

October 2001

**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION
AND ASSESSMENT SCHEME**

FULL PUBLIC REPORT

Z-43

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FULL PUBLIC REPORT**Z-43****1. APPLICANT**

Lubrizol International Inc. of 28 River Street, SILVERWATER NSW 2128 (ARBN 002 747 944) has submitted a limited notification statement in support of their application for an assessment certificate for Z-43. Z-43 is a polymer of NAMW>1 000.

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 have been exempted from publication in the Full Public Report and the Summary Report.

Other Names: OS 144268,
OS 157406,
OS 155171 (mineral oil mixture containing Z-43);
OS 160649 (mineral oil mixture containing Z-43).

Marketing Name: Z-43

3. PHYSICAL AND CHEMICAL PROPERTIES

Physical and chemical properties of Z-43 were determined.

Appearance at 20°C & 101.3 kPa: Amber solid

Melting Point: 96°C

Specific Gravity: 1 050 kg/m³ at 20±0.5°C

Vapour Pressure: < 3.3 × 10⁻⁷ kPa at 25°C

Water Solubility: < 6.76 × 10⁻⁵ g/L at 20 ± 0.5°C

**Partition Co-efficient
(n-octanol/water):** log P_{ow} > 4.73

Hydrolysis as a Function of pH: Not determined.

Adsorption/Desorption:	$\log K_{oc} > 5.63$
Dissociation Constant:	Not determined.
Particle Size:	Not determined.
Flash Point:	Not determined.
Flammability Limits:	Not highly flammable.
Autoignition Temperature:	Not determined; does not have a relative self-ignition temperature below the melting temperature.
Explosive Properties:	Not expected to have explosive properties.
Reactivity/Stability:	See comments below.

3.1 Comments on Physico-Chemical Properties

The melting point of the notified polymer was determined in accordance with OECD Test Guideline 102, by Differential Scanning Calorimetry (Safepharm, 2000a). As the polymer gradually melted with decomposition from $95.4 \pm 5^\circ\text{C}$, no value for boiling temperature could be determined.

The relative density of the notified polymer was determined in accordance with OECD Test Guideline 109 using the Gas Pycnometer Method (Safepharm, 2000a). The relative density was measured as 1.05 at $20 \pm 0.5^\circ\text{C}$.

The vapour pressure of the notified polymer was determined in accordance with OECD Test Guideline 104, using a Vapour Pressure Balance (Safepharm, 2000b). The vapour pressure was measured as $< 3.3 \times 10^{-7}$ kPa at 25°C , and the polymer can be regarded as very slightly volatile (Mensink, 1995).

The water solubility of the notified polymer was determined in accordance with OECD Test Guideline 105, using the column elution method (Safepharm, 2000a). The water solubility was measured as < 67.6 $\mu\text{g/L}$ at $20 \pm 0.5^\circ\text{C}$, and the polymer can be regarded as very slightly soluble in water (Mensink, 1995).

The hydrolysis potential of the notified polymer was not determined due to the low water solubility of the polymer. However, the polymer contains no functionalities that would be expected to hydrolyse under environmental conditions (pH 4-9).

The partition coefficient of the notified polymer was determined in accordance with OECD Test Guideline 107, using the Shake-Flask Method (Safepharm, 2000a). The partition coefficient ($\log P_{ow}$) was calculated as > 4.73 at $22 \pm 0.5^\circ\text{C}$, and the polymer can be regarded as hydrophobic and will preferentially partition into the organic phase.

The adsorption/desorption behaviour of the notified polymer was determined in accordance

with OECD Draft Document (August 1999) and the adsorption coefficient was determined on soil and on sewage sludge using HPLC (SafePharm, 2000a). As the retention time of the polymer was greater than that for DDT, the most strongly retained reference material used, Log K_{oc} for the polymer was estimated to be >5.63 and the polymer can be regarded as immobile in soils.

The dissociation constant of the notified polymer was not determined, due to the low water solubility of the polymer (SafePharm, 2000a). However, the polymer is the magnesium salt of a weakly acidic phenol proton which would not be expected to significantly dissociate under environmental conditions (pH 4-9).

