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

FULL PUBLIC REPORT

Z-46

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| | |
|-----------------|--|
| Street Address: | 334 - 336 Illawarra Road MARRICKVILLE NSW 2204, AUSTRALIA. |
| Postal Address: | GPO Box 58, SYDNEY NSW 2001, AUSTRALIA. |
| TEL: | + 61 2 8577 8800 |
| FAX | + 61 2 9577 8888. |
| Website: | www.nicnas.gov.au |

**Director
Chemicals Notification and Assessment**

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FULL PUBLIC REPORT**Z-46****1. APPLICANT AND NOTIFICATION DETAILS**

APPLICANT(S)

Lubrizol International Inc. (ABN 52 073 495 603)

28 River Street

Silverwater NSW 2118

NOTIFICATION CATEGORY

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

EXEMPT INFORMATION (SECTION 75 OF THE ACT)

Data items and details claimed exempt from publication:

Chemical Name

CAS Number

Molecular Formula

Structural Formula

Molecular Weight

Spectral Data

Purity

Non-hazardous Impurities

Import Volume

Polymer Composition

Residual Monomers

Low Molecular Weight Polymer

Degradation Products

Loss of Monomers, Additives and Impurities

VARIATION OF DATA REQUIREMENTS (SECTION 24 OF THE ACT)

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

Melting/Boiling Point

Hydrolysis as a Function of pH

Dissociation Constant

Particle Size

Flammability Limits

PREVIOUS NOTIFICATION IN AUSTRALIA BY APPLICANT(S)

None

NOTIFICATION IN OTHER COUNTRIES

USA: PMN No. P-02-120

2. IDENTITY OF CHEMICAL

OTHER NAME(S)

OS 165439

MARKETING NAME(S)

Z-46

METHODS OF DETECTION AND DETERMINATION

ANALYTICAL The notified polymer may be determined by HPLC and identified using ^1H and ^{13}C nmr
METHOD and infrared spectroscopy.
Remarks Reference spectra have been supplied by the notifier.

3. COMPOSITION

HAZARDOUS IMPURITIES

None, apart from residual monomers at low levels.

ADDITIVES/ADJUVANTS

| | | | |
|----------------------|-------------|-----------------|------|
| <i>Chemical Name</i> | mineral oil | | |
| <i>CAS No.</i> | 64742-54-7 | <i>Weight %</i> | 50 % |

4. INTRODUCTION AND USE INFORMATION

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

The notified polymer will be imported as a 50 % solution in mineral oil, in bulk shipments or in 1000 L isotainers.

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

The importation volume for the notified polymer will be less than 1000 tonnes per annum during the first five years of importation.

USE

The notified polymer will be used as an emulsifier to stabilise water in oil emulsions in ammonium nitrate/fuel oil (ANFO) explosives.

5. PROCESS AND RELEASE INFORMATION

5.1. Distribution, Transport and Storage

PORT OF ENTRY

Not stated.

IDENTITY OF MANUFACTURER/RECIPIENTS

The notified polymer may be transported to a large number of end use sites (normally mine sites) where reformulation to produce explosive mixtures occurs.

TRANSPORTATION AND PACKAGING

The 50 % solution of the notified polymer in mineral oil will be imported in bulk shipments or in 1000 L isotainers or 200 L drums. Transport to the often isolated sites of use is expected to normally be by road.

5.2. Operation Description

Formulation of the final explosive emulsions involves blending fuel oil containing the Z-46 polymer with concentrated aqueous ammonium nitrate solution to produce a stable water in oil emulsion. The notified material is a stabiliser for these formulations, and may constitute between 0.5 and 1 % by weight of the finished explosive. The finished explosive will be stable unless detonated.

The notified polymer as a mineral oil solution will be transported to batching plants operated by various contracting companies at a number of locations at or near mines throughout Australia. The process would usually involve pumping the imported Z-46 from the drums or bulk containers (which are stored in banded areas) to a blending tank where it is mixed with fuel oil and other additives. This would then be transferred to a second blending tank where the explosive emulsion is produced by blending the fuel oil mixture (containing the notified polymer) with a concentrated aqueous solution of ammonium nitrate. The blended explosive emulsion will be transported to the blast site by

dedicated tanker truck. Short term storage of blended explosives may occur. The emulsions will be poured into bore holes, which are typically 5-23 cm wide and 6-8 metres deep in quarries, or 25-38 cm in diameter and 12-18 metres deep in open pit mines. These dimensions correspond to hole (and hence explosive) volumes of 0.012 m³ to 2.04 m³. The explosive is detonated using a blasting cap. During the explosion, the notified polymer will be destroyed completely.

5.3. Occupational exposure

Number and Category of Workers

No details of the number and category of workers were supplied by the notifier. From the details provided, it is evident that one or several workers at each of a large number of sites will be involved in blending explosives and pouring the mixture into bore holes. A large number of transport and storage workers may also be involved in the distribution of the notified polymer.

