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December 2000

**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION
AND ASSESSMENT SCHEME**

FULL PUBLIC REPORT

Z42

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Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT**Z42****1. APPLICANT**

Lubrizol International, Inc. (ACN 002 747 944) of 28 River Street, SILVERWATER, NSW 2128 has submitted a [limited](#) notification statement in support of their application for an assessment certificate for Z-42.

2. IDENTITY OF THE CHEMICAL

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

Other Names: OS 141659, polyether amine

Marketing Name: Z-42

Method of Detection and Determination: Infrared (IR) and nuclear magnetic resonance (NMR) spectroscopy and gel permeation chromatography (GPC).

Spectral Data: IR and NMR spectra were provided.

3. PHYSICAL AND CHEMICAL PROPERTIES

Appearance at 20°C & 101.3 kPa: Yellow liquid.

Boiling Point: Polymer decomposed from approximately 186°C.

Pour Point: < -23°C.

Specific Gravity: 0.976 at 20°C.

Vapour Pressure: < 9.7×10^{-8} kPa at 25°C

Water Solubility: < 52.7 mg/L at 20°C

Partition Co-efficient (n-octanol/water): $\log P_{ow} > 6.2$.

Hydrolysis as a Function of pH:	Not determined (see notes below).
Adsorption/Desorption:	$\log K_{oc} > 5.63$.
Dissociation Constant:	Not determined.
Particle Size:	Not applicable for a liquid.
Flash Point:	161°C.
Flammability Limits:	Not determined.
Autoignition Temperature:	390°C.
Explosive Properties:	Not expected to be explosive.
Reactivity/Stability:	Not an oxidiser. Thermally stable to ~ 250°C.

3.1 Comments on Physico-Chemical Properties

Tests were performed according to EEC/OECD test guidelines at facilities complying with OECD Principles of Good Laboratory Practice.

Woolley and Mullee (undated report) used the flask method of OECD TG 105 to determine the water solubility of the notified polymer. Measured amounts of the notified polymer were added to 1000 mL of water at pH 7. The flasks were shaken, left to stand for at least 24 hours, centrifuged and filtered. Gel permeation chromatography (GPC) was used to determine the concentration of the notified polymer in the samples. Standard solutions of the notified polymer in tetrahydrofuran were prepared and used in the GPC analysis. The solubility of the notified polymer was determined to be 52.7 mg/L. This indicates that the notified polymer is moderately soluble in water.

Due to the presence of pendant methyl groups it is unlikely that the notified polymer would undergo hydrolysis.

Woolley and Mullee (undated report) used OECD TG 117 to determine the partition coefficient of the notified polymer. The test solution was prepared by dilution of 51.5 mg of notified polymer with methanol to 100 mL. Reference solutions of benzene (5.33 g/L), toluene (3.19 g/L), naphthalene (191 mg/L), phenanthrene (24.5 mg/L), triphenylamine 211 mg/L, DDT (162 mg/L) and thiourea (18.8 mg/L) in methanol were used to prepare a calibration curve and determine the dead time. The partition coefficient of the notified polymer was determined to be greater than 1.59×10^6 ($\log P_{ow} > 6.2$).

Woolley and Mullee (undated report) determined the soil adsorption coefficient (K_{oc}) using the OECD draft screening method. This method employs a similar methodology to that used in the determination of $\log P_{ow}$ whereby the retention time of the material on a HPLC column is compared with those of a series of standards with known values of K_{oc} . Using this technique, the value of $\log K_{oc}$ was estimated as greater than 5.63.

4. PURITY OF THE CHEMICAL

Degree of Purity:	80%
Hazardous Impurities:	None.
Non-hazardous Impurities (> 1% by weight):	20% unreacted starting material.
Maximum Content of Residual Monomers:	None.
Additives/Adjuvants:	None.

5. USE, VOLUME AND FORMULATION

Z-42 is as an additive for gasoline. Z-42 is blended with other components and is sold as a formulated product, at this time Lubrizol 8216 at a concentration up to 19.9% (see Material Safety Data Sheet (MSDS) in which the notified polymer is identified as polyether amine). The treatment rate for Z-42 in finished gasoline is approximately 40 - 100 parts per million (ppm).