The notified polymer is not an oxidizer. The phenate is stable under acidic condition, and is not readily cleaved under acidic or basic conditions. The magnesium salt portion can be dissociated in water under acidic or basic conditions. It is thermally stable, decomposition starts from approximately 369 ± 5 K at 100.42 kPa based on differential scanning calorimetry analysis.

4. PURITY OF THE CHEMICAL

Degree of Purity: High.

Hazardous Impurities:

Chemical name: Magnesium oxide

CAS No.: 1309-48-4

Weight percentage: <0.1

Toxic properties: Magnesium oxide (fume) is on the NOHSC *List of Designated Hazardous Substances* (NOHSC, 1999a).

Magnesium oxide (fume) has an exposure standard of TWA, 10 mg/m³ (NOHSC, 1995).

Additives/Adjuvants: None

5. USE, VOLUME AND FORMULATION

Z-43 will be used as an additive to engine oils. Less than 100 tonnes Z-43 will be imported into Australia annually in the first 5 years.

Z-43 will be imported either at <10% in a “concentrate/additive package”, or at <5% in fully formulated engine oil. Either form will be packed in either 10 000 gallon (about 38 000 L) isotainers or 55 gallon (about 200 L) drums and distributed to customers. The imported fully formulated engine oil would be ready for use. If it is imported as a concentrate, reformulation of engine oil will be carried out in Australia.

6. OCCUPATIONAL EXPOSURE

Transport and storage

The notified polymer will be imported in 38 000 L isotainers, or 200 L drums and transported by rail or truck to blending facilities. Exposure to waterside, transport or storage workers would occur only in the event of accidental spillage.

Blending operations

Typically, the concentrate is pumped directly from containers or drums to a blend tank and mixed with base oil and other additives. Diluent oil is used to flush the tank or drum and the flushings are added to the blend. Blending lasts approximately 1-3 hours, supervised by 1-2 workers. The notifier states that blending is expected to be a highly automated process using dedicated tanks and transfer lines where feasible. Losses during blending are also minimised by catch pans and ventilation. Therefore, exposure will most likely be limited to dermal contact to the residues in lines and on couplings and occasionally from leaks and spills. The fully formulated engine oil is filled into small containers at the customer's choice via an automated filling line, supervised by 2-3 workers for 2-5 hours per day. All the workers are expected to wear long sleeve shirt, protective apron, gloves, boots, and chemical goggles or faceshield. If any recommended exposure limit is exceeded, a respirator with a dust/mist cartridge will be used.

End use

Engine oils are used in large and small facilities in Australia to top up reservoirs or, less frequently, as a complete lubricant change in engines. Exposure of the hands may be significant as it is uncommon for gloves to be worn during addition of these products to machinery. However, a MSDS for OS 160649 containing Z-43 recommends the use of local exhaust ventilation and personal protective equipment including neoprene or polyvinyl alcohol gloves (when contact with water is not anticipated), chemical goggles, long sleeve shirt and chemically protective boots. When workers enter into confined space, poorly ventilated areas or large spill clean-up sites, a disposable dust/mist mask is recommended.

7. PUBLIC EXPOSURE

Z-43 will be manufactured and blended outside of Australia. The imported containers, 38000L isotainers or 200L drums will be transported to customer facilities by truck or rail. If the fully formulated engine oil is imported, there will be no further processing activity in Australia except to decant bulk material into smaller retail containers. If the concentrate is imported, further blending activity will occur at the customer's site in which case Z-43 would be blended with oil. After blending, the engine oil will be packaged into containers of the blenders choice. Mineral oil may be used to rinse containers. The blending facility will generally be ventilated and automated. Packaging will also be automated and housed within or near the blend operation area. Operational spillage will be catered for with catch pans.

