File No SAPLC/142

January 2013

NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME (NICNAS)

PUBLIC REPORT

Polymer in HZ-10

This Self Assessment has been compiled by the applicant and adopted by NICNAS 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), administered by the Department of Health and Ageing and the Department of Sustainability, Environment, Water, Population and Communities have screened this assessment report. The data supporting this assessment will be subject to audit by NICNAS.

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 Level 7, 260 Elizabeth Street, Surry Hills NSW 2010.

This 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

TABLE OF CONTENTS

SUMMARY

The following details will be published in the NICNAS *Chemical Gazette:*

ASSESSMENT REFERENCE	APPLICANT(S)	CHEMICAL OR TRADE NAME	HAZARDOUS SUBSTANCE	INTRODUCTION VOLUME	USE
SAPLC/142	Halliburton Pty Ltd	Polymer in HZ-10	No	≤0.5 tonnes per annum	Component of a gel for oil and gas wells

CONCLUSIONS AND REGULATORY OBLIGATIONS

Human health risk assessment
Under the conditions of the occupational settings described, the notified polymer is not considered to pose an unreasonable risk to the health of workers.

When used in the proposed manner, the notified polymer is not considered to pose an unreasonable risk to public health.

Environmental risk assessment
The polymer is not considered to pose an unreasonable risk to the environment based on its assessed use pattern.

Recommendations

CONTROL MEASURES
Occupational Health and Safety

- A person conducting a business or undertaking at a workplace, should implement the following engineering controls to minimise occupational exposure to the notified polymer:
  - Use in well-ventilated area

- A person conducting a business or undertaking at a workplace, should implement the following safe work practices to minimise occupational exposure during handling of the notified polymer:
  - Avoid contact with skin, eyes, and clothing

- A person conducting a business or undertaking at a workplace, should ensure that the following personal protective equipment is used by workers to minimise occupational exposure to the notified polymer, if the potential for significant inhalation exposure is expected:
  - Respiratory protection

- A copy of the (M)SDS should be easily accessible to employees.

- If products and mixtures containing the notified polymer are classified as hazardous to health in accordance with the *Globally Harmonised System for the Classification and Labelling of Chemicals (GHS)* as adopted for industrial chemicals in Australia, workplace practices and control procedures consistent with provisions of State and Territory hazardous substances legislation should be in operation.

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

Disposal

- The notified polymer should be disposed of to landfill.

Emergency procedures

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

Regulatory Obligations

Secondary Notification
This risk assessment is based on the information available at the time of notification. The Director may call for the reassessment of the polymer under secondary notification provisions based on changes in certain circumstances. Under Section 64 of the *Industrial Chemicals (Notification and Assessment) Act (1989)* the notifier, as well as any other importer or manufacturer of the notified polymer, have post-assessment regulatory obligations to notify NICNAS when any of these circumstances change. These obligations apply even when the notified polymer is listed on the Australian Inventory of Chemical Substances (AICS).

Therefore, the Director of NICNAS must be notified in writing within 28 days by the notifier, other importer or manufacturer:

(1) Under Section 64(1) of the Act; if
- the notified polymer is introduced in a chemical form that does not meet the PLC criteria;
- the notified polymer is intended to be used in applications associated with hydraulic fracturing;

or

(2) Under Section 64(2) of the Act; if
- the function or use of the notified polymer has changed from a component of a gel for oil and gas wells, or is likely to change significantly;
- the amount of polymer being introduced has increased, or is likely to increase, significantly;
- the notified polymer has begun to be manufactured in Australia;
- additional information has become available to the person as to an adverse effect of the notified polymer on occupational health and safety, public health, or the environment.

The Director will then decide whether a reassessment (i.e. a secondary notification and assessment) is required.

(Material) Safety Data Sheet
The notifier has provided an (M)SDS as part of the notification statement. The accuracy of the information on the (M)SDS remains the responsibility of the applicant.

ASSESSMENT DETAILS

1. APPLICANT AND NOTIFICATION DETAILS

APPLICANT
Halliburton Australia Pty Ltd (ABN: 73 009 000 775)
53-55 Bannister Road,
CANNING VALE WA 6155

NOTIFICATION CATEGORY
Self Assessment: Polymer of Low Concern

EXEMPT INFORMATION (SECTION 75 OF THE ACT)
Chemical Name, Other Names, CAS Number, Molecular and Structural Formulae, Molecular Weight, Polymer Constituents, Residual Monomers/Impurities, Use Details and Import Volume.