Import volume of Z-42 is less than 100 tonnes per year for the first five years.

6. OCCUPATIONAL EXPOSURE

The notified polymer is to be imported as a blended product containing up to 19.9% Z-42 (at this time, Lubrizol 8216).

Import, Transport and Storage

The notified polymer will be imported in 208 L drums or 1 250 L IBCs and transferred to customer depots or terminals by road or rail. Occupational exposure of dockside or transport workers is not expected except in the event of a spill.

Refinery/Terminal Facilities

The fuel additive package containing the notified polymer is transferred from the container to the customer's storage tank. It is then automatically metered into gasoline as the gasoline is pumped into a tank truck or added to a closed blending tank containing the gasoline prior to transfer to the tank truck. Despite the use of automated processes and dedicated delivery lines, worker exposure may occur during transfer of the additive from containers to a storage tank and during the transfer of the additive package from storage to fuel in tankers. Exposure is expected to be confined to dermal contamination with drips and spills during the connection and disconnection of transfer lines and equipment. Protective aprons, nitrile gloves and nitrile or neoprene boots are recommended by the notifier for workers when

handling the additive package and the worker environment is expected to be well ventilated.

End Use - Service Stations

At service stations, the fuel plus additive will be transferred via hoses and couplings from tanker trucks to underground tanks. Exposure of transport drivers, service station personnel and mechanics to 0.004 – 0.010% notified polymer in the final fuel may occur due to spillage. Exposure is expected to be confined to dermal contamination with drips and spills during the connection and disconnection of transfer lines and dipping of tanks.

In all categories, estimated numbers of workers and duration of exposure were not provided by the notifier.

7. PUBLIC EXPOSURE

It is expected that during import, transport, storage, mixing with petrol, and replenishment at service stations, exposure of the general public to the notified polymer will be low, except in the event of an accidental spill. Public exposure to the notified polymer will occur during refuelling of vehicles at petrol stations and filling of petrol containers for storage and use in domestic petrol-engined equipment. Exposure is likely to be by the inhalation and dermal routes, with the possibility of ocular and oral exposure.

8. ENVIRONMENTAL EXPOSURE

8.1 Release

All transfer operations from the storage facility to the (closed) blending equipment (typically in line mixers) would be under automatic control, and any spills incurred in the blending operations would be contained within concrete bunds and would be reclaimed or sent with other waste material to the on site waste water treatment facilities at the refineries. Generally, these facilities employ technologies such as oil/water separation, induced air flotation, sand filtration and possibly biological treatment, after which the treated water is discharged to either municipal sewage or receiving waters while most of the hydrocarbon material (including the new polymer) would be recovered into waste sludge. This material is usually incinerated, or may possibly be placed into landfill. The notifier has not provided any quantities of notified polymer that may be lost in this manner. It therefore has been estimated that due to the automated nature of the operation the amount is likely to be less than 1%. Any fuel containing the notified polymer that remains in the pipe will become part of the next load.

The import containers will be sent to a reconditioning facility. It is estimated that there will be less than 1% residue product in the containers.

Finished petrol is transported to service stations by bulk rail or road tankers, and distributed to the general public from bowsers. The notifier has estimated that with each tank filling at the service station, approximately 10 mL of fuel (containing the notified polymer at 70 ppm) is spilt.

8.2 Fate

The majority of the material will be burnt with the petrol with evolution of water vapour and oxides of carbon. Similarly, any material lost as a result of spills at refineries or blending facilities will be recovered into waste sludge and this is also likely to be incinerated. The notifier indicates that use of the new polymer as an additive for non-leaded fuels will not adversely effect the levels of hydrocarbon, CO, CO₂ or NO_x emissions in exhaust emissions, and claims that use of the new material will reduce these emissions through improved engine performance.

Clarke (2000) undertook a ready biodegradation study of the notified polymer using OECD Guideline 301B, CO₂ Evolution Test. Test culture was taken from a mixed population of activated sludge micro-organisms, which had been washed to remove any excess dissolved organic carbon, and added to the test vessels to give a 10 mg carbon/L concentration and 30 mg suspended solids. The sealed vessels were maintained at 21°C with CO₂-free air bubbled through at a rate of 40 mL/minute. Any CO₂ emitted was collected in two 500 mL Dreschel bottles containing 350 mL of 0.05 M NaOH. Sodium benzoate was used as the standard and had undergone 76% degradation by day 28, while the notified polymer had undergone 0% degradation. This indicates that the notified polymer is not readily biodegradable.