In Australia, the general public may have contact with spilled concentrate (<10% Z-43) following an accident with respect to unloading at the arrival wharf, transport by road or rail, or at a blending facility. In the event of a spill, the liquid should be collected for recycling and/or disposal, and may be absorbed on inert material. Public contact with the fully formulated engine oil (<5% Z-43) may occur in similar ways and in the use of the engine oil either by way of topping up the engine oil content, home engine maintenance or by doing a complete engine oil change. This latter activity, involving as it does the process of emptying

the oil pan, is likely to be the most probable form of significant contact. There exists the possibility of accidental spillage leading to contact with skin and the eyes and accidental ingestion.

The usage pattern for the concentrate and the oil indicate that exposure is likely to be limited and infrequent.

8. ENVIRONMENTAL EXPOSURE

8.1 Release

The blending operations are performed at specially constructed sites owned and operated by lubricant manufacturers. Up to twenty sites located in Sydney, Melbourne, Brisbane and Perth may be involved in producing lubricants which contain the notified polymer. However, there are no properties of the polymer that would increase the likelihood of release during the transport of the product to the customer's blend facility or repackaging outlet. Release to the environment prior to end use is expected to occur only in the unlikely event of an accident during transport or an accidental leak. The concentrate containing the new polymer will be delivered to the blending facilities in bulk, isotanks (10,000 gallons) or steel drums (55 gallons) and transferred to storage tanks. It is anticipated that there will be minimal release of the notified polymer during transfer from the storage containers to the blending tanks.

Blending occurs in fully enclosed automated systems. Blending tanks will be cleaned with mineral oil, which will typically be recycled during subsequent blending, or incinerated. Any spills incurred in the blending operations are expected to be contained within concrete bunds or catch pans and either reclaimed or sent to on-site waste-water treatment facilities where residual hydrocarbon based products will be separated from the aqueous stream by the Australian Petroleum Industry (API) process, with a claimed removal of greater than 95%. Before being released to the sewage system, the aqueous waste is likely to undergo further treatment involving pond aeration and sand filtration. The remaining oily waste will be incinerated. Empty drums containing residual notified polymer would be steam cleaned, with the resultant aqueous waste sent to on-site waste-water treatment facilities.

The finished lubricants will be sold in drums and bulk to industrial and commercial customers and bottles to the domestic market. If the worst case is assumed, where containers are disposed of to landfill and not recycled, and a maximum of 1% of the import volume remains in containers after transfer to engines, up to 1 000 kilograms of the notified polymer would be released to landfill from this route.

The notified polymer is not substantially altered during use and does not decompose in crankcases because it is thermally stable. However, it is likely to be converted to lower MW species as a result of mechanical shearing within the crankcase. Some of the polymer is likely to be burned in the engine during oil consumption, with most of the ash remaining after combustion returning to the sump as insolubles, or emitted as particulate matter in the exhaust. The notified polymer will be attracted to and coat insoluble materials (soot particles, insoluble resins etc.) and can be filtered or centrifuged out of the oil. Over time, fresh oil containing the notified polymer may be added to keep sump levels constant and to maintain the effectiveness of the oil, or during maintenance, the oil may be drained completely and replaced with new oil. In cases where specialised technicians perform oil changes or repairs,

the used oil generated will generally be incinerated or sent for recycling. However, in the case of passenger vehicles where “do it yourself” (DIY) enthusiasts perform oil changes at home, a significant percentage of the oil sold for use in these vehicles is likely to be inappropriately released. Information presented at an API 1997 Conference, showed that of oil sold for use in the automotive market, 14% was sold to DIY enthusiasts (Snow, 1997). Of this oil, approximately 13% was collected for recycling, 32% was lost or consumed during use, and the remaining 55% was released inappropriately eg buried, tipped into landfill, used for weed control, tipped into stormwater or stored. However, as the notified polymer is a component of diesel engine oils only, this value is likely to be considerably less in this case, as these vehicles are more likely to be serviced by professional mechanics. As a market breakdown for usage of the notified polymer was not provided, the worst case will be assumed where all of the notified polymer will be sold for use in the automotive market, with 14% sold to DIY enthusiasts. Thus the amount of notified polymer disposed of inappropriately could be up to 7.7%, or 7.7 tonnes of the notified polymer.

