

File No: LTD/1783

January 2015

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

PUBLIC REPORT

Polymer in HPT-1

This Assessment has been compiled in accordance with the provisions of the *Industrial Chemicals (Notification and Assessment) Act 1989* (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 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.

For the purposes of subsection 78(1) of the Act, this 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:

Street Address:	Level 7, 260 Elizabeth Street, SURRY HILLS NSW 2010, AUSTRALIA.
Postal Address:	GPO Box 58, SYDNEY NSW 2001, AUSTRALIA.
TEL:	+ 61 2 8577 8800
FAX:	+ 61 2 8577 8888
Website:	www.nicnas.gov.au

**Director
NICNAS**

TABLE OF CONTENTS

SUMMARY	3
CONCLUSIONS AND REGULATORY OBLIGATIONS	3
ASSESSMENT DETAILS	5
1. APPLICANT AND NOTIFICATION DETAILS	5
2. IDENTITY OF CHEMICAL.....	5
3. COMPOSITION.....	5
4. PHYSICAL AND CHEMICAL PROPERTIES	5
5. INTRODUCTION AND USE INFORMATION	6
6. HUMAN HEALTH IMPLICATIONS	7
6.1. Exposure Assessment.....	7
6.1.1. Occupational Exposure.....	7
6.1.2. Public Exposure.....	7
6.2. Human Health Effects Assessment	7
6.3. Human Health Risk Characterisation	7
6.3.1. Occupational Health and Safety	7
6.3.2. Public Health	8
7. ENVIRONMENTAL IMPLICATIONS.....	8
7.1. Environmental Exposure & Fate Assessment	8
7.1.1. Environmental Exposure	8
7.1.2. Environmental Fate	8
7.1.3. Predicted Environmental Concentration (PEC).....	8
7.2. Environmental Effects Assessment.....	9
7.2.1. Predicted No-Effect Concentration	9
7.3. Environmental Risk Assessment	9
<u>APPENDIX A: PHYSICAL AND CHEMICAL PROPERTIES</u>	<u>10</u>
<u>APPENDIX B: ENVIRONMENTAL FATE AND ECOTOXICOLOGICAL INVESTIGATIONS</u>	<u>11</u>
B.1.1 Ready biodegradability	11
B.2 Ecotoxicological Investigations	11
B.2.1 Acute toxicity to marine fish.....	11
B.2.2 Acute toxicity to Marine invertebrates.....	12
B.2.3 Algal growth inhibition test.....	12
BIBLIOGRAPHY	14

SUMMARY

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

ASSESSMENT REFERENCE	APPLICANT(S)	CHEMICAL OR TRADE NAME	HAZARDOUS CHEMICAL	INTRODUCTION VOLUME	USE
LTD/1783	Halliburton Australia Pty Ltd.	Polymer in HPT-1	ND*	≤ 1 tonne per annum	Component of a product used in well drilling operations

*ND = not determined

CONCLUSIONS AND REGULATORY OBLIGATIONS

Hazard classification

As no toxicity data were provided, the notified polymer cannot be classified according to the *Globally Harmonised System for the Classification and Labelling of Chemicals* (GHS), as adopted for industrial chemicals in Australia, or the *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 2004).

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

On the basis of low import volume and the reported use pattern, the notified polymer is not considered to pose an unreasonable risk to the environment.

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:
 - Enclosed, automated processes, where possible
- 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 skin contact
- 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:
 - coveralls
 - impervious gloves

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

- 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.

Disposal

- Where reuse or recycling are not available or appropriate, dispose of the notified chemical in an environmentally sound manner in accordance with relevant Commonwealth, state, territory and local government legislation.

Emergency procedures

- Spills or accidental release of the notified chemical 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 chemical 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 chemical, 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 polymer has a number-average molecular weight of less than 1000;
 - the notified chemical is proposed to be used for hydraulic fracturing applications;or
- (2) Under Section 64(2) of the Act; if
 - the function or use of the polymer has changed from a component of a product used in well drilling operations, or is likely to change significantly;
 - the amount of polymer being introduced has increased, or is likely to increase, significantly;
 - the polymer has begun to be manufactured in Australia;
 - additional information has become available to the person as to an adverse effect of the 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 (M)SDS of a product containing the notified polymer provided by the notifier was reviewed by NICNAS. The accuracy of the information on the (M)SDS remains the responsibility of the applicant.

