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**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME
(NICNAS)**

FULL PUBLIC REPORT

Polymer in Z-60

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**Director
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FULL PUBLIC REPORT

Polymer in Z-60

1. APPLICANT AND NOTIFICATION DETAILS

APPLICANT(S)

Lubrizol International, Inc. (ABN: 002 747 944)
28 River Street
Silverwater NSW 2128

NOTIFICATION CATEGORY

Limited: Polymer with NAMW ≥ 1000 (greater than 1 tonne per year).

EXEMPT INFORMATION (SECTION 75 OF THE ACT)

Chemical identity
Molecular Weight
Polymer Constituents
Residual Monomers/Impurities
Purity
Use Details
Import Volume

VARIATION OF DATA REQUIREMENTS (SECTION 24 OF THE ACT)

Variation to the schedule of data requirements is claimed as follows:

Particle size distribution
Melting point
Flammability
Hydrolysis as a function of pH
Adsorption/desorption
Dissociation constant

PREVIOUS NOTIFICATION IN AUSTRALIA BY APPLICANT(S)

No

NOTIFICATION IN OTHER COUNTRIES

Canada, Japan, Korea, United States (current notifications).

2. IDENTITY OF CHEMICAL

MARKETING NAME(S)

Z-60 (solution containing the notified polymer)

SPECTRAL DATA

METHOD	GPC, IR, UV, NMR
Remarks	Reference spectra were provided.

METHODS OF DETECTION AND DETERMINATION

Remarks	Spectral data was consistent with the expected structure of the polymer.
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3. COMPOSITION

DEGREE OF PURITY

> 99%

NON HAZARDOUS IMPURITIES/RESIDUAL MONOMERS (>1% by weight)

None

ADDITIVES/ADJUVANTS

None

DEGRADATION PRODUCTS

None under normal conditions of use. Thermal decomposition products may include aldehydes and oxides of carbon and nitrogen.

LOSS OF MONOMERS, OTHER REACTANTS, ADDITIVES, IMPURITIES

None known

4. INTRODUCTION AND USE INFORMATION

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

The notified polymer will be imported as part of a lubricant additive product.

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

<i>Year</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>
<i>Tonnes</i>	3-10	30-100	100-300	100-300	100-300

USE

Additive for diesel lubricants.

5. PROCESS AND RELEASE INFORMATION

5.1. Distribution, transport and storage

PORT OF ENTRY

Sydney

IDENTITY OF MANUFACTURER/RECIPIENTS

Notifier's storage site:

28 River Street

Silverwater NSW 2128

TRANSPORTATION AND PACKAGING

The lubricant additive product containing the notified polymer at 12-15% will be imported in 20 tonne isotainers, 1250 L intermediate bulk containers (IBCs) or 205 L drums and transferred by road to the notifier's warehouse. From there they will be transported to the formulation sites of customers for blending into lubricants, which will be distributed to industrial customers and retail outlets.

5.2. Operation description

The notified polymer will be imported as 12-15% of a lubricant additive product. At customer lubricant blending facilities, typically located at diesel refineries, the additive product will be mixed with oil and possibly other additives to form the final diesel lubricant, containing approximately 2-3% of the notified polymer. During end-use in vehicle maintenance, the lubricant will be added to engines of road vehicles, primarily trucks. From time to time the used lubricant will be drained from the engines and packaged for recycling or disposal.

5.3. Occupational exposure

Number and Category of Workers

<i>Category of Worker</i>	<i>Number</i>	<i>Exposure Duration</i>	<i>Exposure Frequency</i>
Transport and storage workers	8	6 h /day	20 days /year
Formulators of diesel lubricant	2/site	6 h /day	20 days / year
Laboratory staff	1-2/site	0.5 h / day	20 days/year
Specialist automotive mechanics	1000	2 h /day	200 days /year
Oil recyclers	100	1 h/day	100 days/year

Exposure Details

Transport and storage

The potential exposure of workers during transport and storage is low, as the additive product and diesel lubricant will be in closed containers. Exposure is possible in the case of accidental breaching of the packaging.