Effects of new fuel additive on vehicle exhaust emissions

Due to future Commonwealth fuel quality legislation which will require motor fuels to meet certain standards in respect of vehicle exhaust emissions, the notifier was asked to provide documentation of the effects of the notified polymer on these emissions. The notifier provided an exhaust emission test report (Dudek, 2000) on petrol treated with the notified polymer. The study was conducted under the United States Environmental Protection Agency's exhaust emissions federal test procedure and was done in duplicate. The fuel contained approximately 68 ppm of the notified polymer and the results indicate that there was no change in exhaust emission levels. There are a number of studies in which the positive effects of similar additives (not necessarily containing the notified polymer) on aspects of vehicle exhaust emissions were examined. Although the information contained within the studies made no specific reference to the notified polymer, the benefits accruing from the effects of these additives should be generic and not confined to the notified polymer alone. Nevertheless, from the available evidence use of the notified polymer as a fuel additive would appear to be beneficial in respect of exhaust emissions (hydrocarbon, CO and NO_x). It is relevant that these additives also have significant positive impact on engine efficiency.

9. EVALUATION OF TOXICOLOGICAL DATA

9.1 Acute Toxicity

Summary of the acute toxicity of Z-42

<i>Test</i>	<i>Species</i>	<i>Outcome</i>	<i>Reference</i>
acute oral toxicity	rat	LD ₅₀ > 5 000 mg/kg	Morris (1997a)
acute dermal toxicity	rabbit	LD ₅₀ > 2 000 mg/kg	Morris (1997b)
skin irritation	rabbit	moderate to severe irritant	Morris (1997c)
eye irritation	rabbit	moderate to severe irritant	Morris (1997d)

9.1.1 Oral Toxicity (Morris, 1997a)

<i>Species/strain:</i>	rat/Sprague Dawley.
<i>Number/sex of animals:</i>	5/sex.
<i>Observation period:</i>	14 days.
<i>Method of administration:</i>	Oral (gavage); administered undiluted at 5 g/kg.
<i>Test method:</i>	OECD TG 401
<i>Mortality:</i>	3/10 on days 5, 8 and 13.
<i>Clinical observations:</i>	Depression, reddish stains around eyes, on muzzle and on fore paws, laboured breathing, ataxia, hunched posture, tremors, eye squinting, dirty hair coat, emaciation, masticatory movements and faecal stains.
<i>Morphological findings:</i>	In decedents, signs in stomach and intestines consistent with ingestion of a severely irritating substance. No findings in survivors.
<i>LD₅₀:</i>	> 5 000 mg/kg
<i>Result:</i>	The notified chemical was of very low acute oral toxicity in rats.

9.1.2 Dermal Toxicity (Morris, 1997b)

<i>Species/strain:</i>	rabbit/New Zealand White (NZW).
<i>Number/sex of animals:</i>	5/sex.
<i>Observation period:</i>	14 days.
<i>Method of administration:</i>	Under occlusive dressing for 24 hours; dose, 2 g/kg body weight.
<i>Test method:</i>	OECD TG 402
<i>Mortality:</i>	None.

Clinical observations: Slight sluggishness and faecal stains.

Morphological findings: None.

Comment: A summary of signs of skin irritation was provided as follows: extreme erythema, marked to extreme erythema, slight to marked desquamation, extreme coriaceousness, slight to moderate fissuring, necrosis in one rabbit, blanching, brown and purple discolouration, scabbing and moist lesions.

LD₅₀: > 2 000 mg/kg

Result: The notified chemical was of low dermal toxicity in rabbits.

9.1.3 Skin Irritation (Morris, 1997c)

Species/strain: rabbit/NZW.

Number/sex of animals: 3/sex.

Observation period: 14 days.

Method of administration: 0.5 mL of test substance applied to the shaved trunk under occlusive dressing for 4 hours.