ASSESSMENT DETAILS

1. APPLICANT AND NOTIFICATION DETAILS

APPLICANT(S)

Halliburton Australia Pty Ltd (ABN: 73 009 000 775)
Level 10, 12-14 The Esplanade
PERTH WA 6000

NOTIFICATION CATEGORY

Limited: Synthetic polymer with $M_n \geq 1,000$ Da.

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, analytical data, degree of purity, polymer constituents, residual monomers, impurities, additives/adjuvants, use details and import volume.

VARIATION OF DATA REQUIREMENTS (SECTION 24 OF THE ACT)

Variation to the schedule of data requirements is claimed as follows: all physico-chemical end points (exception: partition coefficient).

PREVIOUS NOTIFICATION IN AUSTRALIA BY APPLICANT(S)

None.

NOTIFICATION IN OTHER COUNTRIES

None.

2. IDENTITY OF CHEMICAL

MARKETING NAME(S)

HPT-1 (containing $\leq 5\%$ of the notified polymer)

MOLECULAR WEIGHT

$> 10,000$ Da

ANALYTICAL DATA

Reference GPC spectrum was provided.

3. COMPOSITION

DEGREE OF PURITY

$> 95\%$

4. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE AT 20 °C AND 101.3 kPa: colourless liquid*.

Property	Value	Data Source/Justification
Boiling Point*	100 °C at 101.3 kPa	(M)SDS
Density*	1013 kg/m ³ at 20 °C	(M)SDS
Vapour Pressure	$< 1.3 \times 10^{-9}$ kPa	Estimated based on the NAMW $> 1,000$ Da (US EPA, 2013)
Water Solubility	Soluble in water	(M)SDS
Hydrolysis as a Function of pH	Not determined	Contains hydrolysable functionalities but not expected to significantly hydrolyse in the environmental pH range of 4-9.
Partition Coefficient (n-octanol/water)	$\log P_{ow} = -2.92$	Measured
Adsorption/Desorption	Not determined	The notified polymer is expected to adsorb to soil, sediment and sludge based

Dissociation Constant	pKa = 4.5	on the presence of cationic groups and high molecular weight. Estimated based on literature value for carboxylic acids.
Flash Point/Flammability	Not determined	Introduced only in a formulated product. Not expected to be flammable under conditions of use
Autoignition Temperature	Not determined	Introduced only in formulated products. Not expected to autoignite under normal conditions
Explosive Properties	Not determined	Does not contain any functional groups that imply explosive properties.
Oxidising Properties	Not determined	Does not contain any functional groups that imply oxidising properties.

*Product containing the notified chemical at $\leq 5\%$ concentration

DISCUSSION OF PROPERTIES

For full details of tests on physical and chemical properties, refer to Appendix A.

Reactivity

The notified polymer is expected to be stable under normal conditions of use.

Physical hazard classification

Based on the limited submitted physico-chemical data depicted in the above table, the notified polymer is not recommended for hazard classification according to the *Globally Harmonised System for the Classification and Labelling of Chemicals (GHS)*, as adopted for industrial chemicals in Australia.

5. INTRODUCTION AND USE INFORMATION

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

The notified polymer will not be manufactured in Australia. The notified polymer will be imported as a component ($\leq 5\%$ concentration) of a binding agent product for use in gravel packing.

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

Year	1	2	3	4	5
Tonnes	≤ 1	≤ 1	≤ 1	≤ 1	≤ 1

PORT OF ENTRY

Adelaide, Perth and Brisbane.

TRANSPORTATION AND PACKAGING

The product containing the notified polymer ($\leq 5\%$ concentration) will be imported in 330 gallon or 55 gallon drums. The product will be transported by truck to on-shore drilling sites or by ship to off-shore sites.

USE

The notified polymer will be used during gravel packing, acidizing and matrix water reduction processes in on-shore and off-shore well drilling operations.