Formulation of diesel lubricant

Blending of the additive product with oil to form diesel lubricant will take place at a small number of facilities, using closed processes and a high degree of automation. Residues of the additive product remaining in transport containers will be flushed out with diluent oil and added to the diesel lubricant. Sampling and testing will be carried out by laboratory staff. Personal protective equipment (PPE) such as gloves and eye protection will be worn during formulation. Engineering controls include automated transfer of materials and exhaust ventilation where vapour or aerosols are likely to be generated. Workers at the blending plants are potentially exposed to additive packages containing 12-15% of the notified polymer and diesel lubricant containing 2-3%.

Filling and replacing lubricant in engines

End-use of diesel lubricant containing 2-3% of the notified polymer is likely to occur at a large number of automotive workshops throughout Australia. Exposure may occur during transfer of lubricant to smaller containers, addition to engines, or draining spent lubricant from engines and packing for recycling or disposal. Exposure is likely to be through accidental dermal or ocular contact. Varied degrees of PPE may or may not be worn.

Recycling of diesel lubricant

Workers at oil recycling facilities may also be incidentally exposed to diesel lubricant containing the notified polymer at 2-3% or at lower concentrations in mixed oils.

5.4. Release

RELEASE OF CHEMICAL AT SITE

Since the notified polymer will not be manufactured locally, there will be no environmental exposure associated with this process in Australia. The losses during transportation, storage and handling and during the blending process and use in industrial assembly plants are minimised by the safety practices, use of sealed delivery systems and automated and computer controlled processes.

RELEASE OF CHEMICAL FROM USE

Each year, about 581 million litres of lubricating oil is sold in Australia, and about 303 million litres of waste oil is generated. The remainder is consumed during engine operation, unrecoverable or unaccounted for (Meinhardt, 2002). The greatest potential for environmental release of the notified chemical is through disposal of oil product wastes. A survey by the Australian Institute of Petroleum (AIP 1995) indicates that of the annual sales of automotive engine oils in Australia, some 60% are potentially recoverable (i.e. not burnt in the engines during use). This report also indicates that around 86% of oil changes take place in specialised automotive service centres, where old oil drained from crankcases is disposed of responsibly (e.g. oil recycling or incineration). Assuming this is the case, negligible release of the notified chemical should result from these professional activities. The remaining 14% of oil (up to 42.00 tonnes of the estimated maximum 300 tonnes of notified chemical imported per annum) is removed by "do it yourself" (DIY) enthusiasts. In these cases, some of the used oil would be either incinerated, left at transfer stations where it is again likely to be recycled, or deposited into landfill. Meinhardt (2002) estimated that DIY activities account for 7-10% of the unaccounted used oil.

5.5. Disposal

According to a survey tracing the fate of used lubricating oil in Australia (Snow, 1997), only

approximately 20% of used oil removed by DIY enthusiasts is collected for recycling, approximately 25% is buried or disposed of in landfill, 5% is disposed of into stormwater drains and the remaining 50% is used in treating fence posts, killing grass and weeds or disposed of in other ways. In a worst case scenario involving the 14% of used oil removed by DIY enthusiasts, the notified chemical could be collected for recycling (≤ 8400 kg/y), buried or disposed of in landfill (≤ 10500 kg/y), disposed of in stormwater drains (≤ 2100 kg/y) and used in treating fence posts, to kill weeds or disposed of in other ways (≤ 21000 kg/y). A proportion of the latter may potentially be disposed of to sewer. Therefore, about 0.7% (up to 2100 kg/y) of the total import volume of the notified chemical could potentially enter the aquatic environment via disposal into the stormwater system. In addition to this, considering the unknown fate of some of the oil used by DIY operators, up to 7% (i.e. 50% of 14%; < 21000 kg/y) may also be sent to the sewer for disposal. Since the use of the lubricating oils will occur throughout Australia, all releases resulting from use or disposal of used oil will be very diffuse, and release of the notified material in neat concentrations is very unlikely except as a result of transport accidents.

