

File No: LTD/1254

27 June 2006

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

**FULL PUBLIC REPORT**

**Polymer in OS207197 / Polymer in OS204957**

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## **FULL PUBLIC REPORT**

### **Polymer in OS207197 / Polymer in OS204957**

#### **1. APPLICANT AND NOTIFICATION DETAILS**

##### APPLICANT(S)

Lubrizol International Inc.(ABN 52 073 495 603)

28 River Street

Silverwater NSW 2128

##### NOTIFICATION CATEGORY

Limited: Polymer with NAMW  $\geq 1000$  (greater than 1 tonne per year).

##### EXEMPT INFORMATION (SECTION 75 OF THE ACT)

Data items and details claimed exempt from publication:

Chemical name, structural formula, molecular formula, molecular weight, spectral data, purity, import volume, weight percentage and ingredients, residual monomers/other reactants, low molecular weight polymers.

##### VARIATION OF DATA REQUIREMENTS (SECTION 24 OF THE ACT)

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

Melting point, boiling point, density, vapour pressure, water solubility, hydrolysis as a function of pH, partition coefficient, adsorption/desorption, flash point, flammability limits, autoignition temperature.

##### PREVIOUS NOTIFICATION IN AUSTRALIA BY APPLICANT(S)

None

##### NOTIFICATION IN OTHER COUNTRIES

Currently being notified in the United States, Canada and Korea.

#### **2. IDENTITY OF CHEMICAL**

##### MARKETING NAME(S)

OS207197 and OS204957 (50% polymer solution in mineral oil)

Z-62 (polymer)

##### METHODS OF DETECTION AND DETERMINATION

Remarks                      GPC, NMR, IR and UV reference spectra were provided.

#### **3. COMPOSITION**

##### DEGREE OF PURITY

>98%

##### HAZARDOUS IMPURITIES/RESIDUAL MONOMERS

All hazardous impurities and residual monomers are present at below the relevant cut offs for classification of the notified polymer solution as a hazardous substance.

##### DEGRADATION PRODUCTS

The notified polymer is not expected to depolymerise under normal conditions.

#### LOSS OF MONOMERS, OTHER REACTANTS, ADDITIVES, IMPURITIES

In normal use there will be no loss of monomers or reactants from the notified polymer.

## 4. INTRODUCTION AND USE INFORMATION

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

The notified polymer will be imported in isotainers or 55 gallon drums as a 50% solution in mineral oil. It will not be manufactured in Australia.

#### 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>	10-30	10-30	30-100	30-100	30-100

#### USE

The notified polymer acts as a viscosity modifier in automatic transmission fluids, gear oils and hydraulic fluids. At the customer sites it is blended with other components to form additive packages, in which the notified polymer would be < 20% concentration.

## 5. PROCESS AND RELEASE INFORMATION

### 5.1. Distribution, transport and storage

#### PORT OF ENTRY

Sydney

#### IDENTITY OF MANUFACTURER/RECIPIENTS

The notified polymer will not be manufactured in Australia, but may be reformulated at sites in Victoria, New South Wales or Queensland.

#### TRANSPORTATION AND PACKAGING

The isotainers (maximum size 1250 L) and 55 gallon drums containing the notified polymer solution (50%) will be unloaded at the dock and placed on trucks for transport to the customer sites. The blended additive package is expected to be transported in drums or tanker trucks.

### 5.2. Operation description

At the reformulation sites the isotainer or 55 gallon drum containing the notified polymer solution (50%) is connected by pipeline to the blend tank, where the notified polymer is blended with mineral oil and other additives such as friction modifiers, antiwear agents, dispersants, foam inhibitors and corrosion inhibitors. Diluent oil can be used to flush the isotainer or drum, and the flushings added to the blend or disposed of according to local regulations. Once blended the finished product containing the notified polymer (< 20%) is pumped back into drums or into a tanker truck for shipment to the end-use customer. These operations are expected to be carried out automatically, or semi-automatically in a closed system and in a well ventilated work area.

The blended products containing the notified polymer (< 20%) are used in auto manufacturing plants to fill new car parts. This is generally an automated process. The blended products may also be used in mechanical workshops if these oils/fluids require changing. Transfer may be manual or semi-automatic using pumping equipment.

### 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>
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Transport	8	6 hours/day	4 days/year
Reformulation	1-2	6-8 hours/day	10 days/year
End-use sites (auto manufacturers, machine shops)	2-4	6 hours/day	10-20 days/year

### *Exposure Details*

#### Transport and Storage

Transport and storage workers would only be exposed to the notified polymer in the event of a spill. The sealed containers used for transport minimise the likelihood of release or loss of the notified polymer in the case of an accident.