Test method: OECD TG 404

Draize scores:

<i>Time after treatment (days)</i>	<i>Animal #</i>					
	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>
<i>Erythema</i>						
½ - 1 hour	2 ^a	2	2	2	2	2
1	2	2	2	2	2	2
2	2	3	2	3	2	3
3	3	3	4	3	3	3
7	3	2	3	3	3	2
14	3	1	2	2	2	1
<i>Oedema</i>						
½ - 1 hour	4	3	4	3	3	4
1	4	4	4	4	4	4
2	4	4	4	4	4	4

3	3	4	3	4	4	3
7	3	2	3	2	3	2
14	1	0	1	1	0	1

^a see Attachment 1 for Draize scales

Comment: Erythema spreading beyond the site was observed in all animals on days 2, 3 and 7; blanching was observed in the majority of animals up to and including day 3; desquamation was observed in the majority of animals on days 7 and 14; light brown discolouration on the site was observed in all animals on day 7; coriaceousness occurred in all animals on days 3 and 7; fissuring was observed in 5 animals on day 3 and 3 animals on day 7. The total mean scores were: erythema: 2.5; oedema: 3.8.

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

9.1.4 Eye Irritation (Morris, 1997d)

Species/strain: rabbit/NZW.

Number/sex of animals: 3/sex.

Observation period: 21 days.

Method of administration: 0.1 mL of the undiluted test substance into the conjunctival sac of the right eye.

Test method: OECD TG 405

Draize scores of unirrigated eyes:

<i>Animal</i>	<i>1 h</i>		<i>1 d</i>		<i>2 d</i>		<i>3 d</i>		<i>4 d</i>		<i>7 d</i>		<i>14 d</i>		<i>21 d</i>	
<i>Cornea</i>	<i>o</i>	<i>a</i>	<i>o</i>	<i>a</i>	<i>o</i>	<i>a</i>	<i>o</i>	<i>a</i>	<i>o</i>	<i>a</i>	<i>o</i>	<i>a</i>	<i>o</i>	<i>a</i>	<i>o</i>	<i>a</i>
1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	1	3	1	3	2	2	2	2	2	2	2	2	2	1	2	3
3	2	1	1	1	1	1	0	0	0	0	0	0	0	0	-	-
4	2	1	2	1	1	1	0	0	0	0	0	0	0	0	0	0
5	2	1	2	1	1	1	0	0	0	0	0	0	0	0	0	0
6	2	2	2	1	2	1	2	1	2	1	0	0	0	0	0	0
<i>Iris</i>																
1	1		1		0		0		0		0		0		0	
2	0		1		1		1		1		0		0		1	

3	1	1	1	1	0	0	0	-																
4	0	1	0	0	0	0	0	0																
5	1	1	0	0	0	0	0	0																
6	0	1	0	1	0	0	0	0																
Conjunctiva	r	c	d	r	c	d	r	c	d	r	c	d	r	c	d	r	c	d	r	c	d	r	c	d
1	1	2	2	3	4	3	2	3	2	2	3	2	2	3	1	1	2	0	1	1	0	1	1	0
2	1	2	3	3	4	3	3	4	2	2	4	3	2	4	2	2	4	2	2	3	0	2	2	0
3	1	2	3	3	4	3	2	3	2	2	3	2	2	3	2	1	2	0	0	0	0	-	-	-
4	1	2	3	2	4	3	2	3	1	2	3	0	2	3	0	1	2	0	1	1	0	1	1	0
5	1	2	2	2	4	3	3	4	3	2	4	2	2	4	0	1	4	0	1	2	0	1	1	0
6	1	2	3	2	4	2	3	4	2	2	4	2	2	4	1	1	2	0	1	1	0	1	1	0

¹ see Attachment 1 for Draize scales shaded boxes: blistering of the conjunctiva

o = opacity a = area r = redness c = chemosis d = discharge

Comment: Mean scores on days 1 – 3: corneal opacity, 1.1; iris, 0.6; conjunctival redness, 2.3; conjunctival chemosis, 3.7.

Result: The notified chemical was moderately to severely irritating to the eyes of rabbits.