Spent packaging material and container residues are disposed of to landfill or incinerated. Emptied drums are likely to be cleaned with mineral oil and reconditioned, with oily waste potentially containing 2% of the formulation reused in subsequent batches or concentrated and incinerated. Emptied drums may also be collected for metal recycling. Assuming ~2% of the imported formulation remains in emptied drums, an estimated maximum quantity of ≤ 6000 kg/y will be generated as waste by this route based on a total annual import volume of 300 t/y of the notified polymer.

5.6. Public exposure

The public is not expected to come into contact with the notified polymer during import, transport or formulation of diesel lubricants, except in the case of accidental spillage during transport. Addition of diesel lubricants to engines and replacement of spent lubricant is primarily expected to be carried out by workers, however there may be some use by the public eg through sale of lubricant to the DIY market. This would be a minor use because most diesel vehicles have industrial or commercial use. Dermal contact would be the most likely route of exposure to the public, through spills or splashes during addition or removal of the lubricants, or contact with automotive components that had been in contact with lubricant. Accidental ocular exposure could also occur. The extent of exposure would be reduced by the low concentration (2-3%) of the notified polymer in lubricants. Inhalation exposure is not expected as vapours or aerosols would not be present when the lubricant is handled at room temperature.

6. PHYSICAL AND CHEMICAL PROPERTIES

Appearance at 20°C and 101.3 kPa Dark yellow viscous liquid

Melting Point/Freezing Point 10°C

METHOD	OECD TG 102 Melting Point/Melting Range. EC Directive 92/69/EEC A.1 Melting/Freezing Temperature.
Remarks	Pour point method, also meets BS 2000: Part 15.
TEST FACILITY	Safepharm (2005a)

Boiling Point Decomposes from 193°C at 101.22 kPa

METHOD	OECD TG 103 Boiling Point. EC Directive 92/69/EEC A.2 Boiling Temperature.
Remarks	Differential scanning calorimetry (DSC) method was used. As the material decomposed, no value for the boiling temperature could be determined experimentally. The boiling temperature was calculated to be greater than 360°C, using an adaptation of the Brown and Stein method.
TEST FACILITY	Safepharm (2005a)

Density 856 kg/m³ at 20°C

METHOD	OECD TG 109 Density of Liquids and Solids.
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Remarks	EC Directive 92/69/EEC A.3 Relative Density.
TEST FACILITY	Pycnometer method. Safepharm (2005a)
Vapour Pressure	1.1×10^{-6} kPa at 25°C
METHOD	OECD TG 104 Vapour Pressure. EC Directive 92/69/EEC A.4 Vapour Pressure.
Remarks	Vapour pressure balance method used, with linear regression analysis used to calculate the vapour pressure.
TEST FACILITY	Safepharm (2005b)
Water Solubility	$< 7.6 \times 10^{-5}$ g/L at 20°C
METHOD	OECD TG 105 Water Solubility. EC Directive 92/69/EEC A.6 Water Solubility.
Remarks	Flask Method. The water was adjusted to pH 7 for both the preliminary and main tests. Analysis was carried out by high performance liquid chromatography (HPLC). No test material was detected in any sample solution on analysis and therefore a limit value has been reported. The preliminary water solubility test indicated that the column elution method should have been performed as the solubility was less than 1×10^{-2} g/L. However due to the physical nature of the test material it was not possible to use this method.
TEST FACILITY	Safepharm (2005a)
Hydrolysis as a Function of pH	Not performed
Remarks	This test was not performed because of the low water solubility of the notified polymer.
Partition Coefficient (n-octanol/water)	$\log P_{ow} > 9.4$ at 20°C
METHOD	OECD TG 117 Partition Coefficient (n-octanol/water). EC Directive 92/69/EEC A.8 Partition Coefficient.
Remarks	HPLC Method. The notified polymer eluted well beyond the least polar reference material (1-phenyltridecane).
TEST FACILITY	Safepharm (2005a)
Adsorption/Desorption	Not performed.
Remarks	Testing was not performed as the notified polymer has very limited water solubility and high molecular weight. The $\log K_{oc}$ is expected to be > 4 and it is therefore expected to have strong binding potential for organic carbon in soils, sediments or sludge in wastewater treatment plants. It is not likely to be found in dissolved phase in surface water and the potential to migrate with groundwater is very low.
Dissociation Constant	Not determined
Remarks	The notified polymer is not expected to dissociate as it has no ionisable groups.
Particle Size	Not determined
Remarks	Not applicable as the notified polymer is a liquid.
Flash Point	$199 \pm 2^\circ\text{C}$ at 101.3 kPa
METHOD	EC Directive 92/69/EEC A.9 Flash Point.