In addition, up to 0.5% (500 kg) of the notified polymer will be lost as leakage through seals and gaskets (Copan and Laycock, 1993).

Overall, up to 9.2 tonnes of the notified polymer may be released to the environment from the above processes. Since the use of the lubricating oils will occur throughout Australia, all releases resulting from use or disposal of old oil will be very diffuse, and release of the notified polymer in high concentrations is unlikely except as a result of accidents during transport.

8.2 Fate

The notified polymer, as a component of crankcase lubricant, will enter the engine when either the sump is filled or when the engine is topped up. It will leave the engine via lubricant consumption down the tailpipe as gaseous emissions (combustion products or particulates), or as leakage through seals or gaskets during use, or in drained used oil. Leakage past seals or gaskets is estimated to be less than 0.5% (500 kg) of polymer. The environmental routes of this portion of the lubricant are to the water and soil compartments. An estimated breakdown of lubricant oil fate (and hence the fate of the notified polymer) is given below (Copan and Laycock, 1993):

Unaccounted for:	34%
Exhaust emissions:	25%
Rerefined/recycled:	19.5%
Fuel oil:	17%
Incinerated:	4%
Leakage during use:	0.5%

In the case of accidental or deliberate release to land, the anticipated high K_{OC} indicates that the material would not be mobile and would adsorb onto and become strongly associated with the organic component of soils and sediments. Similarly, in the event of accidental release into the water compartment or inappropriate disposal, it is likely to become associated with suspended organic material, and eventually be incorporated into sediments.

Although the notified polymer has a high $\log P_{OW}$, the relatively high molecular weight

(1347) indicates little potential for bioaccumulation (Connell, 1990).

Incineration of waste oil containing the notified polymer would destroy the substance with evolution of water vapour and oxides of carbon, together with production of magnesium compounds that would be assimilated with the ash. Sludges from waste treatment plants or oil recycling facilities could also be incinerated.

9. EVALUATION OF TOXICOLOGICAL DATA

The notifier provided a report of acute oral toxicity on Z-43 (OS144268) and two skin and eye irritation studies on OS 155171 which contains 53% Z-43 in mineral oil.

9.1 Acute Toxicity

9.1.1 Oral Toxicity (Safepharma, 2000e)

<i>Test material:</i>	Z-43
<i>Species/strain:</i>	Rat/Sprague-Dawley CD
<i>Number/sex of animals:</i>	3/sex
<i>Observation period:</i>	14 days
<i>Method of administration:</i>	A single oral dose (2 000 mg/kg) by gavage (vehicle: arachis oil).
<i>Test method:</i>	OECD TG 423
<i>Mortality:</i>	None.
<i>Clinical observations:</i>	None.
<i>Morphological findings:</i>	None.
<i>Comment:</i>	None.
<i>LD₅₀:</i>	>2 000 mg/kg.
<i>Result:</i>	Z-43 was of very low acute oral toxicity in rats.

9.1.2 Skin Irritation (MB Research Laboratories, 2000)

<i>Test material:</i>	OS 155171
<i>Species/strain:</i>	Rabbit/New Zealand White
<i>Number/sex of animals:</i>	1 male and 2 females.

Observation period: 7 days

Method of administration: An aliquot of 0.5 mL of test material was applied to the trunk of each animal under a semi-occlusive dressing for 4 hours.

Test method: Similar to OECD TG 404

Draize scores:

<i>Time after treatment</i>	<i>Animal #</i>		
	<i>1</i>	<i>2</i>	<i>3</i>
<i>Erythema</i>			
1 hour	^a 0	0	1
1 day	0	0	1
2 days	1	0	1
3 days	1	1	2
7 days	0	0	0
<i>Oedema</i>			
1 hour	0	0	0
1 day	0	0	0
2 days	1	0	1
3 days	1	0	1
7 days	0	0	0

^a see Attachment 1 for Draize scales

Comment: One female had signs of diarrhoea and few faeces.