OPERATION DESCRIPTION

The notified polymer will not be manufactured, reformulated or repackaged within Australia, prior to the distribution to on- and off-shore drilling sites. The notifier has advised the following:

At well sites, the imported product containing the notified polymer (at $\leq 5\%$ concentration) will be pumped into a mixing tank and mixed with other components before being pumped into the wells. This will be done in well ventilated outdoor areas.

Gravel packing involves the placement of gravel into the annulus of a well to prevent naturally present sand from sloughing off and clogging the well screen. Matrix water reduction prevents formation waters from entering the well. During acidizing the product containing the notified chemical binds the formation together and prevents

sand from shifting and clogging pores in the rock. Once mixed and introduced into the formation, the product containing the notified polymer binds the sand and gravel together, or binds to the formation and becomes immobile.

6. HUMAN HEALTH IMPLICATIONS

6.1. Exposure Assessment

6.1.1. Occupational Exposure

CATEGORY OF WORKERS

<i>Category of Worker</i>	<i>Exposure Duration (hours/day)</i>	<i>Exposure Frequency (days/year)</i>
Pump operator	< 0.1	< 10

EXPOSURE DETAILS

Transport and storage

Transport and storage workers are expected to only be exposed to the notified polymer in the unlikely event of an accidental breach of the sealed containers. In this case, dermal and/or ocular exposure may occur; however, clean-up procedures would be in place to minimise worker exposure to the notified polymer.

End use

Workers involved in mixing and pumping the product containing the notified polymer (at $\leq 5\%$ concentration) may experience dermal and ocular exposure. Operations involving the transfer of the product into wells will be performed in well ventilated areas. The notifier has stated that the workers are expected to wear personal protective equipment (PPE), such as gloves, eye protection and coveralls to minimise exposure. In addition, the pumping operations involving the notified polymer will be of short duration and of relatively low frequency (intermittently), further minimising the potential for exposure.

6.1.2. Public Exposure

The notified polymer is intended only for industrial use. Public exposure to the notified polymer is not expected except in the unlikely event of an accident occurring during road transport. Exposure to the public is therefore expected to be negligible.

6.2. Human Health Effects Assessment

No toxicity data were submitted.

Based on the high molecular weight of the polymer ($> 10,000$ Da), the potential of the notified polymer to be dermally absorbed following exposure is limited.

Based on structural considerations, there is potential for the notified polymer to cause skin and eye irritation and skin sensitisation. However, the potential for these effects is likely to be limited by the high molecular weight of the polymer.

Health hazard classification

As no toxicity data were provided, the notified polymer cannot be classified according to the *Globally Harmonised System for the Classification and Labelling of Chemicals (GHS)*, as adopted for industrial chemicals in Australia, or the *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 2004).

6.3. Human Health Risk Characterisation

6.3.1. Occupational Health and Safety

Dermal exposure and potentially ocular exposure to the notified polymer (at $\leq 5\%$ concentration) may occur during mixing operations as well as when pumping the mixed product into wells. The potential for eye and skin irritation and/or skin sensitisation effects to be associated with the notified polymer cannot be ruled out.

However, irritant effects are not expected at the proposed usage concentration and the potential for skin sensitisation effects is expected to be mitigated by the use of PPE, including gloves and protective clothing.

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

6.3.2. Public Health

The notified polymer is intended only for industrial use. Therefore, the risk to the public from use of the notified polymer at $\leq 5\%$ concentration is not considered to be unreasonable.

7. ENVIRONMENTAL IMPLICATIONS

7.1. Environmental Exposure & Fate Assessment

7.1.1. Environmental Exposure

RELEASE OF CHEMICAL AT SITE

The notified polymer will not be reformulated in Australia. Therefore, no environmental release is expected from manufacturing or reformulation in Australia. The release of the notified polymer to the environment during import, storage, and transport is also unlikely. Release from residues in storage and shipping containers is expected to be minimal. Containers are expected to be disposed of in accordance with local requirements. The most likely source of a release to the environment during these activities would be an accidental release during transportation or operational handling. Spills or accidental release of the product will be handled by physical containment, collection and subsequent safe disposal in accordance with local requirements.

