

File No PLC/702

May 2007

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

FULL PUBLIC REPORT

Polydrill

This Assessment has been compiled in accordance with the provisions of the *Industrial Chemicals (Notification and Assessment) Act 1989* (Cwlth) (the Act) and Regulations. This legislation is an Act of the Commonwealth of Australia. The National Industrial Chemicals Notification and Assessment Scheme (NICNAS) is administered by the Department of Health and Ageing, and conducts the risk assessment for public health and occupational health and safety. The assessment of environmental risk is conducted by the Department of the Environment and Water Resources.

For the purposes of subsection 78(1) of the Act, this Full Public Report may be inspected at our NICNAS office by appointment only at 334-336 Illawarra Road, Marrickville NSW 2204.

This Full Public Report is also available for viewing and downloading from the NICNAS website or available on request, free of charge, by contacting NICNAS. For requests and enquiries please contact the NICNAS Administration Coordinator at:

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**Director
NICNAS**

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Polydrill

1. APPLICANT AND NOTIFICATION DETAILS

APPLICANT(S)

Rheochem Limited (ABN 11 099 949 452)
 1 Keegan Street
 O'CONNOR WA 6163

NOTIFICATION CATEGORY

Polymer of Low Concern

EXEMPT INFORMATION (SECTION 75 OF THE ACT)

Data items and details claimed exempt from publication:

Chemical Name, Other Names, CAS Number, Molecular and Structural Formulae, Molecular Weight, Polymer Constituents, Residual Monomers/Impurities, Import Volume

VARIATION OF DATA REQUIREMENTS (SECTION 24 OF THE ACT)

No variation to the schedule of data requirements is claimed.

PREVIOUS NOTIFICATION IN AUSTRALIA BY APPLICANT(S)

CEC/662

NOTIFICATION IN OTHER COUNTRIES

USA (1986), North Sea (HOCNF)

2. IDENTITY OF CHEMICAL

MARKETING NAME(S)

Polydrill

MOLECULAR WEIGHT (MW)

Number Average Molecular Weight (Mn) >10000

REACTIVE FUNCTIONAL GROUPS

Not applicable as polymer has Mw >10,000

3. PLC CRITERIA JUSTIFICATION

<i>Criterion</i>	<i>Criterion met (yes/no/not applicable)</i>
Molecular Weight Requirements	Yes
Functional Group Equivalent Weight (FGEW) Requirements	N/A
Low Charge Density	Yes
Approved Elements Only	Yes
Stable Under Normal Conditions of Use	Yes
Not Water Absorbing	Yes
Not a Hazard Substance or Dangerous Good	Yes

The notified polymer meets the PLC criteria.

4. PHYSICAL AND CHEMICAL PROPERTIES

Appearance at 20°C and 101.3 kPa	Reddish brown powder
Melting Point/Glass Transition Temp	>370°C – information from MSDS
Density	1800 kg/m ³ at 20°C – information from MSDS
Water Solubility	320 g/L at 20°C (from the MSDS, supported by multiple polar functionalities).
Dissociation Constant	Not determined. Contains a strong acid functionality which will be dissociated through the environmental pH range of 4-9.
Particle size	0.5-11 µm: 8.97% 11-105 µm: 63.89% x ₅₀ =56.46 µm
Reactivity	Stable under normal storage and use conditions.
Degradation Products	None under the conditions of use described. Sulphur and carbon oxides will be formed if burned under extreme conditions >380°C. There are no hydrolysable groups.

5. INTRODUCTION AND USE INFORMATION

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>	<40	<40	<40	<40	<40

USE AND MODE OF INTRODUCTION AND DISPOSAL

Mode of Introduction

The polymer will be imported into Australia as dry powder in 25 kg multi-wall paper sack, 50 sacks per pallet. The pallets are imported into Adelaide SA and Fremantle WA ports and transported to drilling sites by trucks.

Reformulation/manufacture processes

At the drilling site, the polymer bag is opened and the polymer powder is added to a hopper connected to a pipe transporting drilling mud to the centre of the drill shaft. The polymer mixes with the mud (approx 1% of total fluid composition) and flows to the drill bit. Polydrill is the primary fluid loss additive in the drilling fluid formulation, which assists in minimising wellbore filtration into the ground during the drilling process. It is specific for high temperature ground drilling conditions.

Volumes of the fluid used is determined by the hole geometry. The minimum typical volume of notified polymer is estimated to be 700 kg per well.

The fluid system on the rig-site is a closed recirculated system used during the drilling of oil and gas holes. The drilling fluid is reused from well to well, through the project.

Use

A drilling fluid additive for oil and gas exploration at onshore drilling sites in South Australia.

6. HUMAN HEALTH IMPLICATIONS

6.1. Exposure Assessment

OCCUPATIONAL EXPOSURE

Dermal, ocular and inhalation exposure to the powder of the notified polymer may occur during opening and closing of bags and the addition of notified polymer to the drilling mixture.

However, exposure to significant amounts of the notified polymer is limited because of engineering controls and the use of personal protective equipment is required for all workers at the drilling sites. The notified polymer is unpacked and mixed outdoors in well-ventilated areas where the mixing stands are present.

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

PUBLIC EXPOSURE

The notified polymer is intended only for use in industry (specialized) and hence the general public will not be exposed to the notified polymer.