#### Reformulation

Dermal and ocular exposure may potentially occur during certain processes involving the notified polymer, such as during the opening of containers/drums and connecting pipe lines for the blending operation. However, exposure to significant amounts of the notified polymer is limited because of the automated or semi-automated processes, and the personal protective equipment (protective aprons, gloves, boots, face shield) worn by workers.

#### End-use sites

Dermal and ocular exposure to the blended products containing the notified polymer (< 20%) may occur during the changing of automotive lubricants in mechanic shops. Protective equipment may not be worn in these workplaces. Dermal and ocular exposure may also occur in auto manufacturing plants during maintenance operations. Exposure to the notified polymer by workers at the end-use site is expected to be infrequent and minimal.

## **5.4. Release**

### **RELEASE OF CHEMICAL AT SITE**

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

Blending is conducted using automated, closed, non-dispersive systems. Drips and spills may potentially occur during manual handling (i.e. connection and disconnection of hose/pump lines); however, environmental release is not expected due to onsite physical containment. After blending, the finished oil is automatically discharged into steel drums. Blending tanks are typically cleaned with lube oil, which will be recycled during subsequent blending or collected for incineration at authorised facilities. Less than 1% of the notified polymer is estimated to enter waste streams at the blending process, which are subsequently incinerated. No aqueous wastes are generated during the blending process.

### **RELEASE OF CHEMICAL FROM USE**

The finished lubricants for use in gears, hydraulics and automatic transmission products will be distributed to customers throughout Australia in isotainers or 55 gallon drums. There may be some accidental losses (e.g. drips) when lubricant is added to vehicle engines, which may be about every 5,000-10,000 kilometres for passenger car petrol engines. These are expected to be minor spills that which would be mostly left on the ground or cleaned up and disposed of to landfill. The amount disposed of in this way should be less than 1% of the final lubricant. In the closed system of an engine, there is no expected release of the notified polymer to the environment under normal conditions of use, except for unintended oil leaks, which would mostly drip to road and pavement surfaces. Spills/leaks from engines may potentially comprise 1% of the notified polymer. Since the use of the lubricating oils will occur throughout Australia, any releases from use of oils containing the notified polymer would be diffuse.

### 5.5. Disposal

Each year, about 581 million litres of lubricating oil is sold in Australia, and about 303 million litres of waste oil is generated. The remainder is consumed during engine operation, unrecoverable or unaccounted for (Meinhardt, 2002). The greatest potential for environmental release of the notified polymer 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 polymer should result from these professional activities. The remaining 14% of oil (up to 14.0 tonnes of the estimated maximum 100 tonnes of notified polymer 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.

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 polymer could be collected for recycling ( $\leq 2800$  kg/y), buried or disposed of in landfill ( $\leq 3500$  kg/y), disposed of in stormwater drains ( $\leq 700$  kg/y) and used in treating fence posts, to kill weeds or disposed of in other ways ( $\leq 7000$  kg/y). A proportion of the latter may potentially be disposed of to sewer. Therefore, about 0.7% (up to 700 kg/y) of the total import volume of the notified polymer 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%;  $< 7000$  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 polymer 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  $\leq 2000$  kg/y will be generated as waste by this route based on a total annual import volume of  $< 100$  t/y of the notified polymer.

### 5.6. Public exposure

The public may be exposed to the blended products containing the notified polymer ( $< 20\%$ ) through operations such as changing gear oil, transmission fluid or hydraulic fluid. However this is unlikely, as the blended products are not anticipated to be sold to the general public. The route of exposure would be largely dermal, however some ocular exposure may also occur. The frequency of exposure would be intermittent and not widespread, as the majority of these operations would be carried out by professional mechanics rather than the public.

## 6. PHYSICAL AND CHEMICAL PROPERTIES

The notified polymer is introduced in solution. The following information has been provided for OS207197 (50% polymer in mineral oil).

**Appearance at 20°C and 101.3 kPa**                      Pale amber coloured viscous liquid.

**Melting Point/Freezing Point**                      7°C

METHOD	OECD TG 102 Melting Point/Melting Range.
Remarks	The test substance is liquid at room temperature. The value given is the pour point of the liquid. Statement of GLP.
TEST FACILITY	SafePharm Laboratories (2005a)

