imports of 200 kg per annum, all of which is released to sewer and assuming that none is removed during sewage treatment processes, assuming a national population of 19,000,000 and that each person contributes an average 150 L/day to overall sewage flows, the predicted concentration in sewage effluent on a nationwide basis is estimated as 0.19 μg/L.

Amount of Sifosil entering sewer annually	200 kg
Population of Australia	19 million
Amount of water used per person per day	150 L
Number of days in a year	365
Estimated PEC	0.19 μg/L (0.19 ppb)

When released to receiving waters the concentration is generally understood to be reduced by a further factor of at least 10, and so the Predicted Environmental Concentration (PEC) is around 0.019 μg/L. If the notified chemical were to be used in one major capital city, such as Sydney (pop. 3500000), the PEC in the receiving waters would be 1.04 μg/L.

The nationwide and larger cities PEC estimates indicate that after discharge to receiving waters the environmental concentration of the notified chemical will be 5 orders of magnitude less than the demonstrated toxicity to algae (EC_{50} >100 mg/L).

Wastes containing the notified chemical including residues from imported drums, from repackaging and radiator servicing will be disposed of either into the sewer or in landfill. Even though the notified chemical is soluble in water, it will adsorb to soil and sediment due to its high molecular weight and polyanionic nature.

Therefore, the environmental exposure and overall environmental hazard from the notified chemical is expected to be low.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

Hazard Assessment

In oral and dermal toxicity tests in rats, the notified chemical was of low acute toxicity. A skin irritation test in rabbits showed mild irritation. In contrast, the notified chemical was a severe eye irritant in rabbits. Also, it is a mild skin sensitiser.

In a 28-day repeated dose toxicity drinking water study, the notified chemical at the highest dose of 9000 ppm induced decreases in food and water consumption and body weights, decreases in liver weights and alterations in clinical chemistry/haematology values. On the basis of these changes, a NOEL of 3000 ppm and NOAEL of 9000 ppm were established for the notified chemical.

In a bacterial reverse mutation assay and mouse micronucleus assay, the notified chemical was shown to be non mutagenic and non clastogenic respectively.

In accord with the NOHSC *Approved Criteria for Classifying Hazardous Substances* the notified chemical is classified Irritant (Xi) with the risk phrase R41 - Risk of Serious Damage to Eyes.

Occupational Health and Safety

Dermal and ocular exposure to the notified chemical from spills and splashes may occur during decanting of imported anti-freeze fluid into distribution containers and during end-use when the anti-freeze is added to or drained from automotive radiators. Inhalation exposure is unlikely due to the expected low volatility of the notified chemical.

Although personal protective equipment such as coveralls, apron, boots, chemical goggles/safety glasses and face shield are likely to be available and worn during repackaging, the use of personal protection during end-use is uncertain and personal protection in most instances may consist only of coveralls and safety boots. In the environment of the workshop at vehicle service centres, dermal and ocular exposure from spills and splashes are most likely and, hence, personal protection is important. Given the low level of notified chemical in the anti-freeze fluid, acute exposure to the fluid is unlikely to cause adverse health effects. However, if repeated or prolonged exposure occurs, skin and eye irritation may result.

Public Health

Public exposure to Sifosil during unloading at wharves, distribution, warehouse storage, decanting or end use is expected to be very low. In those circumstances where exposure does occur, the very low concentration of Sifosil in coolant solutions will minimise the effects of

any exposure to Sifosil.

Sifosil is unlikely to pose any significant health risk when used in the intended way and when present at the stated concentration.

13. RECOMMENDATIONS

Regulatory controls

- The NOHSC Chemicals Standards Sub-committee should consider the following health hazard classification for the notified chemical:
  - R41 - Risk of Serious Damage to Eyes.

Control Measures

Occupational Health and Safety

- Employers should ensure that the following personal protective equipment is used by workers to minimise occupational exposure to the notified chemical as introduced:
  - Impervious coveralls, boots, gloves and eye protection should be worn when prolonged or repeated exposure to the antifreeze containing the notified chemical is likely.

  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.

Secondary notification

The Director of Chemicals Notification and Assessment must be notified in writing within 28 days by the notifier, other importer or manufacturer:

Under Subsection 64(1) of the Act:

- if the import volume exceeds one tonne per year, or

Under Subsection 64(2) of the Act:

- if any of the circumstances listed in this subsection arise.

The Director will then decide whether secondary notification is required.

14. MATERIAL SAFETY DATA SHEET

The MSDS for the imported product containing the notified chemical was provided in a format consistent with the *National Code of Practice for the Preparation of Material Safety Data Sheets* (National Occupational Health and Safety Commission, 1994).

This MSDS was provided by the applicant as part of the notification statement. It is reproduced here as a matter of public record. The accuracy of this information remains the responsibility of the applicant.

15. REFERENCES

BASF AG Test Laboratory (1985): Measuring Sifosil P2R's Physical Chemical Properties, Germany, (unpublished report submitted by BASF).

BASF AG Test Laboratory (1987): Determination of the Melting Point and Relative Density, Germany, (unpublished report submitted by BASF).

BASF Aktiengesellschaft (1985) Study Number 1/0064/2/85-285/85: Determination of the Acute Toxicity of Sifosil P2R vom 4.6.85 to the Water Flea Daphnia Magna Straus, Germany, (unpublished report submitted by BASF).