Remarks	Closed cup method.
TEST FACILITY	Safepharm (2005b)

Flammability Limits	Not determined.
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Remarks	The notified polymer has a low vapour pressure and is not expected to volatilise to a significant extent.
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Autoignition Temperature	$356 \pm 5^{\circ}\text{C}$
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METHOD	92/69/EEC A.15 Auto-Ignition Temperature (Liquids and Gases).
Remarks	A flask heater was used. Grey fumes were observed at temperatures below the autoignition temperature.
TEST FACILITY	Safepharm (2005b)

Explosive Properties	Not expected to be explosive
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Remarks	The notified polymer contains a small proportion of a chemical group that may be explosive under certain conditions. However the results of Modulated Differential Scanning Calorimetry (MDSC) and high resolution Thermogravimetric Analysis (TGA) indicate that the material is not likely to be explosive (Lubrizol, 2004b).
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Reactivity

Remarks	Stable up to approximately 200°C.
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7. TOXICOLOGICAL INVESTIGATIONS

No toxicological test reports were submitted. Based on the known toxicity of components or similar compounds, the notifier has advised that the oral toxicity of the notified polymer is likely to be > 5000 mg/kg in rats and dermal toxicity > 2000 mg/kg in rabbits. It is not expected to cause eye irritation, however may cause skin irritation. It is not expected to be a skin or respiratory sensitiser. Respiratory irritation may occur if the polymer is misted or vapours generated by heating.

8. ENVIRONMENT

8.1. Environmental fate

No environmental fate data were submitted. Based on the characteristics of related chemicals, the notifier has advised that the notified polymer is likely to have moderate biodegradation properties and will not bioconcentrate. The ultimate fate of the notified polymer depends upon its disposal method. If burnt, it will decompose to form simple compounds containing carbon, oxygen and nitrogen.

8.2. Ecotoxicological investigations

No ecotoxicity data were submitted. Based on similar chemicals, the notified polymer is likely to have an acute EC50 of > 1000 mg/L for bacteria and freshwater invertebrates, and an acute LC50 of > 1000 mg/L for freshwater fish.

9. RISK ASSESSMENT

9.1. Environment

9.1.1. Environment – exposure assessment

The main environmental exposure is expected to result from inappropriate disposal of waste lubricant product by DIY enthusiasts, which will be, however, widespread across Australia. Most of the improperly released notified polymer due to DIY activities is likely to become associated with soils or sediments, as will the notified polymer released to landfill including as container residues. Incineration of waste polymer will generate water vapour and oxides of carbon.

It is difficult to estimate the Predicted Environmental Concentration (PEC) of the notified polymer released into the aquatic environment via stormwater drains. However, a worst case PEC might be estimated if it is assumed that all of the 1% of the imported notified substance (i.e. 1000 kg) expected to be released into the stormwater drains in a single metropolitan area with a geographical footprint of 500 square kilometres, an average annual rainfall of 50 cm. With a maximum annual release into this localised stormwater system of 10 kg and the annual volume of water drained from this region estimated to be approximately $250 \times 10^6 \text{ m}^3$, the resultant PEC is approximately 4 µg/L. It should be stressed that this result is very much a worst case scenario, and that in reality releases of the polymer would be very much more diffuse than indicated here, and also at significantly reduced levels. Further, given that the lubricant oil is designed for use in specialised diesel engines, most oil changes will not be done by DIY enthusiasts.