<b>Boiling Point</b>		353°C at 101.84 to 102.14 kPa
METHOD	OECD TG 103 Boiling Point.	
Remarks	Differential scanning calorimetry was used, with the onset of partial boiling of the test substance being approximated by an extrapolated onset of the endotherm. Statement of GLP.	
TEST FACILITY	SafePharm Laboratories (2005a)	
<b>Density</b>		881 kg/m <sup>3</sup> at 20°C
METHOD	OECD TG 109 Density of Liquids and Solids.	
Remarks	Density was measured using a pycnometer, the reference liquid was distilled water. Statement of GLP.	
TEST FACILITY	SafePharm Laboratories (2005a)	
<b>Vapour Pressure</b>		Not determined
Remarks	The notified polymer is expected to have a low vapour pressure based on the high molecular weight.	
<b>Water Solubility</b>		Less than $8 \times 10^{-4}$ g/L at 20°C
METHOD	Flask method based on OECD TG 105 Water Solubility.	
Remarks	The water solubility was estimated by visual estimation of a flask method test. 3 samples were prepared by adding 0.8, 1.1 and 1.5 mg of test substance to 1000 mL glass double-distilled water. The samples were shaken at 30°C for 72 hours, and then allowed to equilibrate at 24°C for 24 hours prior to being assessed visually. Water solubility was also estimated using QSAR as being significantly less than $1 \times 10^{-9}$ g/L. Statement of GLP.	
TEST FACILITY	SafePharm Laboratories (2005a)	
<b>Hydrolysis as a Function of pH</b>		Not determined.
Remarks	The notified polymer is not expected to hydrolyse based on its chemical composition and very low water solubility.	
<b>Partition Coefficient (n-octanol/water)</b>		log P <sub>OW</sub> > 4.38 at 20°C
METHOD	Visual assessment and computer-based atom fragment contribution model	
Remarks	Estimation by HPLC or Shake-Flask was considered not applicable due to the high molecular weight of the test material and that the test material was a mixture. The P <sub>OW</sub> was estimated by dividing the visually estimated solubility of the test material in n-octanol, by the visually estimated solubility of the test material in water, thus $217 \text{ g/L} \div < 9.00 \times 10^{-3} \text{ g/L} = > 2.41 \times 10^4$ .	
	Estimation by computer-based atom fragment contribution model (KOWWIN v1.67) on small fragments predicted a log P <sub>OW</sub> = 9.88. Given the high molecular weight, and the inability of the model to predict for high molecular weight fragments, it was considered that the estimate should be quoted as being much higher than log P <sub>OW</sub> >> 9.88.	
TEST FACILITY	SafePharm Laboratories (2006a)	
<b>Adsorption/Desorption</b>		log K <sub>oc</sub> >> 7.17 at 20°C
METHOD	Computer-based atom fragment contribution model	
Remarks	Determination for adsorption coefficient was not possible by standard experimental methods because the potentially cationic group present in the test substance would be in its ionised form at the test pH and this would have adversely interacted with the stationary phase of the column, and because reverse-	



phase HPLC is not applicable to material that are non-aqueous soluble with an estimated Mw of greater than 2000.

Estimation by computer-based atom fragment contribution model (PCKOCWIN v1.66) on small fragments predicted a  $\log K_{OC} = 7.17$ . Given the high molecular weight, and the inability of the model to predict for high molecular weight fragments), it was considered that the estimate should be quoted as being much higher than  $\log K_{OC} \gg 7.17$ .

TEST FACILITY SafePharm Laboratories (2006a)

**Dissociation Constant** Not determined.

Remarks While the notified polymer contains functional groups which are anticipated to be ionised in the environmental pH range of 4-9, this is not expected to be significant given the low water solubility of the notified polymer, which also makes the conduct of this test impractical.

**Particle Size** Not applicable.

Remarks The notified polymer is a liquid.

**Flash Point**  $178 \pm 2^\circ\text{C}$  at 101.3 kPa

METHOD EC Directive 92/69/EEC A.9 Flash Point.  
Remarks Determined using a closed cup equilibrium method. Statement of GLP. The test substance is classified as a C2 combustible liquid according to NOHSC *National Code of Practice for the Storage and Handling of Workplace Dangerous Goods* (NOHSC 2001).

TEST FACILITY SafePharm Laboratories (2006b)

**Flammability Limits** Not determined.

Remarks Based on the flash point the test substance is not classified as flammable according to the Australian Dangerous Goods Classification (FORS, 1998).

**Autoignition Temperature**  $366 \pm 5^\circ\text{C}$

METHOD 92/69/EEC A.15 Auto-Ignition Temperature (Liquids and Gases).  
Remarks Statement of GLP.  
TEST FACILITY SafePharm Laboratories (2005b)

**Explosive Properties**

Remarks Expected to be stable under normal conditions of use. The notified polymer contains no functional groups that would infer explosive properties.

**Reactivity**

Remarks The notified polymer is not an oxidizer and is considered to be stable and non-reactive.

## 7. TOXICOLOGICAL INVESTIGATIONS

No toxicity data were submitted.

## 8. ENVIRONMENT

### 8.1. Environmental fate

No environmental fate data were submitted.

### 8.2. Ecotoxicological investigations

No ecotoxicity data were submitted. However, the MSDS for the notified polymer states that for similar products the acute LC50 for freshwater fish toxicity is in the range of 100 – 1000 mg/L, and that the acute EC50 for bacteria is > 1000 ppm, based on similar material.