6.2. Toxicological Hazard Characterisation

No toxicological data were submitted. The notified polymer meets the PLC criteria and can therefore be considered to be of low hazard. This is consistent with the stated results of in-house tests for the notified polymer that indicate:

Rat, acute oral LD50 >5000 mg/kg bw – Low toxicity
Rabbit, skin irritation – Non irritating
Rabbit, eye irritation – Non irritating
Genotoxicity – Ames – Non mutagenic

The notified polymer is a water soluble powder with <10% of respirable particles of <10 µm. The USEPA does not expect water-soluble polymers to exhibit lung toxicity because they are expected to rapidly clear the respiratory tract. However, high exposure could cause lung congestion.

6.3. Human Health Risk Assessment

OCCUPATIONAL HEALTH AND SAFETY

Exposure to the notified polymer could occur during opening and closing of bags and the addition of notified polymer to the drilling mixture. The most significant type of exposure during use of the notified polymer is likely to be by inhalation of the particulate material.

Overall the risk to workers is considered to be low due to the intrinsic low hazard of the notified polymer, presence of engineering controls and the use of personal protective equipment including respirators, at the drilling sites. The use report for the notified polymer under the Commercial Evaluation Permit 618 reports absence of any adverse effects from the use of the notified polymer under the operational description specified in this notification.

However, even though not significant toxicity is predicted for the notified polymer, the generation of dust should be monitored and kept to a minimum, and the recommended PPE should be worn if exposure occurs.

PUBLIC HEALTH

As there will be no exposure of the public to the notified polymer the risk to the public from exposure to the notified polymer is considered low.

7. ENVIRONMENTAL IMPLICATIONS

7.1. Exposure Assessment

ENVIRONMENTAL RELEASE

The notified polymer will not be manufactured locally, there will be no environmental exposure associated with this process in Australia. Release of the polymer during transport (due to a ripped bag) is expected to be very limited. Residual notified polymer empty bags is expected to account for < 1% (maximum 400 kg) of total import volume and will be disposed of to licensed landfill.

ENVIRONMENTAL FATE

The notified polymer is expected to remain tightly adhered to the drilling mud, and should degrade slowly through biotic and abiotic processes. The notifier stated that the polymer is not “readily biodegradable” when tested according to OECD TG 302 B. Hydrolysis will not occur under environmental conditions.

7.2. Environmental Hazard Characterisation

The notified polymer meets the PLC criteria and can therefore be considered to be of low hazard. However, anionic polymers are known to be moderately toxic to algae. The mode of toxic action is overchelation of nutrient elements needed by algae for growth. The highest toxicity is when the acid is on alternating carbons of the polymer backbone. This is unlikely to apply to the notified polymer. The notified polymer’s toxicity to algae is also likely to be reduced due to the presence of calcium ions, which will bind to the functional groups.

This is supported by environmental endpoints observed in testing conducted on the notified polymer.

Endpoint	Result	Effects Observed?	Test Guideline
<i>Oncorhynchus mykiss</i> (Rainbow trout)	EC50 4430 mg/L	no	ASTM Standard E-729-88

The results are indicative of low hazard.

7.3. Environmental Risk Assessment

Less than 400 kg (based on the maximum import volume) of the notified polymer is expected to be left as residue in empty import bags, which will be disposed of to landfill.

The notified polymer is part of the drilling fluid formulation. Such drilling fluid is only used from 1500 m to 3200 m below the ground. 90% of the fluids are returned to the surface and 10% of fluids are left in the hole. The fluid system on the rig site is a closed recirculated system used during the drilling of Oil and Gas holes. The fluid returned from the hole is combined with drilling cuttings and the cuttings are retained by the screen and separated from the mud. Normally cuttings contain 60% of drilling fluid and 40% of the formation being drilled. The cuttings will be disposed into a dedicated cutting disposal dump in the Cooper/Eromanga Basin. The Drilling fluid is reused from well to well, through the project.

There will be limited, if any, aquatic exposure and the notified polymer can therefore be considered to be of low hazard. This is supported by ecotoxicity endpoints observed in testing conducted on *Oncorhynchus mykiss* (LC50 = 4430 mg/L).

8. CONCLUSIONS

8.1. Level of Concern for Occupational Health and Safety

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

8.2. Level of Concern for Public Health

There is Negligible Concern to public health when used in the proposed manner.

8.3. Level of Concern for the Environment

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

9. MATERIAL SAFETY DATA SHEET

9.1. Material Safety Data Sheet

The notifier has provided MSDS as part of the notification statement. The accuracy of the information on the MSDS remains the responsibility of the applicant.

10. RECOMMENDATIONS

CONTROL MEASURES

Occupational Health and Safety

- No other specific engineering controls, work practices or personal protective equipment are required for the safe use of the notified polymer itself during manufacture and reformulation, however, these should be selected on the basis of all ingredients in the formulation.
- Employers should implement the following safe work practices to minimise occupational exposure during handling of the notified polymer as introduced and in formulated paint products:
 - Avoid breathing aerosol
- Employers should ensure that the following personal protective equipment is used by workers to minimise occupational exposure to the notified polymer during use:
 - Suitable respirators during handling of the polymer powder

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

- The level of atmospheric nuisance dust during use of the notified polymer should be maintained as low as possible. The NOHSC exposure standard for atmospheric dust is 10 mg/m³.
- 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.

Environment

Disposal

- The notified polymer can be land filled or incinerated, when in compliance with local regulations. Packaging that cannot be cleaned must be disposed off in the same way as the notified polymer.

Storage

- Keep in tightly closed container. Store in a cool dry well ventilated area.

Emergency procedures

- Spills and/or accidental release of the notified polymer should be handled by avoiding dust formation. Keep away from heat and sources of ignition.

10.1. 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 subsection 64(1) of the Act; if
- the notified polymer is introduced in a chemical form that does not meet the PLC criteria.
 - if use in offshore drilling sites is proposed.

or

- (2) Under subsection 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.