9.1.2. Environment – effects assessment

No ecotoxicity data were submitted. However the notifier has advised that tests of similar chemicals have shown acute EC50 and LC50 values of > 1000 mg/L in aquatic organisms. It is noted that poly non-ionic polymers of NAMW > 1000 are of low concern to the aquatic environment.

9.1.3. Environment – risk characterisation

It is not possible to determine a predicted no effect concentration (PNEC) for aquatic ecosystems in order to assess the risk to aquatic organisms as no ecotoxicity data were provided. However, the use pattern of the notified polymer will result in limited and widespread

exposure to the aquatic environment throughout Australia. Further, the notified polymer is non-ionic and therefore, is not likely to be toxic to the aquatic environment. While it can be assumed that the notified chemical will not degrade readily, it is likely to undergo slow biodegradation under environmental conditions.

The amount released to stormwater drains (less than 1% of the import volume) and enters the aquatic compartment could be expected to become strongly associated with suspended organic material, settle out into the sediments and slowly degrade due to the biotic and abiotic processes. There is potential for the notified polymer to bioaccumulate due to its expected high log P_{ow} and the low water solubility but they will be limited due to the high molecular weight, and the low and diffuse release to the aquatic environment Australia wide.

9.2. Human health

9.2.1. Occupational health and safety – exposure assessment

Exposure to the notified polymer is likely to be low during transport and storage, and during formulation would be limited by the high level of engineering controls and PPE in place. Exposure to workers may occur during end-use of lubricants containing the notified polymer at 2-3% (filling and draining engines) at many different facilities throughout Australia. The main route of exposure would be dermal, and the extent of exposure will be dependent on safe work practices and use of appropriate PPE. Workers would typically wear overalls but not necessarily wear gloves or eye protection. Similar potential for worker exposure exists during the recycling or disposal of used lubricant.

9.2.2. Public health – exposure assessment

The public could have intermittent dermal and/or ocular exposure to the notified polymer through DIY use of diesel lubricant containing it at 2-3%. DIY end-users are not likely to wear PPE such as gloves while using the engine oil. It is expected that the majority of the notified polymer would be in lubricant sold to industrial users rather than to the public.

The public may also be exposed to the notified polymer from spills of lubricant on roads, parking areas and soil. However exposure will be limited by the dispersive use and low concentration in the lubricants.

9.2.3. Human health – effects assessment

No toxicological data have been provided for the notified polymer and therefore the substance cannot be classified in accordance with the NOHSC Approved Criteria for Classifying Hazardous Substances (NOHSC, 2004). However the notifier has classified it as hazardous

Based on the information supplied by the notifier on the effects of components or similar chemicals, the notified polymer can be classified as a skin irritant (R38 – Irritating to skin).

9.2.4. Occupational health and safety – risk characterisation

The notified polymer has a NAMW > 1000 with very low levels of residual monomers or low molecular weight species. Therefore dermal absorption is likely to be low. Based on analogue data, it is a potential skin irritant. However it will be introduced into Australia at 12-15%, below the cut-off concentration of 20%, and will be present at an even lower concentration in lubricants (2-3%) for diesel engines.

Exposure to additive products containing 12-15% of the notified polymer is expected to be low during transport, storage and formulation, due to the enclosed nature of the packages and tanks, and the controls in place during formulation.

During end-use of diesel lubricant containing 2-3% of the notified polymer, workers carrying out maintenance of diesel vehicles or recycling or disposing of lubricant may be exposed to the notified polymer, primarily through skin contact. The extent of exposure will depend on the nature of the processes carried out, and the controls in place. Although it is expected that the level of controls is likely to be varied and that some exposure will occur, the risk of health

effects will be limited by the low concentration of the polymer in lubricant. The known health effect of the notified polymer – skin irritation – is likely to be significantly reduced at this degree of dilution.