## 9. RISK ASSESSMENT

### 9.1. Environment

#### 9.1.1. Environment – exposure assessment

The notified polymer has a very low water solubility at  $< 8 \times 10^{-4}$  g/L. With  $\log P_{ow} > 4.38$  (visually estimated), the notified chemical is expected to partition with organic matter, suspended particulates and accumulate in sediments and soils in the environment. In soils, the notified polymer is expected to be immobile. While no biodegradation data is available for the notified polymer, it is expected that any notified polymer disposed of to soil would biodegrade over time within a landfill or field environment.

##### Predicted Environmental Concentrations (PEC)

###### *Stormwater*

Spills/leaks from engines may comprise 1% of the oil formulation. These may enter the soil and stormwater compartments over a diffuse area based on the widespread use pattern along with material disposed of improperly by DIY enthusiasts. While it is not possible to accurately calculate a Predicted Environmental Concentration given the very diffuse release pattern, the resultant PEC it expected to be very low and therefore not significant.

#### 9.1.2. Environment – effects assessment

It is not possible to calculate a Predicted No-Effect Concentration as no ecotoxicity data were provided. Based on the presence of a functionality which is potentially cationic within the environmental pH range, significant toxicity to aquatic species would be expected. However, given the low water solubility and the relatively high molecular weight, it is anticipated that the notified polymer would have low aquatic exposure.

#### 9.1.3. Environment – risk characterisation

As neither a PEC nor PNEC could be calculated, it is not possible to determine the Risk Quotient (Q). However, given the low water solubility and expected diffuse release patterns, the notified polymer is not expected to pose an unacceptable risk to the aquatic environment.

### 9.2. Human health

#### 9.2.1. Occupational health and safety – exposure assessment

##### *Transport and storage*

During transport and storage, workers are unlikely to be exposed to the notified polymer except when packaging is accidentally breached.

##### *Reformulation*

Exposure to the notified polymer solution (50%) during the reformulation process is expected to be low due to the automated or semi-automated processes and the wearing of PPE by workers.

##### *End-use*

Exposure to the notified polymer in lubricant oils (< 20%) is expected to be infrequent and

minimal in mechanic shops and auto manufacturing plants. However, personal protective equipment may not be worn in some of these workplaces, therefore increasing the dermal and ocular exposure potential.

#### **9.2.2. Public health – exposure assessment**

Public exposure to the notified polymer is expected to be low as the blended products containing the polymer are not anticipated to be sold to the public; and the operations through which exposure could occur (such as changing gear oil, transmission fluid or hydraulic fluid) are primarily carried out by professional mechanics rather than the public.

#### **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).

The polymer contains a functional group which may infer irritancy. The notified polymer is of a high molecular weight (> 10000 daltons), with low levels of low molecular weight species, making it unlikely to cross biological membranes and thus it is expected to have a low order of toxicity.

#### **9.2.4. Occupational health and safety – risk characterisation**

Due to the expected low exposure of workers and the expected low toxicity of the polymer, the risk of adverse effects is considered to be low. The polymer does however have the potential to be an irritant and so personal protective equipment, such as protective clothing, impervious gloves and safety glasses, should be worn during operations where dermal or ocular exposure to the notified polymer is possible.

#### **9.2.5. Public health – risk characterisation**

Due to the expected low exposure of the public, as well as the expected low toxicity of the polymer, the risk to public health is considered to be 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 polymer and therefore the substance cannot be classified in accordance with the NOHSC *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 2004)

and

Classification of notified polymer using the Globally Harmonised System for the Classification and Labelling of Chemicals (GHS) (United Nations 2003) cannot be undertaken as no toxicological or ecotoxicological data were available. This system is not mandated in Australia and carries no legal status but is presented for information purposes.

#### **10.2. Environmental risk assessment**

The notified polymer 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 the notified polymer is introduced and used as described.

### 11. MATERIAL SAFETY DATA SHEET

#### 11.1. Material Safety Data Sheet

The MSDS of the notified polymer solution and products 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 the notified polymer solution and products containing the notified chemical provided by the notifier were 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

#### CONTROL MEASURES

##### Occupational Health and Safety

- 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 blended products:
  - Avoid skin and eye contact
- 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 blended products:
  - Chemical resistant gloves
  - Protective clothing
  - Safety goggles

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

- The notified polymer as introduced should be handled consistent with provisions of State and Territory legislation regarding the Handling of Combustible and Flammable Liquids.
- 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 polymer should be disposed of by incineration or to secure landfill.

##### Storage

- The notified polymer as introduced should be stored consistent with provisions of State and Territory legislation regarding the Storage of Combustible and Flammable Liquids.

#### Emergency procedures

- Spills or accidental release of the notified polymer should be handled by physical containment, collection and subsequent safe disposal.

### 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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