Result: OS 155171 was slightly irritating to the skin of rabbits.

9.1.3 Eye Irritation (MB Research Laboratories, 2000)

Test material: OS 155171

Species/strain: Rabbit/New Zealand White

Number/sex of animals: 1 male and 2 females.

Observation period: 72 hours.

Method of administration: Undiluted test material (0.1 mL) was instilled into the conjunctival sac of one eye, and the untreated eye served as control.

Test method: Similar to OECD TG 405

Draize scores:

<i>Time after instillation</i>												
<i>Animal</i>	<i>1 hour</i>			<i>24 hours</i>			<i>48 hours</i>			<i>72 hours</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>	
1	Zero scores were recorded for corneal effects in all animals at all time points.											
2												
3												
<hr/>												
<i>Iris</i>												
1	Zero scores were recorded for iridial effects in all animals at all time points.											
2												
3												
<hr/>												
<i>Conjunctiva</i>	<i>r</i>	<i>c</i>	<i>d</i>	<i>r</i>	<i>c</i>	<i>d</i>	<i>r</i>	<i>c</i>	<i>d</i>	<i>r</i>	<i>c</i>	<i>d</i>
1	1	1	2	1	1	0	1	0	0	0	0	0
2	1	1	1	1	1	0	0	0	0	0	0	0
3	1	1	2	1	2	1	1	1	0	0	0	0

¹ see Attachment 1 for Draize scales

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

Comment: Sodium fluorescein examination results were negative in all animals at 24 hours post-treatment.

Result: OS 155171 was a slight to moderate eye irritant to the eyes of rabbits.

9.2 Overall Assessment of Toxicological Data

Z-43 was of very low acute oral toxicity (LD50>2000 mg/kg) in rats. OS 155171 containing 53% Z-43 was a slight skin irritant and a slight to moderate eye irritant in rabbits. Based on the available information, Z-43 cannot be classified against the NOHSC *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 1999b) for the endpoints tested.

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

The following ecotoxicity studies have been supplied by the notifier, the results of which are summarised in the following table. The tests were performed in compliance with OECD/EEC Test Methods and according to OECD Principles of Good Laboratory Practice.

<i>Test</i>	<i>Species</i>	<i>Results</i>
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Acute Toxicity to Freshwater Fish	Rainbow trout <i>Oncorhynchus mykiss</i>	*LL ₅₀ >1,000 mg/L
Algal growth inhibition	<i>Scenedesmus subspicatus</i>	**EL ₅₀ >1,000 mg/L

* LL₅₀ – lethal loading rate of water available fraction
** EL₅₀ – effective loading rate of water available fraction

Acute Toxicity to Fish (Safepharm, 2000c)

The test was carried out in accordance with OECD Test Guideline 203, using juvenile rainbow trout (*Oncorhynchus mykiss*) as the test species. The water temperature was controlled at 14°C with a dissolved oxygen content of 9.4 mg/L. There were no mortalities in the 7 days prior to the start of the test and the fish had a mean standard length of 4.3 cm, a mean weight of 1.08 g at the end of the definitive study. Based on the mean weight value, this gave a loading rate of 0.54 g bodyweight/L.

In view of the difficulties associated with the evaluation of aquatic toxicity of poorly water soluble test materials, a modification of the standard method for the preparation of aqueous media was performed. An approach endorsed by several regulatory bodies in the EU is to expose organisms to a Water Accommodated Fraction (WAF) of the test material in cases where the test material is a complex mixture and is poorly soluble in water and in the permitted auxiliary solvents and surfactants. Using this approach, aqueous media are prepared by mixing the test material with water for a prolonged period. Pre-study work showed that a preparation period of 96 hours was sufficient to ensure equilibration between the test material and water phase. At the completion of mixing, the test material phase is separated by mid-depth siphoning and the test organisms exposed to the aqueous phase of WAF (which may contain dissolved test material and/or leachates from the test material). Exposures are then expressed in terms of the original concentration of test material in water at the start of the mixing period (loading rate) irrespective of the actual concentration of test material in the WAF. All fish were exposed to a WAF concentration of 1000 mg/L, with mortality and sub-lethal effects monitored at 0, 3, 6, 24, 48, 72 and 96 hours from the start of the test. Analysis of the test solution indicated that the actual concentration of the polymer in the solution was below the limit of quantitation for the test method ie <0.37 mg/L.