PREVIOUS NOTIFICATION IN AUSTRALIA BY APPLICANT(S)
None

NOTIFICATION IN OTHER COUNTRIES
USA
Canada

2. IDENTITY OF CHEMICAL

MARKETING NAME(S)
HZ-10 (20% notified polymer)

MOLECULAR WEIGHT (MW)
Number Average Molecular Weight (NAMW) >10,000 Da

3. PLC CRITERIA JUSTIFICATION

Criterion	*Criterion met*
Molecular Weight Requirements	Yes
Functional Group Equivalent Weight (FGEW) Requirements	Yes
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	Yellowish liquid*
Melting Point/Glass Transition Temp	Not available due the highly cross-linked nature of the polymer.
Density	1058 kg/m^3 at 20°C*
Water Solubility	Not determined. Expected to be water soluble based on the presence of hydrophilic functional groups and use in aqueous systems.
Dissociation Constant	Not determined. The notified polymer is not expected to ionise under environmental conditions (pH 4-9).
Reactivity	Stable under normal environmental conditions.
Degradation Products	None under normal conditions of use.

*Product containing 20% notified chemical.

Comments
The product containing the notified polymer is incompatible with strong oxidizers.

5. INTRODUCTION AND USE INFORMATION

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

Year	*1*	*2*	*3*	*4*	*5*
Tonnes	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5

USE AND MODE OF INTRODUCTION AND DISPOSAL
Mode of Introduction
The notified polymer will be imported as a liquid (in HZ-10) in 53 gallon drums or 264 gallon totes. It will be imported into Perth, Adelaide, Melbourne, and Brisbane and stored at the notifier's warehouse before being transported by truck (on-shore) or by ship (off-shore) to well site field locations.

Reformulation/manufacture processes
The notified polymer will not be manufactured or reformulated in Australia.

Use
The notified polymer will be used as part of a gel sealant system to improve the yield of an oil or gas

well. In some instances, certain zones of a well start generating water or undesired gas rather than oil or gas. Such water or gas producing zones need to be sealed off. The notified polymer in HZ-10 will be used together with a cross linker HZ-20 for this purpose. Specifically, these compounds will be sent "down hole" within the production zone and forced out through perforations in the well. Activated by temperature, the product containing the notified compound will propagate through the rock matrix, form a rigid gel, and seal off areas where water or gas is entering the well bore. Based on the notifier's technical knowledge and experience, it is expected that the rigid gel will remain in situ in the gel matrix for a period of at least several years under the anticipated conditions.

6. HUMAN HEALTH IMPLICATIONS

6.1. Exposure Assessment

OCCUPATIONAL EXPOSURE

Dermal and ocular exposure to the product containing the notified polymer may potentially occur during mixing processes. However, exposure to significant amounts of the notified polymer is expected to be limited because of the fully automated nature of the processes, engineering controls, and personal protective equipment worn by workers.

PUBLIC EXPOSURE

The notified polymer is intended for industrial use only and as such public exposure to the notified polymer is not expected. Under specific formation conditions, the product containing the notified polymer will be introduced at oil and/or gas wells into the target formation (*i.e.*, the oil and gas-producing stratagraphic unit), which would be isolated from overlying aquifers (if any) by isolation casing(s) and cement seal(s). Consequently, there will be no complete exposure pathway for the notified polymer, which will be introduced into the target formation, to reach overlying aquifers and/or the general population.

To prevent release of the notified polymer to surface waters, any spills at the well site will be contained using standard control measures, such as containment berms, sand, sorbent materials, etc. Such measures are likely to prevent the migration of the notified polymer away from the well site, thereby minimising the potential of exposure to the public.

6.2. Toxicological Hazard Characterisation

The notified polymer has low acute oral toxicity (rat oral LD_{50} >5000 mg/kg bw). The notified polymer meets the PLC criteria and can therefore be considered to be of low hazard.

6.3. Human Health Risk Assessment

OCCUPATIONAL HEALTH AND SAFETY

The OHS risk presented by the notified polymer is expected to be low, based on the expected minimal exposure to workers and the low hazard of the polymer. Although the notified polymer is expected to be of low hazard, precautionary measures (as specified in the product SDS) should be taken when working with the notified polymer to minimise exposure, including use in a well-ventilated area and use of gloves, coveralls, eye protection and respiratory protection (if significant inhalation exposure is expected).