9.4 Overall Assessment of Toxicological Data

The notified chemical was of very low acute oral toxicity in rats ($LD_{50} > 5\,000$ mg/kg) and of low acute dermal toxicity in rabbits ($LD_{50} > 2\,000$ mg/kg). It was a moderate to severe skin irritant in rabbits and a moderate to severe eye irritant in rabbits. Necropsy findings on the decedents in the oral toxicity study were consistent with irritation of the gastro-intestinal tract.

Based on the toxicological data provided the notified chemical would be classified as a hazardous substance under the *Approved Criteria for Classifying Hazardous Substances* (National Occupational Health and Safety Commission, 1999). It would be classified as a skin irritant and an eye irritant and assigned the risk phrases R38: Irritating to skin and R41: Risk of serious damage to eyes, the latter on the basis of irritation persisting for 21 days, conjunctival blistering in the first 2 days and corneal vascularisation in 1 animal. No other toxic endpoints were measured.

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

The following ecotoxicity studies have been supplied by the notifier. They were carried out according to OECD Test Methods.

Species	Test	Concentrations (mg/L) (WAF)	Result (mg/L)	Reference
Rainbow trout (<i>Oncorhynchus mykiss</i>)	Semi-static 96 h acute	0.1, 0.18, 0.32, 0.56 and 1.0	LC ₅₀ = 0.13 NOEC = 0.10	Shacklady (2000a)
Water Flea (<i>Daphnia magna</i>)	48 h acute	0.1, 0.18, 0.32, 0.56, 1.0, 1.8, 3.2, 5.6 and 10	EC ₅₀ = 0.16 NOEC = 0.10	Shacklady (2000b)
Algae (<i>Selenastrum capricornutum</i>)	96 h growth	6.25, 12.5, 25, 50 and 100	E _R C ₅₀ = 59 E _B C ₅₀ = 39 NOEC = 25	Mead (2000)

WAF = water accommodated fraction

Shacklady (2000a) used OECD TG 203 to determine the toxicity of the notified polymer on Rainbow Trout. Ten fish were used in each test vessel, with the temperature maintained at 14°C and a photoperiod of 16 hours light/ 8 hours dark. Any mortalities or abnormal behaviour was recorded. At the test concentration 0.01 mg/L no deaths or abnormal behaviour was observed. Abnormal behaviour (sub-lethal effects) was observed in 0.18, 0.32 and 0.56 mg/L concentrations. A trimmed Spearman-Kärber method was used to analyse the mortality data, and the NOEC was determined to be 0.1 mg/L and the LC₅₀ to be 0.13 mg/L. This indicates that the notified polymer is highly toxic to fish.

Shacklady (2000b) used OECD TG 202 to determine the toxicity of the notified polymer on daphnia. The study was run in duplicate with 10 daphnia in each vessel. The temperature was maintained at 21°C and there was a photoperiod of 16 hours light/8 hours dark. A trimmed Spearman-Kärber method was used to determine the EC₅₀ (0.16 mg/L) and NOEC (0.01 mg/L). These results indicate that the notified polymer is highly toxic to daphnia.

Mead (2000) used OECD TG 201, Algal Growth Inhibition Test, to determine the impact of OS 144262 on the algae *Selenastrum capricornutum*. The tests were conducted in triplicate at the nominal concentrations of 6.25, 12.5, 25, 50 and 100 mg/L of filtered water accommodated fractions. The algal suspension had an initial cell density of 10,000 cells per mL. The tests were conducted over 96 hours with constant shaking at 24°C and constant illumination. Algal cell counts were done every 24 hours. Given the E_RC₅₀ of 59 mg/L and E_BC₅₀ of 39 mg/L, the notified polymer is slightly toxic to algae.

The ecotoxicity studies indicate that the notified polymer is highly toxic to fish and daphnia, only slightly toxic to algae.

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

The environmental hazard from the notified polymer is expected to be low when it is blended into petrol and used in the manner indicated by the notifier.

There is considerable evidence that modern motor vehicles running on fuel containing engine deposit control additives for unleaded petrol show significant improvements in exhaust emission of hydrocarbons, CO and NO_x over those of vehicles using un-supplemented fuel.