There were no mortalities or sub-lethal effects observed in 20 fish exposed to a 1000 mg/L loading rate WAF for a period of 96 hours. The 96 hour Lethal Loading Rate for the WAF (LL₅₀) for the notified polymer was >1000 mg/L and the polymer is thus considered to be non-toxic to fish up to the limit of its water solubility.

Algal Inhibition Test (Safepharm, 2000d)

The test organism was the freshwater unicellular green alga *Scenedesmus subspicatus*. Liquid cultures of *S. subspicatus* were maintained in the laboratory at a temperature of 21 ± 1°C under continuous illumination (intensity approximately 7000 lux) and constant aeration.

Again, the WAF method, as described in the Acute Fish Toxicity Test, was used to prepare test solutions of the notified polymer for algal exposure. Algae were exposed to a test concentration of 1000 mg/L of the polymer. Analysis of the test solution indicated that the actual concentration of the polymer in the solution was below the limit of quantitation for the test method ie <0.37 mg/L.

As no algal inhibition was observed, the 72 hour No Effect Loading Rate for the WAF (LE₅₀) for the notified polymer was >1000 mg/L and the polymer is thus considered to be non-toxic to algae up to the limit of its water solubility. However, it should be noted that *S. subspicatus* is not a particularly sensitive algal test organism and other species, such as *Selenastrum capricornutum*, may respond to toxic effects caused by the notified polymer in a more marked fashion (Lewis, 1990).

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

The environmental hazard from the notified polymer is considered to be low provided that it is used as indicated, and that disposal of waste oil follows approved practices. Apart from transport accidents or accidental spills or leaks, limited release of the notified polymer is expected as a result of lubricant formulation and transfer to engine crankcases, and the waste generated would either be incinerated or placed into landfill. However, as a component of passenger vehicle engine lubricants, the potential exists for the notified polymer to be inappropriately released to the environment through disposal of waste engine oil by DIY automobile enthusiasts e.g. used for weed control, tipped in landfill, tipped into stormwater drains, painting fences etc. As no information was provided on the market share of the notified polymer in the lubricants market and the total amount of notified polymer used as an additive in passenger vehicle lubricants, the worst case was assumed, with 14% of the notified polymer sold to DIY enthusiasts. Up to 7.7 tonnes of the notified polymer may be released inappropriately to the environment by DIY users and this material could end up in the water or soil compartments. In addition, up to 1 000 kg of the polymer could be sent to landfill from the disposal of used containers and 500 kg could be released to soils from the leakage of seals and gaskets. Overall, up to 9.2 tonnes per annum of the polymer may be released to the environment.

If deposited on soil or into landfill, the notified polymer will be immobilised through adsorption onto soil particles, while if released into waterways it would become associated with organic matter and sediments. The notified polymer is not readily biodegradable, but in landfill it would be expected to slowly degrade through biological and abiotic processes. Incineration of waste oil containing the notified polymer would destroy the substance with evolution of water vapour and oxides of carbon and magnesium compounds that would be assimilated with the ash. Sludges from waste treatment plants or oil recycling facilities could also be incinerated. In the event of release into the water compartment or inappropriate disposal, the polymer is likely to become associated with suspended organic material, and eventually be incorporated into sediments.

Ecotoxicity test results indicate that the 96 hour Lethal Loading Rate for the Water Accommodating Fraction (WAF) of the polymer is >1000 mg/L for fish, and the 72 hour No Effect Loading Rate for the WAF for algae is >1000 mg/L. Therefore, the polymer may be regarded as non toxic to both fish and algae up to the limit of its water solubility. It may be concluded that despite some inappropriate disposal, levels in water are unlikely to reach those presenting a hazard to aquatic organisms.