RELEASE OF CHEMICAL FROM USE

The notified polymer will be used as part of a specific application in gravel packing operations. Approximately 1,200 litres of the product containing the notified polymer will be used in a single application. The notified polymer is designed to be mixed with the gravel pack and bind permanently to the gravel, remaining immobile in the environment. Any spills or accidental release of the product at the well site will be handled by physical containment, collection and subsequent safe disposal, consistent with local requirements.

RELEASE OF CHEMICAL FROM DISPOSAL

As the purpose of the product containing the notified polymer is to permanently bind to the gravel pack and remain permanently in the well, disposal processes are not applicable. If a small amount of treatment fluid containing the notified polymer remains in the mix tank, this is expected to be disposed of in accordance with local regulations.

7.1.2. Environmental Fate

A full study report for a ready biodegradability study conducted in accordance with OECD test guideline 306 (Ready Aerobic Degradation in seawater Test) has been provided. The notified chemical is considered not readily biodegradable in seawater but has potential to biodegrade (7% biodegradability over 28 days). The notified polymer is designed to be mixed with the gravel pack and bind permanently to the gravel, remaining immobile in the environment. Any spills or accidental release of the product at the well site will be handled by physical containment, collection and subsequent safe disposal, consistent with local requirements. Based on its high water solubility the notified chemical is not expected to bioaccumulate in aquatic organisms. The notified polymer is likely to be bound to soil and sludge due to its cationic functions and is not expected to be mobile in the environment. In water and landfill, the notified chemical is expected to degrade by biotic and abiotic processes to form water, oxides of carbon and nitrogen. For the details of the environmental fate studies please refer to Appendix C.

7.1.3. Predicted Environmental Concentration (PEC)

The predicted environmental concentration (PEC) has not been calculated for the notified chemical as, based on its reported use pattern, ecotoxicologically significant quantities are not expected to be released to the aquatic environment. It is noted that the notifier has indicated that the notified chemical is not expected to be released to the environment, except in the event of an accidental spill.

7.2. Environmental Effects Assessment

The results from ecotoxicological investigations conducted on the notified chemical are summarised in the table below. Details of these studies can be found in Appendix C

<i>Endpoint</i>	<i>Result</i>	<i>Assessment Conclusion</i>
Fish Toxicity (96 h)	LC50 = 5,600 mg/L	Not harmful to marine fish
Marine invertebrates (48 h)	EC50 = 10,000 mg/L	Not harmful to marine invertebrates
Algal Toxicity (72 h)	E _r C50 = 385.1 mg/L	Not harmful to marine algae
Sediment Toxicity (10 day)	LC50 > 13,192 mg/L	Not harmful to amphipods

Based on the endpoints for toxicity of the notified polymer to aquatic organisms, the notified polymer is not considered to be harmful to aquatic organisms under the Globally Harmonised System of Classification and Labelling of Chemicals (GHS) (United Nations, 2009). Therefore, the notified polymer is not formally classified under the GHS. Based on its measured acute toxicity, biodegradability and expected low bioaccumulation potential, the notified polymer is not formally classified under the GHS for the chronic hazard.

7.2.1. Predicted No-Effect Concentration

The Predicted No-Effect Concentration (PNEC) for the notified polymer has been calculated and is presented in the table below. The PNEC is calculated based on the endpoint for the most sensitive species for the notified polymer (Alga, 72 hours E_rC50 = 385.1 mg/L) and an assessment factor 100. An assessment factor of 100 has been used as acute toxicity endpoints for three trophic levels are available.

Predicted No-Effect Concentration (PNEC) for the Aquatic Compartment		
E _r C50 (Alga)	385.1	mg/L
Assessment Factor	100	
PNEC:	3,851	µg/L

7.3. Environmental Risk Assessment

A risk quotient (PEC/PNEC) has not been calculated since PEC has not been calculated. Based on its water solubility and high molecular weight, the notified polymer is not expected to bioaccumulate in aquatic organisms. Given the limited release of the notified chemical to the aquatic compartment, the notified polymer is not expected to pose an unreasonable risk to the aquatic environment.