Overall the risk to workers is considered to be low.

9.2.5. Public health – risk characterisation

The notified polymer has a NAMW > 1000 with very low levels of residual monomers or low molecular weight species. Therefore dermal absorption is likely to be low. Based on analogue data, it is a potential skin irritant. However the public would have contact with the polymer at low (2-3%) concentrations, considerably below the cut-off concentration for irritation of 20%.

Some exposure of the public to the notified polymer could occur through DIY use of diesel lubricants, where PPE may not be used. Dermal and possibly ocular exposure may occur during addition of lubricant to engines or replacement of spent lubricant. A minor source of public exposure would be inadvertent contact with spilt lubricant in the general environment. Exposure would be reduced by the low concentration of notified polymer in lubricant.

Based on the significantly reduced irritant properties expected from low concentrations of the notified polymer, and the likelihood of only intermittent exposure, the risk to the public is considered low.

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

10.1. Hazard classification

No toxicological data have been provided for the notified chemical and therefore the substance cannot be classified in accordance with the NOHSC Approved Criteria for Classifying Hazardous Substances. However, based on the information supplied on classification of similar chemicals, the following classification and labelling details should apply:

R38 Irritating to skin

10.2. Environmental risk assessment

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

10.3. Human health risk assessment

10.3.1. Occupational health and safety

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

10.3.2. Public health

There is No Significant Concern to public health when used at low concentration as an ingredient of diesel lubricants.

11. MATERIAL SAFETY DATA SHEET

11.1. Material Safety Data Sheet

The MSDS of the notified chemical in solution and a product containing the notified chemical provided by the notifier were in accordance with the NOHSC National Code of Practice for the Preparation of Material Safety Data Sheets (NOHSC 2003). They are published here as a matter of public record. The accuracy of the information on the MSDS remains the responsibility of the applicant.

11.2. Label

The label for a product containing the notified chemical provided by the notifier was in accordance with the NOHSC *National Code of Practice for the Labelling of Workplace Substances* (NOHSC 1994). The accuracy of the information on the label remains the responsibility of the applicant.

12. RECOMMENDATIONS

REGULATORY CONTROLS

Hazard Classification and Labelling

- Use the following risk phrases for products/mixtures containing the notified chemical:
 - Conc \geq 20%: R38

CONTROL MEASURES

Occupational Health and Safety

- Employers should implement the following isolation and engineering controls to minimise occupational exposure to the notified chemical as introduced:
 - Where possible, automated processes should be used to reduce worker contact
 - Use closed systems for reformulation
- Employers should implement the following safe work practices to minimise occupational exposure during handling of the notified chemical as introduced and as diluted for use in diesel lubricant:
 - Minimise spills and drips during transfer operations
 - Clean up any spillages promptly
- Employers should ensure that the following personal protective equipment is used by workers to minimise occupational exposure to the notified chemical as introduced and as diluted for use in diesel lubricant:
 - Chemical resistant gloves
 - Protective clothing
 - Safety glasses or goggles

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

- A copy of the MSDS should be easily accessible to employees.
- If products and mixtures containing the notified chemical are classified as hazardous to health in accordance with the NOHSC *Approved Criteria for Classifying Hazardous Substances*, workplace practices and control procedures consistent with provisions of State and Territory hazardous substances legislation must be in operation.

Disposal

- The notified chemical should be disposed of by combustion or to secure landfill.

Emergency procedures

- Spills of the notified chemical should be handled by physical containment, collection and disposal by incineration

12.1. Secondary notification

The Director of Chemicals Notification and Assessment must be notified in writing within 28

days by the notifier, other importer or manufacturer:

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

The Director will then decide whether secondary notification is required.

No additional secondary notification conditions are stipulated.

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