However, the formation and control of engine deposits, their effects on fuel combustion efficiency and on the composition of exhaust emissions is complex. Factors influencing these engine operating parameters may include the composition of the base fuel such as presence or absence of olefins and the presence and concentration of control additives in the fuel. Available evidence indicates that the use of the notified polymer as a fuel additive has no significant deleterious effects on the quality or quantity of noxious or toxic vehicular exhaust emissions, and use of the polymer is not considered to pose a hazard to the environment.

There is little potential for significant release of the material during the blending operations, which will be performed at dedicated petrochemical facilities. A maximum of 0.2 tonne of the material may be released annually as a result of leaks and spills during these operations, and most of this is expected to be recovered into waste sludge and incinerated or placed into landfill. Some release will inevitably occur as a result of petrol spills at service stations, and is estimated to account for a maximum of 5.04 kg per annum, but release will be widespread and very diffuse. Except in the case of transport accident, very little of the polymer is likely to enter the water compartment. The polymer is not expected to have high potential for bioaccumulation.

The majority of the imported polymer is expected to be completely destroyed by combustion within the engine, producing oxides of carbon and water vapour.

The notified polymer is not readily biodegradable, although it may be ultimately degradable. It has a moderate water solubility, high octanol/water partition coefficient and a $\log K_{oc} > 5.63$. If released to the soil or water compartments it is likely to bind to and associate with the organic component of soils and sediments. Any material released to the soil/water compartment would firstly associate with the organic component of the soil/sediments, and is likely to be slowly mineralised to water and oxides of carbon through biological processes. The same fate is expected for any of the notified polymer placed into landfill with waste sludge from refineries.

The ecotoxicity data for the notified polymer suggests that it is slightly toxic to algae while being highly toxic to fish and daphnia. However, its toxic potential may be mitigated by the likelihood that the notified polymer will bind to the organic component of soils and sediments.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

Z-42 was of very low acute oral toxicity in rats and of low acute dermal toxicity in rabbits. It was a moderate to severe skin irritant in rabbits and a moderate to severe eye irritant in rabbits.

Z-42 is determined to be a hazardous substance under the NOHSC *Approved Criteria for Classifying Hazardous Substances* (National Occupational Health and Safety Commission, 1999) and is assigned the risk phrases R38: Irritating to skin and R41: Risk of serious eye damage. The latter phrase is assigned on the basis of irritation persisting for 21 days, conjunctival blistering in the first 2 days and corneal vascularisation in 1 animal. The MSDS for Z-42 carries the phrases: causes respiratory tract irritation, on the basis of the skin and eye irritation studies. The label for Z-42 carries the risk phrases R38 and R41.

The label for a typical additive package (Lubrizol 8216) in which the notified polymer may be imported, lists the contents as including 39.1% hydrodesulfurised kerosene and 10.5% petroleum naphtha including 4% trimethylbenzene isomers, 1% xylene and 0.2% ethylbenzene. The MSDS for Lubrizol 8216 indicates that it has a flash point of 56°C and should be considered a flammable liquid.

Occupational Health and Safety

The notified polymer is to be imported at up to 19.9% in an end use additive product Lubrizol 8216.

During import and transport of the notified polymer, worker exposure is unlikely except in the event of a spill. Exposure after a spill would be controlled by use of the recommended practices for spillage clean up outlined in the MSDS supplied by the notifier.

At refineries and terminals, the handling of fuel additive packages may result in moderate eye irritation and moderate skin irritation from exposure to the notified polymer if adequate precautions are not taken. Trimethylbenzene has a NOHSC exposure standard of 25 ppm and xylene 80 ppm (TWA) (National Occupational Health and Safety Commission, 1995). Employers are responsible for maintaining workplace airborne concentrations below relevant exposure standards. The MSDS for Lubrizol 8216 recommends that workers wear a faceshield and protective apron and use nitrile gloves and nitrile or neoprene boots to control exposure. Respiratory protection (full face respirator) is recommended if exposure limits are exceeded and self-contained breathing apparatus for entry into confined spaces, poorly ventilated areas or large spill clean-up sites. Engineering controls and personal protective equipment for handling the solvent components of the additive package are required to limit exposure to the notified polymer.

The use of automatic, dedicated transfer lines and enclosed, automated injection into fuel as described will reduce the likelihood of exposure to the additive package. Given low exposure, the health risk expected for refinery and terminal workers would be low.