APPENDIX A: PHYSICAL AND CHEMICAL PROPERTIES**Partition Coefficient (n-octanol/water)**

log Pow = -2.92

Method	OECD TG 117 Partition Coefficient (n-octanol/water).
Remarks	HPLC Method
Test Facility	ERT (2002a)

APPENDIX B: ENVIRONMENTAL FATE AND ECOTOXICOLOGICAL INVESTIGATIONS

B.1 Environmental Fate

B.1.1 Ready biodegradability

TEST SUBSTANCE	Notified polymer			
METHOD	OECD TG 306 Ready Aerobic Biodegradation in seawater method			
Inoculum	Natural seawater (salinity 34 – 37%)			
Exposure Period	28 days			
Auxiliary Solvent	None reported			
Analytical Monitoring	Biological Oxygen Demand (BOD)			
Remarks - Method	GLP compliance.			
	No significant protocol deviations.			
RESULTS				
	<i>Test substance</i>		<i>Sodium benzoate</i>	
	<i>Day</i>	<i>% Degradation</i>	<i>Day</i>	<i>% Degradation</i>
	7	6	7	63
	14	8	14	71
	21	4	21	70
	28	7	28	69
Remarks - Results	<p>The validity criteria were achieved after 14 days for the reference substance (sodium benzoate) as degradation exceeded the pass level of 60%.</p> <p>Examination of the degradation curve for the toxicity control showed that the toxicity control attained in excess of 26% degradation by day 14 of the study thereby confirming that the notified polymer was not toxic to the sewage treatment micro-organisms used in the study.</p> <p>The notified polymer attained 7% degradation after 28 days. Therefore, the notified polymer cannot be considered as readily biodegradable under the conditions of OECD Guideline 306.</p>			
CONCLUSION	The notified polymer is not readily biodegradable.			
TEST FACILITY	ERT (2003a)			

B.2 Ecotoxicological Investigations

B.2.1 Acute toxicity to marine fish

TEST SUBSTANCE	Notified polymer			
METHOD	OECD TG 203 Fish, Acute Toxicity Test – Semi Static.			
Species	<i>Scophthalmus maximus</i>			
Exposure Period	96 h			
Auxiliary Solvent	None			
Water Salinity	34-37%			
Analytical Monitoring	Not reported			
Remarks – Method	GLP compliance.			
	No significant protocol deviations.			
	The definitive test was performed in semi-static test with renewal every 48 hours.			
RESULTS				

Concentration mg/L Nominal	Number of Fish	Mortality			
		24 h	48 h	72 h	96 h
Control	5	0	0	0	0
1	5	0	0	0	0
10	5	0	0	0	0
100	5	0	0	0	0
1,000	5	0	0	0	0

LC50 > 5,600 mg/L at 96 hours.

NOEC = 5,600 mg/L

Remarks – Results All validity criteria were satisfied and no significant deviations to the protocol were reported.

CONCLUSION The notified chemical is not toxic to fish.

TEST FACILITY ERT (2002b)

B.2.2 Acute toxicity to Marine invertebrates

TEST SUBSTANCE Notified polymer

METHOD ISO 14669 (1990): Water Quality: Determination of acute lethal toxicity to marine copepods (*Copepoda*, *Crustacea*) - Static.

Species *Acartia tonsa*

Exposure Period 48 hours

Auxiliary Solvent None

Water Salinity 34-37%

Analytical Monitoring Not reported

Remarks - Method GLP compliance.

No significant protocol deviations.

RESULTS

Concentration mg/L Nominal	Number of <i>D. magna</i>	Number Immobilised	
		24 h	48 h
Control	5	0	0
1	5	0	0
10	5	0	0
100	5	0	0
1,000	5	0	0

LC50 > 10,000 mg/L at 48 hours

NOEC = 10,000 mg/L

Remarks - Results All validity criteria were satisfied and no significant deviations to the protocol were reported.

CONCLUSION The notified chemical is not toxic to marine invertebrates.