Overall, the environmental risk presented by the introduction of the notified polymer is predicted to be low.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

Z-43 is of very low acute oral toxicity. A product containing Z-43 was a slight skin irritant and a slight to moderate eye irritant. The notified polymer has a NAMW greater than 1000 which is expected to preclude absorption across biological membranes and any potential systemic effects. The levels of low molecular weight species and residual monomers will not render the polymer hazardous. Based on available (limited) information, Z-43 cannot be classified against the NOHSC *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 1999b). The notified polymer degrades thermally to emit toxic fumes, so there is some risk of acute health effects by inhalation when handling or disposing of previously heated oil. Respiratory protection may be required during these activities.

The notified polymer will be used in the presence of mineral oil, which may be slightly irritating to the skin in the short term and cause dermatitis after chronic exposure. Mineral oil mists may cause respiratory irritation at high concentrations and employers should ensure that the NOHSC exposure standard for mineral oil mist of 5 mg/m³ TWA (NOHSC, 1995) is not exceeded. Information on the MSDS indicates that dermatitis may occur after prolonged or repeated skin contact and that respiratory irritation may occur if mists or vapours are generated.

Occupational health and safety

Under normal working conditions, waterside, transport and storage workers are unlikely to be exposed to the notified polymer and the occupational health risk posed to these workers is considered very low.

Reformulation occurs in enclosed systems so that the potential for exposure is limited to dermal contact with residues in lines and on couplings and during clean up of any spills. Except in cases where there is a large spill, exposure would be expected to be low. Following blending, automatic filling of containers of oil should not result in exposure unless overfilling or spillage occurs. In any case, the concentration of the notified polymer in the final products is <5% and in the event of exposure, the health risk to the notified polymer would be low. Ventilation should be installed at the blending sites. The wearing of safety goggles would protect against splashes and any consequent eye irritation. Under routine working conditions, workers are expected to wear protective clothing, gloves and goggles.

End use of the formulated products may potentially result in frequent exposure if gloves are not employed, but the risk of adverse health effects is low given the likely low hazard and low concentration of the notified polymer. Gloves should be worn to minimise the risk of dermatitis through frequent skin contact. When workers enter into confined space, poorly ventilated areas or large spill clean-up sites, a disposable dust/mist mask is also recommended.

Public health

The potential for public exposure during transport, storage, formulation or from disposal is expected to be low. Exposure may result from the use of the product, and during home car maintenance. This is expected to result in limited dermal contact, with the potential for accidental ocular contact. At the concentration of the notified polymer in the formulated product, this is not expected to pose a significant hazard.

13. RECOMMENDATIONS

Control measures (for formulator/end-user)

OHS

Employers should implement the following engineering controls and safe work practices to minimise occupational exposure to Z-43:

- enclosure of mixing tanks during formulation to prevent exposure to aerosols
- local exhaust ventilation during transfer of notified polymer from drum to mixing tank.
- during transfer to mixing tank, avoid splashing and generation of aerosols
- workers using products containing the notified polymer should be instructed in their proper handling and use, including information about the additional risks posed by heat.

Employees should wear the following personal protective equipment to minimise occupational exposure to the notified polymer:

- chemical resistant gloves
- protective clothing
- eye protection.

Guidance in selection of personal protective equipment can be obtained from Australian, Australian/New Zealand or other approved standards.

A copy of the MSDS should be easily accessible to employees.

If products and mixtures containing the notified polymer are 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.

Atmospheric monitoring should be conducted during formulation of the notified polymer to ensure that no relevant exposure standards are exceeded.

14. MATERIAL SAFETY DATA SHEET

The MSDS for the notified polymer and a product containing the notified polymer were provided in a format consistent with the *National Code of Practice for the Preparation of Material Safety Data Sheets* (NOHSC, 1994).

These MSDS was provided by the applicant as part of the notification statement. The MSDS for the product containing the notified polymer is 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 polymer may be required. No other specific conditions are prescribed.

16. REFERENCES

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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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