Tanker drivers, service station workers and mechanics will receive negligible exposure to the notified polymer because of the very low concentration (0.004 – 0.01%) present in the final fuel. Therefore, the risk of adverse health effects for these workers arising from exposure to the notified polymer is negligible.

Public Health Effects

Public exposure to the notified polymer will predominantly occur from inhalation, dermal and, to a lesser extent, ocular and oral exposure when refuelling vehicles and/or the filling of petrol containers for domestic use at petrol stations. The notified polymer is a severe irritant, but is present at low concentrations in petrol (40 – 100 ppm). Consequently, the irritant risk to the public is likely to be no greater than that of untreated petrol. The potential risk to the public from storage, transport, formulation and commercial operations is considered to be low.

13. RECOMMENDATIONS

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

- Spillage of the notified polymer should be avoided. Spillage should be cleaned up promptly with absorbents which should be put into containers for disposal;
- Good personal hygiene should be practised to minimise the potential for ingestion;
- A copy of the MSDS should be easily accessible to employees.

Safety goggles, chemical resistant industrial clothing including an apron and footwear and impermeable nitrile gloves should be used during occupational use of the additive packages containing the notified polymer; where engineering controls and work practices do not reduce vapour and particulate exposure to safe levels, an air fed respirator should also be used.

- Guidance in selection of goggles may be obtained from Australian Standard (AS) 1336 (Standards Australia, 1994) and Australian/New Zealand Standard (AS/NZS) 1337 (Standards Australia/Standards New Zealand, 1992); for industrial clothing, guidance may be found in AS 3765.2 (Standards Australia, 1990); for impermeable gloves or mittens, in AS 2161.2 (Standards Australia/ Standards New Zealand, 1998); for occupational footwear, in AS/NZS 2210 (Standards Australia/ Standards New Zealand, 1994a); for respirators, in AS/NZS 1715 (Standards Australia/ Standards New Zealand, 1994b) and AS/NZS 1716 (Standards Australia/ Standards New Zealand, 1994c). Other internationally accepted standards may also be used in the selection and use of PPE.

If products containing the notified polymer are hazardous to health in accordance with the NOHSC *Approved Criteria for Classifying Hazardous Substances* (National Occupational Health and Safety Commission, 1999), workplace practices and control procedures consistent with State and territory hazardous substances regulations must be in operation.

Employers should ensure that NOHSC exposure standards for all components of additive packages are not exceeded in the workplace.

The notified polymer will need to be tested to ensure that it will meet the criteria in the upcoming Australian Standard, *Evaluation of Devices and Additives which Claim to Improve Vehicle Performance*, to be AS 4430.2.

The notified chemical may be recommended to the National Occupational Health and Safety Commission (NOHSC) for consideration for inclusion in the NOHSC List of Designated Hazardous Substances with the risk phrases Irritant (Xi) R38-Irritating to Skin and R41-Risk of Serious Eye Damage.

14. MATERIAL SAFETY DATA SHEET

The MSDS for the notified chemical and a fuel additive package containing the notified

polymer were provided in a format consistent with the *National Code of Practice for the Preparation of Material Safety Data Sheets* (1994).

These MSDS were provided by the applicant as part of the notification statement. They are reproduced here as a matter of public record. The accuracy of this information remains the responsibility of the applicant.

15. REQUIREMENTS FOR SECONDARY NOTIFICATION

Under the Act, the director must be informed if any of the circumstances stipulated under subsection 64(2) of the Act arise, and secondary notification of the notified chemical may be required. No other specific conditions are prescribed.

16. REFERENCES

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Standards Australia/Standards New Zealand (1994a) Australian/New Zealand Standard 2210-1994, Occupational Protective Footwear. Standards Association of Australia/Standards Association of New Zealand.

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Attachment 1

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

<i>Erythema Formation</i>	<i>Rating</i>	<i>Oedema Formation</i>	<i>Rating</i>
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

<i>Opacity</i>	<i>Rating</i>	<i>Area of Cornea involved</i>	<i>Rating</i>
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

<i>Redness</i>	<i>Rating</i>	<i>Chemosis</i>	<i>Rating</i>	<i>Discharge</i>	<i>Rating</i>
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

<i>Values</i>	<i>Rating</i>
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

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