TEST FACILITY ERT (2002c)

B.2.3 Algal growth inhibition test

TEST SUBSTANCE Notified polymer

METHOD ISO 10253 1998 Water Quality – marine algal growth inhibition Test.

Species *Skeletonema costatum*

Exposure Period 72 hours

Concentration Range Nominal: 1, 10, 100, 1000 mg/L

Auxiliary Solvent None

Water Salinity 34-37%

Analytical Monitoring Not reported

Remarks - Method GLP compliance.

No significant protocol deviations.

RESULTS

<i>Biomass</i>		<i>Growth</i>	
<i>E_bC₅₀</i> <i>mg/L at 72 h</i>	<i>NOEC</i> <i>mg/L</i>	<i>E_rC₅₀</i> <i>mg/L at 72 h</i>	<i>NOEC</i> <i>mg/L</i>
Not calculated	Not calculated	385.1	Not provided

Remarks - Results All validity criteria were satisfied and no significant deviations to the protocol were reported.

CONCLUSION The notified chemical is not toxic to marine algae.
TEST FACILITY ERT (2002d)

B.2.4 Sediment Toxicity

TEST SUBSTANCE Notified polymer

METHOD OPARCOM Guidelines (1995) A sediment Bioassay using an amphipod.
Species *Corophium volutator*
Exposure Period 10 days
Concentration Range Nominal: 12.86, 134.34, 427.24, 1318.52 and 13,192.41 mg/kg dry weight
Auxiliary Solvent None
Water Salinity 34 - 37‰
Remarks – Method GLP compliance.
No significant protocol deviations.
Results
10 day LC₅₀ > 13,192.41
10 day NOEC = 13,192.41

CONCLUSION The notified polymer is not expected to be inhibitory to amphipods at concentrations > 13,192.41 mg/kg dry weight.
TEST FACILITY ERT (2003b)

BIBLIOGRAPHY

- ERT (2002a) Notified polymer: Assessment of the Partition Coefficient (N-Octanol/Water), (Study No 476-19 December 2, 2002) ERT (Orkney) Ltd, United Kingdom.
- ERT (2002b) Notified polymer: Assessment of the Aquatic-Phase Toxicity to the marine Fish *Scophthalmus maximus*, (Study No 476-5 December 3, 2002) ERT (Orkney) Ltd, United Kingdom.
- ERT (2002c) Notified polymer: Assessment of the Toxicity to the marine Copepod *Acartia tonsa*, (Study No 476-1 October 22, 2002) ERT (Orkney) Ltd, United Kingdom.
- ERT (2002d) Notified polymer: Assessment of the Toxicity to the marine Alga *Skeletonema costatum*, (Study No 476-3 October 22, 2002) ERT (Orkney) Ltd, United Kingdom.
- ERT (2003a) Notified polymer: Assessment of Ready Aerobic Degradability, (Study No 476-9 January 9, 2003) ERT (Orkney) Ltd, United Kingdom.
- ERT (2003b) Notified polymer: Assessment of the Sediment-Phase Toxicity to the Amphipod *Corophium volutator*, (Study No 476-2 January 8, 2003) ERT (Orkney) Ltd, United Kingdom.
- NOHSC (2004) Approved Criteria for Classifying Hazardous Substances, 3rd edition [NOHSC:1008(2004)]. National Occupational Health and Safety Commission, Canberra, AusInfo.
- SWA (2012) Code of Practice: Managing Risks of Hazardous Chemicals in the Workplace, Safe Work Australia, <http://www.safeworkaustralia.gov.au/sites/swa/about/publications/pages/managing-risks-of-hazardous-chemicals-in-the-workplace>.
- United Nations (2009) Globally Harmonised System of Classification and Labelling of Chemicals (GHS), 3rd revised edition. United Nations Economic Commission for Europe (UN/ECE). http://www.unece.org/trans/danger/publi/ghs/ghs_rev03/03files_e.html
- US EPA (2013) Interpretive Assistance for the Assessment of Polymers (Updated June, 2013): Environmental Protection Agency. Washington DC, USA. http://www.epa.gov/oppt/sf/pubs/iad_polymers_june2013.pdf