Exposure Details

Transport and storage workers will handle sealed containers of the notified polymer solution, or, in the case of bulk shipments, may be involved in filling and emptying road tankers. If the notified polymer is handled in sealed containers, no exposure of these workers is expected. Tanker drivers may be exposed to drips and spills of the 50 % solution of the notified polymer while connecting and disconnecting transfer hoses.

Explosive formulation workers will transfer the notified polymer solution into blending containers by a variety of means, depending on the storage systems at the individual sites and the quantities involved. There may be widespread dermal exposure and possible accidental ocular exposure depending on the type of transfer operation used. The notified polymer will comprise a low proportion of the finished emulsion and the likelihood of exposure will therefore be reduced following explosives formulation.

The notifier states that workers will wear protective aprons, neoprene or nitrile gloves and boots, also long sleeved shirts and safety glasses as appropriate.

5.4. Release

RELEASE OF CHEMICAL FROM USE

Some spillage could be expected as a result of leaks and accidents during transfer operations in the formulation of the explosives. However, such spills are likely to be contained within catch pans or bunding, and would be collected and most probably be disposed of by incineration. Hence, release from formulation of the explosives is expected to be minimal.

However, the notifier indicated that a maximum of between 5 and 7.5 tonnes of the notified polymer may remain as residuals in emptied drums and containers. It is likely that this material will be rinsed from the containers with mineral oil and incinerated.

When the explosive formulations are prepared at remote mine sites, it is likely that the emptied drums and residuals would be placed into landfill at the mine site with other wastes originating from mining operations.

It is anticipated that all the notified polymer present in the explosive will be totally consumed during the blast.

5.5. Disposal

The majority of the notified polymer will be consumed during its use in ANFO explosives. Residues in drums and containers are likely to be incinerated yielding oxides of carbon, hydrogen and nitrogen.

5.6. Public exposure

The notified chemical will only be available to explosive industry end users and will not be available to the public. Public exposure during importation and transportation is expected to be minimal. As the chemical is used in industrial explosives it is expected that the notified chemical will be destroyed in use. Public exposure through end use is expected to be negligible.

6. PHYSICAL AND CHEMICAL PROPERTIES

| | |
|---|---|
| Appearance at 20°C and 101.3 kPa | Dark brown viscous liquid. |
| Freezing Point | Not determined |
| Remarks | Freezing point was not determined; the boiling point is expected to be very high, at a temperature where decomposition is expected. |
| Density | 919 kg/m ³ at 20°C |
| METHOD | OECD TG 109 Density of Liquids and Solids. EC Directive 92/69/EEC A.3 Relative Density. |
| Remarks | Pycnometer method. |
| TEST FACILITY | Safepharm Laboratories Ltd (2001b) |
| Vapour Pressure | 1.1×10^{-12} kPa at 25°C |
| METHOD | OECD TG 104 Vapour Pressure. EC Directive 92/69/EEC A.4 Vapour Pressure. |
| Remarks | A vapour pressure balance and linear regression analysis was used to calculate vapour pressure at 25°C. The low value determined indicates that the notified polymer is classified as being very slightly volatile. |
| TEST FACILITY | Safepharm Laboratories Ltd (2001a) |
| Water Solubility | < 0.304 mg/L at 20°C |
| METHOD | OECD TG 105 Water Solubility. EC Directive 92/69/EEC A.6 Water Solubility. |
| Remarks | Analytical Method: Gel permeation chromatography Water solubility was estimated using the shake flask method. Samples of around ~0.5 g in ~500 mL of water were shaken for up to 72 h at 30°C, centrifuged and filtered. Both a preliminary and definitive tests were conducted. |
| TEST FACILITY | Safepharm Laboratories Ltd (2001b) |
| Hydrolysis as a Function of pH | |
| Remarks | Hydrolysis as a function of pH was not determined due to the low water solubility of the notified polymer. The polymer contains amide linkages which are not generally considered to be hydrolysable under environmental conditions. |
| Partition Coefficient (n-octanol/water) | log Pow at 20°C > 6.2 |
| METHOD | OECD TG 117 Partition Coefficient (n-octanol/water), HPLC Method. EC Directive 92/69/EEC A.8 Partition Coefficient. |
| Remarks | Analytical Method: HPLC The partition coefficient was determined by comparing the HPLC retention time of the polymer with a series of standards to determine the K _{ow} . The retention time for the polymer was greater than any of the standard substances hence the determined K _{ow} represents a lower limit. |
| TEST FACILITY | Safepharm Laboratories Ltd (2001b) |
| Adsorption/Desorption – HPLC screening test | log K _{oc} > 5.63 |
| METHOD | OECD TG 121 Adsorption – HPLC Screening Method. |
| Remarks | The adsorption coefficient was determined by comparing the HPLC retention time of the polymer with a series of standards to determine the K _{oc} . The retention time for the polymer was greater than any of the standard substances hence the determined K _{oc} represents a lower limit. |
| TEST FACILITY | Safepharm Laboratories Ltd (2001b) |

Dissociation Constant

Not determined

Remarks A dissociation constant was not determined for this notification due to the low water solubility of the notified polymer. The polymer contains tertiary amine groups, which are likely to display typical basicity.