BASF Aktiengesellschaft (1986a) Study Number 06 21/60-5 61 48: Test Report: Modified OECD Screening Test Biodegradability, Germany, (unpublished report submitted by BASF).

BASF Aktiengesellschaft (1986b) Study Number 17F297/85: Report on the Study of the Acute Toxicity: Zebra Fish, Germany, (unpublished report submitted by BASF).

BASF Aktiengesellschaft (1991) Study Number 1/91/0541/60/1: Determination of the Inhibitory Effect of Sifosil P2R vom 4.6.85 to the Green Algae Scenedesmus subspicatus, Germany, (unpublished report submitted by BASF).

Connell DW (1990) General Characteristics of Organic Compounds Which Exhibit Bioaccumulation. In: Bioaccumulation of Xenobiotic Compounds. CRC Press, Boca Raton, USA, pp. 47-57.

Engelhardt G (1985b) Cytogenetic investigations in NMRI mice after a single oral administration of Sifosil. Project no. 26M0297/8541. BASF Aktiengesellschaft, Department of Toxicology, Ludwigshafen/Rhein, Germany.

Engelhardt G (1985a) Report on the study of Sifosil in the Ames Test. Project no. 40/1M0297/85. BASF Aktiengesellschaft, Department of Toxicology, Ludwigshafen/Rhein, Germany.

Kieczka H (1986b) 85/297 – Report on the acute dermal irritation/corrosivity to the intact dorsal skin of the white rabbit. BASF Aktiengesellschaft, Department of Toxicology, Ludwigshafen/Rhein, Germany.

Kieczka H (1986c) 85/297 - Report on the acute irritation to the eye of the white rabbit. BASF Aktiengesellschaft, Department of Toxicology, Ludwigshafen/Rhein, Germany.

Kieczka H (1986a) 85/297 - Report on the study of acute oral toxicity. BASF Aktiengesellschaft, Department of Toxicology, Ludwigshafen/Rhein, Germany.

Kirsch P (1987a) Project number 11A0297/851113 - Report on the study of acute dermal toxicity. BASF Aktiengesellschaft, Department of Toxicology, Ludwigshafen/Rhein, Germany.

Kirsch P (1987b) Report on the maximisation test for the sensitising potential of Sifosil in guinea pigs. Project no. 30H297/85. BASF Aktiengesellschaft, Department of Toxicology, Ludwigshafen/Rhein, Germany.

Kühborth B (1987) Study of the oral toxicity of Sifosil P2R in rats. Administration in the drinking water over 4 weeks. Project no. 32S0297/8555. BASF Aktiengesellschaft, Department of Toxicology, Ludwigshafen/Rhein, Germany.

National Occupational Health and Safety Commission (1994) National Code of Practice for the Preparation of Material Safety Data Sheets [NOHSC:2011(1994)]. Australian Government Publishing Service, Canberra.

National Occupational Health and Safety Commission (1999) Approved Criteria for Classifying Hazardous Substances [NOHSC:1008(1994)]. Australian Government Publishing Service, Canberra.

Attachment 1

The Draize Scale (Draize, 1959) for evaluation of skin reactions is as follows:

Erythema Formation	*Rating*	*Oedema Formation*	*Rating*
No erythema	0	No oedema	0
Very slight erythema (barely perceptible)	1	Very slight oedema (barely perceptible)	1
Well-defined erythema	2	Slight oedema (edges of area well-defined by definite raising	2
Moderate to severe erythema	3	Moderate oedema (raised approx. 1 mm)	3
Severe erythema (beet redness)	4	Severe oedema (raised more than 1 mm and extending beyond area of exposure)	4

The Draize scale (Draize *et al*., 1944) for evaluation of eye reactions is as follows:

CORNEA

Opacity	*Rating*	*Area of Cornea involved*	*Rating*
No opacity	0 none	25% or less (not zero)	1
Diffuse area, details of iris clearly visible	1 slight	25% to 50%	2
Easily visible translucent areas, details of iris slightly obscure	2 mild	50% to 75%	3
Opalescent areas, no details of iris visible, size of pupil barely discernible	3 moderate	Greater than 75%	4
Opaque, iris invisible	4 severe		

CONJUNCTIVAE

Redness	*Rating*	*Chemosis*	*Rating*	*Discharge*	*Rating*
Vessels normal	0 none	No swelling	0 none	No discharge	0 none
Vessels definitely injected above normal	1 slight	Any swelling above normal	1 slight	Any amount different from normal	1 slight
More diffuse, deeper crimson red with individual vessels not easily discernible	2 mod.	Obvious swelling with partial eversion of lids	2 mild	Discharge with moistening of lids and adjacent hairs	2 mod.
Diffuse beefy red	3 severe	Swelling with lids half-closed	3 mod.	Discharge with moistening of lids and hairs and considerable area around eye	3 severe
		Swelling with lids half-closed to completely closed	4 severe		

IRIS

Values	*Rating*
Normal	0 none
Folds above normal, congestion, swelling, circumcorneal injection, iris reacts to light	1 slight
No reaction to light, haemorrhage, gross destruction	2 severe

Draize, J. H., Woodward, G., Calvery, H. O. (1944) Methods for the Study of Irritation and Toxicity of Substances Applied Topically to the Skin and Mucous Membranes, J. Pharmacol. Exp. Ther. 82 : 377-390.

Draize J. H. (1959) Appraisal of the Safety of Chemicals in Foods, Drugs and Cosmetics. Association of Food and Drug Officials of the US, 49 : 2-56.