PUBLIC HEALTH

As there will be no exposure of the public to the notified polymer or products containing the notified polymer, the risk to the public from exposure to the notified polymer is considered to be negligible and hence is not considered to be unreasonable.

7. ENVIRONMENTAL IMPLICATIONS

7.1. Exposure Assessment

ENVIRONMENTAL RELEASE

The notified polymer will not be manufactured in Australia. Under specific formation conditions, the product containing the notified polymer will be introduced at oil and/or gas wells into the target formation (*i.e.*, the oil and gas-producing stratagraphic unit), which would be isolated from overlying aquifers (if any) by isolation casing(s) and cement seal(s). Consequently, there will be no complete exposure pathway for the notified polymer, which will be introduced into the target formation, to be released to the aquatic environment. It is expected that the rigid gel will remain in situ in the gel matrix for a period of at least several years under the anticipated conditions..

To prevent release of the notified polymer to surface waters, any spills at the well site will be contained using standard control measures, such as containment berms, sand, sorbent materials, etc. Also, release to the environment could only occur through accidental spills or leaks of the storage containers during shipping, transport and warehousing. Wastes containing the notified polymer and empty storage containers containing notified polymer residues will be disposed of in accordance with all applicable laws, most likely to landfill.

ENVIRONMENTAL FATE

The notified polymer is water soluble, expected to be hydrolytically stable and not expected to biodegrade rapidly in seawater (HZ-10: 3% in 28 d, OECD TG 306; OSPAR 2010). Based on its very high molecular weight, the notified polymer is expected to have a reduced mobility in soils and sediments. The notified polymer's high molecular weight will preclude absorption across biological membranes and thus it is unlikely to bioaccumulate. The cured gel will be irreversibly incorporated into the matrix and in this form is expected to be immobile. The cured gel is expected to remain in situ and will eventually degrade through biotic and abiotic processes to form water and oxides of carbon and nitrogen.

7.2. Environmental Hazard Characterisation

The notified polymer meets the PLC criteria and can therefore be considered to be of low hazard. This is supported by environmental endpoints observed in testing conducted on the product, HZ-10 (20% notified polymer).

Endpoint	*Result*	*Test Guideline*
Fish Toxicity	LC50 > 3,200 mg/L	OSPARCOM 1995
Aquatic Invertebrate Toxicity	LC50 = 32,042 mg/L	ISO/TC147/SC5/WG2
Algal Toxicity	EC50 = 9,372 mg/L	ISO 10253
Sediment Reworker Toxicity	LC50 = 38,915 mg/kg	PARCOM 1995

Note: testing was conducted using marine species.

All results on marine test organisms were indicative of low hazard.

The acute toxicity and biodegradability potential of the notified polymer were evaluated previously using standardized tests in accordance with OECD and ISO protocols as part of the Harmonised Offshore Chemical Notification under OSPAR. All parameters recorded during the test were within protocol specifications. All fish in control vessels survived the 96 hour test period, thus the NOEC was 3,200 mg/L. Therefore, the notified polymer is not expected to be harmful to aquatic life.

7.3. Environmental Risk Assessment

Under specific formation conditions, the product containing the notified polymer will be introduced at oil and/or gas wells into the target formation (*i.e.*, the oil and gas-producing stratagraphic unit), which would be isolated from overlying aquifers (if any) by isolation casing(s) and cement seal(s). Consequently, there will be no complete exposure pathway for the notified polymer, which will be introduced into the target formation, to be released to the aquatic environment.

To prevent release of the notified polymer to surface waters, any spills at the well site will be contained using standard control measures, such as containment berms, sand, sorbent materials, etc. Such measures are likely to prevent the migration of the notified polymer away from the well site, thereby greatly minimizing the likelihood of release to the aquatic environment. Any waste is expected to be disposed of in accordance with all applicable laws.

The above considerations indicate minimal risk to the environment when the notified polymer is used in the manner and levels indicated by the notifier. Based on the assessed use pattern, the notified polymer is not considered to pose an unreasonable risk to the environment when it is stored, transported, used, recycled and disposed of in the proposed manner.