Particle Size

Remarks Not applicable as the notified polymer is a liquid at room temperature and is never isolated from mineral oil solution.

Flash Point

145±2°C at 101.3 kPa

METHOD EC Directive 92/69/EEC A.9 Flash Point.
Remarks Closed cup method.
TEST FACILITY Safepharm Laboratories Ltd (2001c)

Flammability Limits

Remarks Due to the low volatility, the notified polymer is not expected to be flammable.

Autoignition Temperature

392±5°C at 99.64 - 99.82 kPa

METHOD 92/69/EEC A.15 Auto-Ignition Temperature (Liquids and Gases).
TEST FACILITY Safepharm Laboratories Ltd (2001c)

Explosive Properties

Remarks Not expected to be explosive based on the lack of functional groups associated with explosive properties.

Reactivity

Remarks May cleave hydrolytically under basic conditions; expected to react with acids. No oxidising properties expected.

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.

9. RISK ASSESSMENT**9.1. Environment**

9.1.1. Environment – exposure assessment

Minimal release to the environment of the explosives containing the notified polymer is expected under normal use, because of the explosive nature of the end use product containing the notified polymer. All notified polymer present in the explosives is expected to be consumed during blasting.

Residues remaining in the import containers are likely to be rinsed from the container and incinerated.

Any spills during blending of the explosive are expected to be contained and disposed of via incineration.

9.1.2. Environment – effects assessment

No data was supplied. In normal use, there will be limited release to the aquatic compartment.

9.1.3. Environment – risk characterisation

Incineration of any spills or container residues would destroy the material with production of water vapour, and oxides of carbon and nitrogen.

When the explosive emulsion containing the notified polymer is detonated, it is expected that the material would be destroyed immediately, again producing oxides of carbon and nitrogen. Hence, it is anticipated that the majority of the notified polymer will be destroyed through normal use.

9.2. Human health**9.2.1. Occupational health and safety – exposure assessment**

Occupational exposure is only likely during reformulation to produce explosives, and during transfer to and from bulk tankers. In both cases, the most likely scenario is dermal and accidental ocular exposure to drips and spills of the notified polymer as a 50 % solution in mineral oil. The notifier indicated that personal protective equipment used will include neoprene or nitrile gloves, and safety glasses where appropriate.

9.2.2. Public health – exposure assessment

The notified chemical will only be available to explosive industry end users and will not be available to the public. Very little public exposure is expected during transport, storage and end use.

9.2.3. Human health - effects assessment

No toxicology data was submitted for the notified polymer. The notified polymer is a surfactant, and contains the amine functional group. For both these reasons, it may be expected to have some irritant properties. The high molecular weight of the notified polymer should preclude absorption across biological membranes, and systemic toxicity is not expected.

As no data has been submitted the notified polymer cannot be classified under the NOHSC *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 1999b).

9.2.4. Occupational health and safety – risk characterisation

Based on the likely irritant properties of the notified polymer, and the possibility of dermal exposure to drips and spills during transfer and blending operations, there is a possibility of dermal irritation if appropriate protective equipment (particularly gloves) is not used. As the solution is a potential ocular irritant, safety glasses should be used at all times while transferring or blending the 50 % solution of the notified polymer. At the low concentrations present in the final blended explosives (< 1 %), the irritant properties of the notified polymer are not expected to result in occupational health risk.

9.2.5. Public health – risk characterisation

As the notified polymer will not be available to the public and is likely to be destroyed during use, it is unlikely to pose a significant public health risk.

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

10.1. Hazard classification

Based on the available data the notified polymer is not classified as hazardous under the NOHSC *Approved Criteria for Classifying Hazardous Substances*.

10.2. Environmental risk assessment

On the basis of the available information, the overall environmental hazard in respect to the proposed use of the notified polymer is expected to be low.

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 Negligible Concern to public health when used as a constituent of explosive emulsions for mining use.

11. MATERIAL SAFETY DATA SHEET

11.1. Material Safety Data Sheet

The MSDS of the notified polymer provided by the notifier was in accordance with the NOHSC *National Code of Practice for the Preparation of Material Safety Data Sheets* (NOHSC, 1994a). It is 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 provided by the notifier was in accordance with the NOHSC *National Code of Practice for the Labelling of Workplace Substances* (NOHSC, 1994b). The accuracy of the information on the label remains the responsibility of the applicant.

12. RECOMMENDATIONS

CONTROL MEASURES

Occupational Health and Safety

- Employers should ensure that the following personal protective equipment is used by workers to minimise occupational exposure to the notified polymer:
 - gloves (neoprene or nitrile)
 - safety glasses at all times when the notified polymer is transferred or blended
 - industrial clothing and footwear

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 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.

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.

13. BIBLIOGRAPHY

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